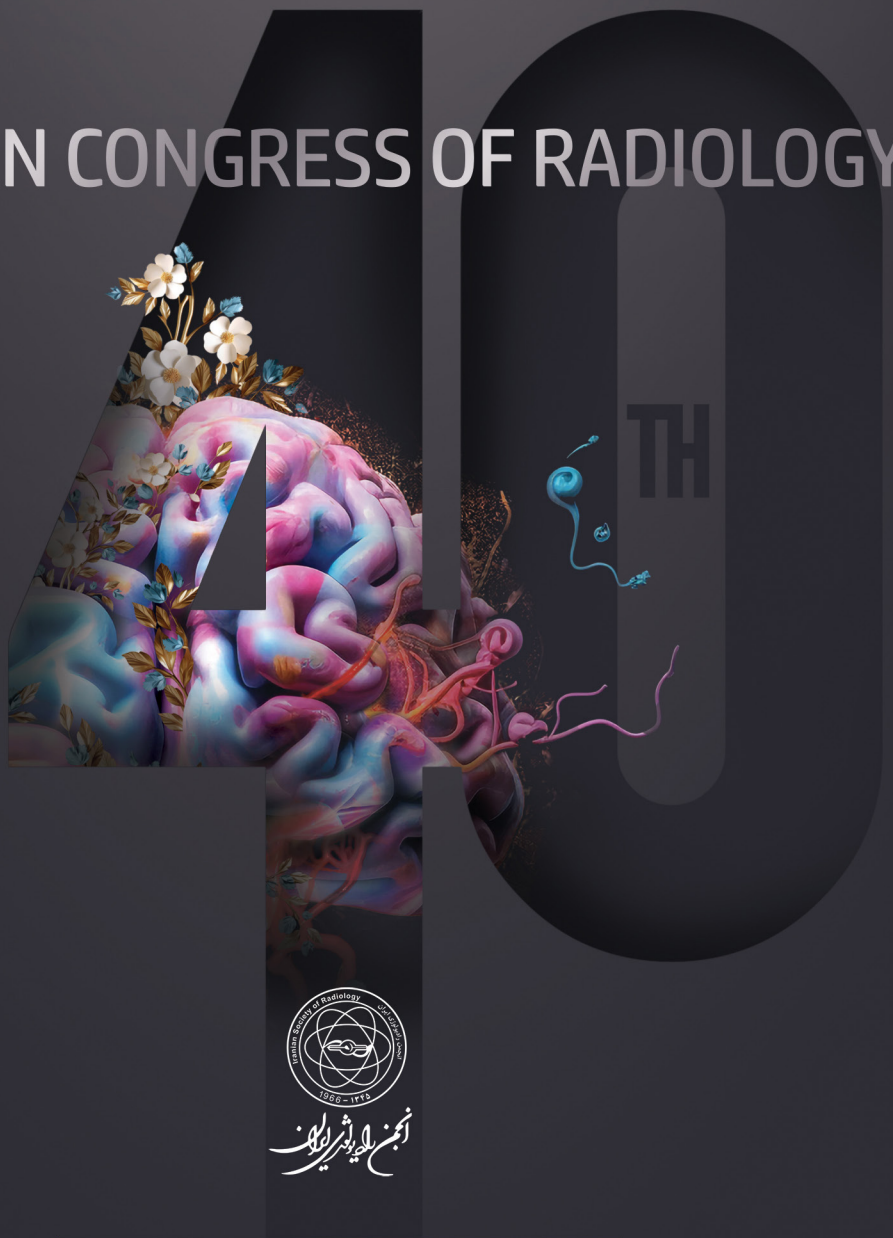
Abstract book of IR 2025

IRANIAN CONGRESS OF RADIOLOGY



21-24 October 2025

Iran Mall Exhibitions Building

General Information

Venue.
Iran Mall Exhibitions Building, Tehran, Iran
Organizer:
40th Iranian Congress of Radiology (ICR 2025) is organized by the Iranian Society of Radiology.
Date:
October 21-24, 2025
Language
The language of the congress is English and Persian.
Registration
Registration fee includes: 5.200.000 Rial • Admission to scientific sessions and commercial exhibition
Scientific Program Secretarial
Assistance and information regarding the scientific program will be provided by secretariat at conference center lobby.
Speaker Ready Room
The slide preview room is located in lobby at the E1. Lecturers are requested to submit their presentations at least 30 minutes before their session. The presentation should be in Power Point format. The files should be in portable media format supplied in flash-disk or CD.
Electronic Posters
This year we only accept posters in electronic format. All posters should be prepared in PowerPoint format similar to a regular lecture presentation but with more description to let them be used stand-alone. Posters will be displayed in a specific site at lobby on several workstations.
Workshop Registration
Workshops need separate registration. workshop schedule will be available at www.isr.org.ir
Meals
Coffee break will be available daily at 10:30-11:00, and lunch at 13:00-14:00.
Technical Exhibition
A technical exhibition will take place at the Conference Center, sufficient time during intermissions is reserved for visiting the booths of leading sponsors (Medical Engineering Companies), which present their latest achievements and give you ample expert information.
Society Booth
The Iranian Society of Radiology booth is located on E1 floor. Application forms and general information for membership are available. It provides membership services, information and an opportunity to pay annual dues for the society.
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Invited Speaker Abstracts

Scientific Oral Accepted Abstract of ICR2025

Poster Accepted Abstract of ICR2025

Invited Speaker Abstracts

10 Must-Knows In Genitourinary Ultrasonography

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Z. Nasiroghli MD
Radiologist

Ultrasound remains the cornerstone imaging modality for evaluating genitourinary pathologies. This review highlights key sonographic features, diagnostic challenges, and adjunct imaging roles. Renal Variants and Vascular Lesions: The hypertrophied column of Bertin, a normal variant, appears as a pear-shaped, isoechoic or mildly hyperechoic extension into the renal sinus with normal vascularity on Doppler. Differentiating it from renal neoplasms is critical. Some vascular renal anomalies mimic solid masses; Doppler combined with CT/MRI prevents unnecessary interventions. Small echogenic RCC may resemble angiomyolipomas but have hypoechoic rims and intratumoral cysts, requiring cross-sectional imaging for confirmation. Testicular Pathologies:Testicular Adrenal Rest Tumors present as bilateral hypoechoic lesions near the mediastinum testis with internal vascularity but no vessel displacement, distinguishing them from malignancies. Tubular ectasia of the rete testis manifests as bilateral, multilocular cystic areas without vascular flow in older men, important to differentiate from cystic neoplasms. Burned-out germ cell tumors show small echogenic scars with calcifications on testicular US, essential for identifying primary lesions in young men with retroperitoneal masses. Ovarian pathologies:GCTs appear as multilocular cystic masses with thin, vascularized septa, differentiating them from avascular hemorrhagic cysts. The “entrapped ovary sign” indicates peritoneal inclusion cysts enveloping a normal ovary, often post-surgery or inflammation. Lack of septal vascularity helps distinguish from paraovarian cysts or neoplasms. Ovarian torsion diagnosis is complex: arterial flow may persist due to dual supply, so grayscale signs (ovarian enlargement, stromal edema, peripheral follicles) with absent/reduced venous flow on Doppler are key.

Abbreviated Breast MRI, The Future Is Fast

Khadijeh Bakhtavar MD
Associate Professor Of Tehran University Of Medical Science,TUMS, Sina Hospital

Breast MRI is the most sensitive examination in the detection of breast cancer. However, considering to its high costs, time consuming, and unavailability in most circumstances, its use in the screening setting has traditionally been limited to those who are at high-risk for breast cancer. Abbreviated protocol breast MRI is capable of reducing the traditional costs associated with breast MRI, while maintaining diagnostic accuracy and cancer detection, and therefore a potential future screening tool for breast cancer in a broader population of women than just those at high-risk. New techniques, such as Ultrafast breast MRI, are able to not only shorten the traditional breast MRI acquisition and interpretation time, but also provide kinetic information. Abbreviated MRI of the breast makes maximum use of the fact that the kinetics of breast cancers and of benign tissue differ most in the very early postcontrast phase. Different published approaches to abbreviated MRI include the following three subtypes: (a) short protocols, consisting of a precontrast and either a single postcontrast acquisition (first postcontrast subtracted [FAST]) or a time-resolved series of postcontrast acquisitions with lower spatial resolution (ultrafast [UF]), obtained during the early postcontrast phase immediately after contrast agent injection; (b) abridged protocols, consisting of FAST or UF acquisitions plus selected additional pulse sequences; and (c) noncontrast protocols, where diffusion-weighted imaging replaces the contrast information. This review defines the three subtypes of abbreviated MRI, highlighting that the future is FAST.

Ablation Of Abdominal Wall Endometriosis

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Shahid Behshti University Of Medical Sciences

Abdominal wall endometriosis (AWE) is an uncommon but increasingly recognized form of extrapelvic endometriosis, often arising in surgical scars such as cesarean section or laparoscopic port sites. It can cause chronic cyclic pain, palpable mass, and significant impairment in quality of life. Surgical excision has traditionally been considered the treatment of choice; however, it is associated with recurrence, cosmetic issues, and postoperative morbidity. Minimally invasive ablation techniques under image guidance have emerged as promising alternatives, providing effective symptom control with minimal tissue disruption. This educational presentation reviews the role of image-guided ablation—including radiofrequency ablation (RFA), microwave ablation (MWA), and cryoablation—for the treatment of AWE. Key aspects such as patient selection, imaging characteristics on ultrasound and MRI, procedural planning, ablation parameters, and post-treatment follow-up will be discussed. Special emphasis will be placed on ultrasound-guided RFA, which allows precise targeting of lesions while preserving surrounding tissue, offering excellent cosmetic outcomes

and low recurrence rates. Recent evidence and case series have demonstrated high efficacy of thermal ablation with significant reduction in pain scores and lesion volume, along with minimal complications. Technical pearls, including hydrodissection to protect adjacent structures and strategies to ensure complete ablation margins, will also be highlighted.

Acinar Adenocarcinoma Of The Breast

Farnaz Godazandeh MD

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This breast cancer subgroup has four specific mammographic tumor features: the in situ carcinomas developing from the TDLUs appear as powdery or crushed stone-like calcifications, while the invasive carcinomas appear as stellate/spiculated or circular/oval shaped tumor masses. These features are easily identified with breast imaging, either alone or in combination, unifocal or multifocal. We propose calling breast cancers of TDLU origin acinar adenocarcinoma of the breast (AAB). The era of early detection necessitates rectifying the current, confusing histopathological nomenclature to one that is based on the anatomical site of origin of breast cancers. Invasive cancers originating from the TDLUs are either stellate/spiculated or circular, irrespective of the complex WHO histopathologic terminology. The mortality reduction accomplished by participation in mammography screening is mostly accomplished by identifying and treating the AABs in their non-palpable, early phase. AABs detected when <15 mm diameter with no associated carcinoma originating from the major lactiferous ducts (ductal adenocarcinoma of the breast, DAB) have a good to excellent long-term outcome, irrespective of the current terminology, which tends to lead to overtreatment of these early invasive tumours. The conventionally used prognostic factors, including immunohistochemical biomarkers, fail to identify those 1–14 mm invasive AABs tumours that are eventually fatal. This identification can be made preoperatively by including the characteristic mammographic tumour features, imaging biomarkers, in primary diagnosis, treatment planning, and predicting long-term patient outcome.

Acute Abdomen In Pregnancy

Golnaz Izadi Amoli MD

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Background: Acute abdominal pain in pregnancy demands fast answers without compromising maternal–fetal safety. Purpose: to outline a pragmatic imaging pathway and practical signs that reduce time-to-decision in the ED.

Approach: Ultrasound is the universal entry point—graded compression for appendicitis; transabdominal±transvaginal views for adnexal torsion; biliary assessment with wall features and probe-induced tenderness; renal colic work-up

documenting hydronephrosis, ureteral jets and side-to-side resistive indices to distinguish physiologic dilatation from obstruction. Escalation: When ultrasound is indeterminate or discordant with symptoms, MRI without gadolinium is the next step. Cover the whole abdomen and pelvis; include rapid T2 single-shot sequences, T1 in/out of phase and diffusion. MRI accurately depicts a cranially displaced appendix, small-bowel obstruction/internal hernia, ovarian torsion and pancreatitis while avoiding ionizing radiation. CT: appropriate when immediately actionable information is needed or MRI is unavailable. Use dose-conscious technique: single-phase acquisition tailored to the question, reduced tube potential, automatic exposure control, narrow z-axis and iterative reconstruction. Iodinated contrast may be administered when clinically necessary; routine gadolinium is avoided in pregnancy.

Pitfalls: physiologic right-sided hydronephrosis in late gestation, pregnancy-related leukocytosis and altered organ position can mimic disease—hence the need for whole-abdomen coverage and close radiology–obstetric communication. Outcome: The session provides a stepwise US→MRI→CT algorithm, a low-dose CT checklist and image pearls that raise diagnostic confidence while maintaining fetal safety.

Conclusion: A safety-first, modality-escalation strategy enables confident diagnosis without delaying care and should be embedded in emergency and obstetric workflows.

Advances In Neuroimaging For Epilepsy: From Structural Assessment To Advanced Imaging

Aidin Taghiloo MD Radiologist

Epilepsy is one of the most prevalent chronic neurological disorders, and neuroimaging plays a pivotal role in its diagnosis, presurgical evaluation, and management. Recent advances in MRI and functional imaging have significantly enhanced our understanding of epileptogenic networks and improved localization of epileptic foci, especially in cases with nonlesional MRI findings. This session will explore the current and emerging neuroimaging modalities used in epilepsy, including high-resolution structural MRI, diffusion tensor imaging (DTI), functional MRI (fMRI), PET, and SPECT. The integration of these modalities allows for a more comprehensive assessment of both structural and functional abnormalities, offering critical insights for surgical planning and prognosis. Particular emphasis will be placed on novel image post-processing techniques, such as voxel-based morphometry, cortical thickness analysis, and functional connectivity mapping, which help delineate subtle cortical dysplasias and network-level dysfunctions that are often invisible on routine imaging. The panel will also address practical challenges, including interpretation pitfalls, standardization issues, and multimodal data integration, aiming to bridge the gap between advanced neuroimaging research and daily clinical practice. Ultimately, the goal is to highlight how radiologists can play a central role in multidisciplinary epilepsy care by leveraging advanced neuroimaging tools to optimize diagnostic accuracy and improve patient outcomes.

AI-Assisted Medical Imaging Center Management: Integrating Patient Data, Workflow Planning, And Intelligent Operations

Vahid Alizadeh BajgIran MD
RAZI Medical Imaging Center & Research Group, Tehran, Iran

Artificial Intelligence (AI) is increasingly improving not only image interpretation but also the management and operational workflow of medical imaging centers. This presentation demonstrates how AI-driven tools can enhance patient scheduling, workflow coordination, and data management, helping radiologists and administrators achieve greater efficiency and consistency in daily practice. Using real-world examples, the talk explains how AI applications are already in use in major healthcare systems worldwide.

- Before the scan: predictive scheduling systems and automated reminders help reduce patient no-shows and optimize resource allocation.
- During scanning: platforms such as Philips ROCC and Siemens teamplay Protocols enable remote scanning, protocol standardization, and multisite supervision to ensure uniform image quality.
- After scanning: intelligent coordination systems like Aidoc Care Coordination streamline urgent case management, while Rad AI Continuity automates follow-up tracking to close care gaps and improve outcomes. The presentation also introduces "AI marketplaces" (e.g., Nuance Precision Imaging Network, Blackford, deepcOS) that integrate multiple FDA- or CE-approved algorithms directly into existing PACS/RIS environments, eliminating the need for separate installations. Finally, the session reviews key international standards—including DICOMweb, FHIR ImagingStudy, and the IHE AI Workflow (AIW-I) and AI Results (AIR) profiles—which make safe, interoperable integration possible. Examples from RSNA Imaging AI in Practice and European Society of Radiology AI Theatre illustrate how these frameworks are successfully implemented in real, multi-vendor radiology networks. By the end of this session, attendees will understand how AI can enhance efficiency, quality, and patient experience in imaging centers, and how to begin adopting such solutions in a safe and measurable way.

AI-Augmented CTA For Clot Burden And Right Heart Strain In Pulmonary Embolism

Mehdi Hasanzadeh Hosseinabadi MD
Board Certified Radiologist, Private Imaging Center

Background: Risk stratification for patients with acute pulmonary embolism (APE) is significantly important for treatment and prognosis evaluation. We aimed to develop a novel clot burden score on computed tomography pulmonary angiography (CTPA) based on deep learning (DL) algorithm for risk stratification of APE. Methods: The study

retrospectively enrolled patients newly diagnosed with APE in China-Japan Friendship Hospital consecutively. We collected baseline data and CTPA parameters, and calculated four different clot burden scores, including Qanadli score, Mastora score, clot volume and clot ratio. The former two were calculated by two radiologists separately, while clot volume and clot ratio were based on the DL algorithm. The area under the curve (AUC) of four clot burden scores were analyzed. Results: Seventy patients were enrolled, including 17 in high-/intermediate-high risk and 53 in low-/ intermediate-low risk. Clot burden was related to the risk stratification of APE. Among four clot burden scores, clot ratio had the highest AUC (0.719, 95% CI: 0.569–0.868) to predict patients with higher risk. In the patients with hemodynamically stable APE, only clot ratio presented statistical difference (P=0.046). Conclusions: Clot ratio is a new imaging marker of clot burden which correlates with the risk stratification of patients with APE. Higher clot ratio may indicate higher risk and acute right ventricular dysfunction in patients with hemodynamically stable status.

Anorectal Inflammatory Conditions

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Anorectal inflammatory disorders, including Crohn's-related fistulizing disease and cryptoglandular infections, represent complex conditions where accurate anatomic mapping is critical for optimal management. MRI has emerged as the gold standard imaging modality due to its superior soft-tissue contrast, multiplanar capability, and ability to delineate the sphincter complex and perianal spaces in detail. This educational lecture aims to:

1) Review normal anorectal anatomy and MRI protocol optimization for perianal evaluation;

2) Illustrate characteristic MRI findings of various anorectal inflammatory conditions;

3) Emphasize the diagnostic value of MRI in identifying fistula tracts, secondary extensions, abscesses, and active inflammation.

Approach And Access In Image Guided Interventions

Tayeb Hosseini MD

Assistant Professor Of Radiology, Shahid Beheshti University Of Medical Sciences, Shohada-e Tajrish Hospital, Tehran, Iran

Background: Image-guided biopsy is a cornerstone of modern diagnostic radiology, allowing precise sampling of lesions with minimal invasiveness. Choosing the correct approach and access route is crucial for diagnostic accuracy and patient safety. Approach Selection: The approach should provide the shortest, safest, and most direct path to the target, while avoiding major vessels, bowel loops, pleura, and nerves. Pre-procedural review of all imaging planes (CT, US, or MRI) helps determine the best trajectory. Lesion location dictates the route: intercostal or

extrapleural for thoracic targets, retroperitoneal for posterior abdominal or renal lesions, and transhepatic or transgastric for deep visceral lesions when necessary. Access Technique: Under sterile conditions, local anesthesia is applied along the planned tract. Needle advancement is guided in real-time (ultrasound) or stepwise (CT). Coaxial systems allow multiple samples through a single puncture, reducing complications. Adjustments for respiratory motion and patient positioning (prone, decubitus, oblique) enhance accuracy. Safety Considerations: Avoid traversing infected or necrotic areas. Plan the tract so that any potential tumor seeding path can be resected if needed. Post-procedure imaging checks for bleeding, pneumothorax, or other complications. Conclusion: Successful biopsy depends on meticulous planning of the access route, understanding regional anatomy, and using appropriate imaging guidance. A well-chosen approach ensures optimal tissue yield with minimal patient risk.

Approach To Pancreatic Cystic Lesions: Diagnostic Challenges And Guideline-Based Approach- An Update

Rahele Mehraeen MD

Department Of Radiology, Rohani Hospital, Babol University Of Medical Sciences, Babol, Iran

Pancreatic cystic lesions (PCLs) are increasingly identified as incidental findings due to the widespread use of cross-sectional imaging. Differentiating between benign, premalignant, and malignant lesions is essential for guiding management, yet remains a diagnostic challenge. This presentation reviews the imaging spectrum of common PCLs, highlighting key features and diagnostic pitfalls. Pseudocysts are typically associated with pancreatitis and lack septations or mural nodules. Serous cystadenomas often appear as microcystic lesions with a central scar and calcification. Mucinous cystic neoplasms usually present in middle-aged women as macrocystic lesions without ductal communication, whereas intraductal papillary mucinous neoplasms demonstrate communication with the pancreatic ductal system and may contain mural nodules. Solid pseudopapillary neoplasms, although rare, predominantly affect young women and show mixed solid and cystic components with intralesional hemorrhage. Despite these characteristic imaging patterns, significant overlap exists, particularly between mucinous cystic neoplasms and branch-duct IPMNs. Therefore, accurate classification requires careful integration of clinical context and advanced imaging techniques. Recent guidelines, including Fukuoka, AGA, and ACR, propose imaging-based risk stratification using high-risk stigmata and worrisome features to identify candidates for surgery versus those suitable for surveillance. Endoscopic ultrasound with cyst fluid analysis further improves diagnostic accuracy in selected cases. Radiologists play a pivotal role in the management of PCLs by recognizing key imaging clues, applying guideline-based algorithms, and collaborating in a multidisciplinary setting to optimize patient outcomes.

Arrythmogenic Cardiomyopathy: Assesment Of New Guidelines, Prognostic Factors And Future Integration Of AI In Diagnosis

Amirafraz Fallah Najmabadi MD

MPH Assistant Professor Of Radiology, Cardiovascular Imaging Fellowship Iran University Of Medical Sciences

This presentation provides a comprehensive review of the newly established diagnostic guidelines for Arrhythmogenic Cardiomyopathy (ACM), with a particular focus on the 2024 Task Force criteria and the Padua criteria. These guidelines represent significant advancements in the identification and classification of this complex myocardial disease. We will thoroughly examine the strengths and limitations of each set of criteria, discussing their clinical applicability, sensitivity, and specificity in various patient populations. Furthermore, the presentation will delve into the prognostic factors of Arrhythmogenic Cardiomyopathy that can be assessed through Cardiac Magnetic Resonance (CMR) imaging. Emphasis will be placed on imaging biomarkers such as fibrosis, ventricular dysfunction, and tissue characterization, which play crucial roles in risk stratification and management. Recent peer-reviewed studies that have contributed to the evolving understanding of these prognostic indicators will be highlighted.

Finally, the presentation will explore the transformative potential of Artificial Intelligence (AI) in the diagnosis and prognosis of Arrhythmogenic Cardiomyopathy. We will discuss current AI-driven tools and algorithms designed to enhance image interpretation, improve diagnostic accuracy, and predict disease progression. The session will conclude with insights into the future integration of AI in clinical workflows and its expected impact on personalized patient care.

Bariatric Surgery: Normal Findings And Complications

Neda Pak MD

Associate Professor Of Radiology, Tehran University Of Medical Science

Bariatric surgery has become a cornerstone in the management of severe obesity, offering substantial improvements in weight reduction and obesity-related comorbidities. However, the complexity of these procedures also brings a spectrum of early and late postoperative complications. Imaging plays a pivotal role not only in the preoperative assessment but also in the timely recognition and characterization of adverse events. In the preoperative setting, imaging techniques such as ultrasound and computed tomography (CT) are valuable for identifying hepatic steatosis, gallstones, and other abdominal pathologies that may influence surgical planning. Postoperatively, imaging assumes a central role in detecting complications. Among the commonly encountered complications, anastomotic leaks remain a serious concern and are best evaluated with CT using oral and intravenous contrast,

which can demonstrate extraluminal contrast, fluid collections, and signs of peritonitis. Strictures and obstruction, often related to technical factors or tissue healing, are typically assessed with fluoroscopic upper gastrointestinal contrast studies that can delineate narrowing or delayed passage of contrast. Internal hernias, a late complication particularly after laparoscopic Roux-en-Y gastric bypass, are efficiently detected with CT, which reveals mesenteric swirl, displaced bowel loops, and vascular crowding. Hemorrhage, another critical complication, may be visualized as active extravasation on contrast-enhanced CT. The integration of advanced imaging techniques, including multidetector CT and three-dimensional reconstructions, has further refined the diagnostic process, enabling better visualization of subtle findings and guiding minimally invasive therapeutic interventions. Effective communication between radiologists and surgeons is crucial, as radiologic findings often directly influence management decisions ranging from conservative therapy to reoperation.

Bone Tumors Panel

Ali Hekmatnia MD Professor Of Radiology
Shamim Shafieioun MD Assistant Professor Of Radiology
Isfahan University Of Medical Sciences

Abstract This panel will provide a structured approach to the evaluation of bone tumors, beginning with a brief overview of diagnostic strategies and imaging considerations. Following the introduction, several illustrative cases will be presented across two age groups: pediatric and adult patients. For each case, radiological findings will be correlated with pathology slides, providing a multidisciplinary perspective. The session will be conducted in collaboration with orthopedic surgeons and pathologists, fostering an interactive discussion that highlights both the radiologic and pathologic aspects of bone tumors. The aim is to enhance diagnostic accuracy and strengthen interdisciplinary understanding in the management of musculoskeletal neoplasms.

Bowel Obstruction: Radiologic Red Flags

Kimia Kazemi Zahrani MD Al-Zahra Hospital,
Isfahan University Of Medical Sciences,
Isfahan, Iran

Bowel obstruction is one of the most common emergency department admissions. Goals of imaging and our role as radiologists in patient management include diagnosis of obstruction, determination of its site and cause and identification of complications. The fifth hidden item that needs special attention would be to highlight imaging signs implying probable success or failure of conservative management. A thorough yet brief imaging report covering significant issues while avoiding superfluous data will assist clinician in achieving the best patient management. For that purpose, one of important issues is to specify adhesions, as

single adhesions bands or matted adhesions, while addressing the causing agent. The next item to point out is whether the obstruction is closed or open loop and if ischemia is likely to be present. Covering the above items and having a high suspicion for complications will lead to the best imaging implication in patients' survival.

Breast Biopsy And Wire And Marker Placement

Fahime Zeinalkhani MD

Assistant Professor Of Radiology,
Department Radiology,
Imam Khomeini Hospital Complex,
Tehran University Of Medical Sciences

Ultrasound-guided breast biopsy and lesion localization are fundamental techniques in the diagnosis and management of breast disease. Core needle biopsy under ultrasound guidance offers a minimally invasive, accurate, and widely accessible method for obtaining tissue samples, with the advantages of real-time visualization, absence of ionizing radiation, and applicability to a broad range of lesions. In addition, ultrasound-guided wire localization and marker clip placement are essential for the preoperative management of non-palpable breast lesions, ensuring precise surgical excision and facilitating radiologic–pathologic correlation. Proper technique, awareness of potential pitfalls, and management of complications are crucial for achieving optimal outcomes. These procedures play an indispensable role in multidisciplinary breast cancer care, improving diagnostic accuracy and guiding effective treatment planning.

Breast Imaging Pitfalls And Missed Diagnoses (A Case-based Presentation)

Soroor Kalantari MD

Women's Imaging Fellowship,
Associate Professor, Department Of Radiology,
Zanjan University Of Medical Sciences, Zanjan, Iran

Abstract Breast imaging is prone to various interpretative and technical pitfalls that can lead to missed or delayed diagnoses, particularly in ultrasound evaluation. This case-based review highlights common sources of diagnostic error in breast ultrasound and outlines strategies to avoid them. Frequent pitfalls include overlooking subtle hypoechoic lesions, misclassifying complex cystic masses, and underestimating lesion extent due to inadequate scanning planes. Additional challenges arise from suboptimal gain settings, insufficient Doppler assessment, and lack of correlation with mammographic or MRI findings. Through representative cases with histopathologic correlation, this presentation emphasizes a systematic, multimodality approach and meticulous image analysis to improve diagnostic accuracy and reduce false-negative outcomes in breast imaging.

Breast MRI: Fundamentals and Technical Aspect

Leila Ansari MD
Breast Radiologist, Shafa Imaging Center, Isfahan, Iran

Breast MRI is an indispensable modality, along with mammography and US. Indications for breast MRI are diagnostic and screening. Breast MRI requires a field strength of at least 1.5T and a breast coil at a minimum of eight channels, but modern designs have 16 channels or more. Contrast material should be administered at a maximum dose of 0.1-0.2mmol per kilogram of body weight, power injector should be used at a flow rate of 2 ml/sec. The contrast material bolus should be flushed with saline. The least components of the multiparametric breast MRI protocol are as fallow: T2-weighted fat sat, axial, native T1-weighted ,T1-weighted fat sat,axial,T1-weighted with contrast (four to six images) ,Subtraction images and maximum intensity projections. The section thickness should be no more than 2.5 mm. The in-plane pixel size should be 1 * 1 mm or lower and Inter slice gap<0. For kinetic curve assessment, Pre-contrast , the first image after 60-90 sec and the last image (usually 4th image) are necessary.

Type I curve: typically shows a continuous increase in signal intensity throughout time and usually considered benign.

Type II curve: Initial uptake followed by the plateau phase towards the latter part of the study considered probable for malignancy.

Type III curve: Typically shows a relatively rapid uptake and reduction in enhancement towards the latter part of the study which is considered strongly suggestive of malignancy. Standard report breast MRI includes clinical indication, MRI sequences and postprocessing methods, Beast composition, Background parenchymal enhancement (BPE) ,The morphologic and kinetic features of findings and BI-RADS score, from 0 to 6. In general, breast MRI is an essential modality for accurate detection and management of breast cancer.

Breast Workshop (a Case Based Journey Through Miss Diagnosis)

Samira Mirzaei MD
Department Of Radiology,
Sina Hospital,
Tehran University Of Medical Sciences, Tehran, Iran

Breast imaging is crucial for early detection of breast diseases, especially cancer. However, misdiagnosis remains a challenge due to factors like subtle lesion appearances and imaging artifacts. This workshop uses a case-based approach to highlight common errors in mammography, ultrasound, and MRI interpretations. Through real clinical cases, participants learn to recognize diagnostic pitfalls, improve pattern recognition, and apply advanced imaging techniques. The goal is to enhance radiologists' diagnostic accuracy, reduce errors, and improve patient outcomes by fostering critical analysis and discussion.

Cervical Cancer: Panel Discussion

Zahra Mahboubi Fouladi MD
Assistant Professor Of Radiology, SBMU, Tehran, Iran

Certainly. Here's a polished abstract for your paneldiscussiononcervicalcancerimaging:———

Abstract: "Cervical Cancer Imaging: Multimodality Approaches, Clinical Impact, and Evolving Standards" This panel discussion brings together experts in radiology and nuclear medicine to explore the critical role of imaging in the diagnosis, staging, and follow-up of cervical cancer. With advances in cross-sectional imaging and evolving clinical guidelines, the session will focus on how MRI, CT, and PET/CT contribute to comprehensive disease evaluation and management. Key topics include standardized MRI protocols for local staging, the role of functional imaging in treatment response assessment, and imaging findings that alter therapeutic decisions. Panelists will also address challenges in interpreting post-treatment changes, pitfalls in image acquisition and reporting, and the importance of multidisciplinary collaboration. Audience engagement will be encouraged through case-based discussions and interactive Q&A. This session is designed to provide attendees with practical insights and evidence-based updates to optimize imaging contributions across the continuum of this cancer

Challenging Cases In Pediatric Neurology: Interactive Case-presentation, Q&A)

Ali Hekmatnia MD
Professor Of Radiology
Shamim Shafieioun MD
Assistant Professor Of Radiology
Isfahan University Of Medical Sciences

This session will present a series of pediatric neuroradiology cases with a focus on key diagnostic challenges. The discussion will cover a spectrum of conditions including demyelinating disorders, metabolic diseases, radiological evaluation of pediatric seizures, and brain tumors in children. Each case will be used as a platform to highlight characteristic imaging features, differential diagnoses, and practical diagnostic approaches. The session is designed to provide participants with a comprehensive overview of important pediatric neuroradiology entities and to enhance their ability to recognize and interpret imaging findings in clinical practice.

Contrast Media And The Kidneys

M. Abdkarimi MD — Tabesh Imaging Center
Elham Goli MD — Assistant Professor of Radiology, Tabriz University of Medical Sciences
Sina Abdkarimi MD — Assistant Professor of Radiology, Tabriz University of Medical Sciences

1. Diagnosis of Contrast-Associated Acute Kidney Injury (PC-AKI) 2. Patient Screening & Timing of eGFR Measurement A) Screening is recommended for patients with B) Timing for eGFR Measurement 3. Prevention Strategies for PC-AKI 4. Dosing Intervals for Iodinated Contrast Media · Normal or Moderately Reduced Renal Function (GFR > 30 mL/min/1.73 m^2): · 75% of the contrast agent is excreted within 4 hours. · Minimum interval between injections: 4 hours · Severely Reduced Renal Function (GFR < 30 mL/min/1.73 m^2) or Dialysis Patients with Residual Function: · Minimum interval between injections: 48 hours 5. Nephrogenic Systemic Fibrosis (NSF) & Gadolinium-Based Contrast Agents A) High-Risk Agents (Associated with NSF) B) Low-Risk Agents (Preferred) Crucial Recommendation: Always document the specific name and dose of the contrast agent in the patient's permanent medical record. 6. Dosing Intervals for Gadolinium-Based Contrast Media· Normal or Moderately Reduced Renal Function (GFR > 30 mL/min/1.73 m^2): · Minimum interval between injections: 4 hours · Severely Reduced Renal Function (GFR < 30 mL/min/1.73 m^2) or Dialysis-Dependent Patients: · Minimum interval between injections: 7 days

Coronary CT Angiography Stent Evaluation: Traditional Techniques Versus Photon-Counting CT And The Added Value Of Deep Learning

Pirouz Pirouzi MD — Assistant Professor Of Radiology
Fellowship Of Cardiovascular Imaging Rajaie Cardiovascular Institute

This presentation reviews conventional EID-CT approaches for stent evaluation and compares them with emerging photon-counting CT (PCCT) technology. PCCT provides intrinsic high-resolution imaging, superior signal-to-noise ratio, and reduced blooming, significantly enhancing stent lumen visibility. Importantly, PCCT enables true multi-energy spectral imaging through direct photon detection. This allows material decomposition, virtual monoenergetic imaging, and improved differentiation of stent struts, lumen, and calcified plaque—further reducing artifact burden. In parallel, advances in deep learning–based image reconstruction and post-processing are highlighted, focusing on noise suppression, edge sharpening, and automated stent/plaque analysis. Early preclinical and clinical evidence demonstrates that PCCT achieves superior stent lumen visualization and diagnostic accuracy compared to EID-CT. Spectral

imaging capabilities further enhance tissue characterization and allow improved contrast optimization within and around stents. Deep learning algorithms complement these hardware improvements by reducing noise variability, enhancing reproducibility, and enabling semi-automated assessment of in-stent restenosis. Together, these innovations improve diagnostic confidence and reduce inter-observer variability. Photon-counting CT, with its unique spectral imaging capabilities, combined with deep learning–based reconstruction and analysis, represents a paradigm shift in coronary stent evaluation. This integrated approach overcomes longstanding limitations of conventional CCTA, facilitates more reliable noninvasive detection of in-stent restenosis, and has the potential to decrease dependence on invasive coronary angiography while improving patient outcomes in coronary artery disease management.

Cracking The Code: Understanding Breast Cancer Staging

Fahime Zeinalkhani MD

Assistant Professor Of Radiology,
Imam Khomeini Hospital,
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Breast cancer staging is fundamental for guiding treatment, predicting outcomes, and standardizing reporting across institutions. The TNM system, developed in the mid-20th century and later refined by the American Joint Committee on Cancer (AJCC), has long been the cornerstone of staging. Traditionally, staging relied only on anatomic features—tumor size (T), lymph node involvement (N), and distant metastasis (M). However, increasing evidence demonstrates that biologic factors, including tumor grade, hormone receptor status, HER2 expression, and multigene assays, are equally important in determining prognosis and therapeutic response. To address this, the AJCC introduced the eighth edition of its Cancer Staging Manual, which incorporates both anatomic and prognostic systems. While anatomic staging remains relevant in resource-limited settings, prognostic staging is now preferred because it integrates biologic markers, allowing for more individualized risk assessment. This approach refines stratification, as tumors with similar anatomic features may have very different outcomes depending on their molecular characteristics. Staging ranges from 0 (non-invasive, such as ductal carcinoma in situ) to IV (metastatic disease), determined through clinical evaluation, imaging, and pathology. Neoadjuvant therapy introduces additional complexity, as staging before and after treatment may differ due to tumor downstaging. Importantly, staging not only informs immediate management but also guides prognosis, supports patient selection for clinical trials, and underpins advances in precision oncology. In conclusion, the shift from a purely anatomic model to an integrated anatomic–prognostic system marks a major advancement in breast cancer care. Combining traditional morphologic assessment with biologic markers enables more personalized treatment strategies and ultimately improves patient outcomes.

CT Colonography Reporting And Data System (C-RADS) 2023: Key Revisions And Evolving Clinical Insights

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The CT Colonography Reporting and Data System (C-RADS) has remained a robust and reliable framework for standardized interpretation of CT colonography (CTC) findings since its introduction in 2005. The 2023 version reflects cumulative experience and evolving clinical understanding over nearly two decades, introducing targeted refinements that enhance clarity, consistency, and applicability in daily practice. A major update is the creation of a new subcategory, C2b, dedicated to mass-like diverticular strictures. These soft-tissue-attenuation lesions, typically arising in segments affected by acute or chronic diverticulitis, are generally benign. Recognizing them as a distinct category reduces diagnostic uncertainty and prevents unnecessary invasive follow-up or intervention. Additionally, the extracolonic classification has been simplified by merging the previous E1 (normal variant) and E2 (clinically unimportant finding) into a single E1/E2 category. Since neither requires further evaluation, this consolidation streamlines reporting and promotes uniform management recommendations. Overall, C-RADS v2023 offers a more intuitive and clinically aligned structure, improving communication between radiologists and referring clinicians while supporting evidence-based, patient-centered decision-making in CT colonography.

Cystic Malformations Of The Posterior Fossa And The Concept Of The Open Fourth Ventricle: Key Points In Fetal Neurosonography

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"Open fourth ventricle" is a key imaging sign indicating communication between the fourth ventricle and cisterna magna. After 18–19 weeks of gestation persistence of open fourth ventricle suggests an underlying posterior fossa anomaly. In normal fetuses, the brainstem–vermis angle is consistently <18°. Here are the main differential diagnoses: Dandy-Walker malformation Diagnosis:

- Cystic dilatation of 4th ventricle
- Expansion of posterior cranial fossa
- Upward displacement of vermis, tentorium (exceeding 45°)
- Vermis may be normal or defective Associated Anomalies: Ventriculomegaly, ACC, holoprosencephaly, polycystic kidneys, cardiac defects, facial clefts Risk of Aneuploidy&Syndromic Conditions: high Obstetric Management: If pregnancy is not terminated: Fetal karyotyping, Thorough anatomic scan, Serial monitoring Blake's Pouch Cyst: Failed or delayed regression of the Blake's

pouch with upward rotation of normal vermis (< 45°) Diagnosis:

- Hourglass opening apparently communicating with CM (axial plane)
- Normal position of tentorium
- Normal vermis with upward rotation Risk of Aneuploidy & Syndromic Conditions: High,if associated with other anomalies Prognosis: If isolated, seems to be a normal variant Obstetric Management:Detailed scan, Serial US, Fetal karyotyping in non-isolated cases Vermian Hypoplasia Small upwardly rotated vermis,not exceeding 45° Risk of Aneuploidy & Syndromic Conditions:high Obstetric Management:karyotyping & anatomic scan Mega Cisterna Magna: A large cisterna magna (depth ≥ 10 mm or > 2 SD above the mean) in the absence of cerebellar anomalies Associated Anomalies:Usually isolated finding Risk of Aneuploidy & Syndromic Conditions: Increased when associated with other anomalies Obstetric Management:Detailed scan Arachnoid Cyst CSF collection located within layers of arachnoid membranes Associated Anomalies: low Prognosis: Large ACs may obstruct circulation of CSF Obstetric Management: Serial monitoring

Cystic Renal Mass Lesions Structured Reporting Based On Bosniak Classification 2019

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Renal masses are common incidental findings, most representing benign cysts; however, a significant subset is malignant. Accurate characterization, especially distinguishing cystic from solid lesions, is essential for clinical management. The 2019 Bosniak classification update advances this by adding quantitative enhancement thresholds and expanding use from CT to MRI, improving diagnostic accuracy and reducing variability. Bosniak 2019 defines cystic lesions as containing less than 25% enhancing solid tissue, with enhancement thresholds of ≥20 Hounsfield units on CT and ≥15% signal increase on MRI, including subtraction imaging. Lesions are categorized by malignancy risk and management:

- Type I: Simple cysts with imperceptible walls, no septa, calcification, or enhancement; no follow-up needed.
- Type II: Minimally complex cysts with few thin septa (<2 mm) or fine calcifications without enhancement; benign.
- Type IIF: Lesions with multiple thin enhancing septa, mildly thickened walls or septa (up to 3 mm), or smooth thick calcifications showing mild enhancement; malignancy risk 0–38%, requiring surveillance.
- Type III: Indeterminate cystic masses with irregular, thickened (>3 mm) or nodular enhancing walls/septa; malignancy risk 40–60%, often needing surgery.
- Type IV: Lesions with enhancing soft-tissue nodules independent of cyst walls/septa; malignancy risk >85%, requiring treatment. Homogeneous low-attenuation renal lesions too small to characterize (TSTC) on CT are usually benign cysts, while heterogeneous TSTC lesions require MRI evaluation due to possible solid neoplasm. Benign cysts on MRI show marked T2

hyperintensity and fat-saturated T1 signal without enhancement, whereas heterogeneous lesions may indicate necrotic papillary carcinoma. Infectious, inflammatory, or vascular cystic masses are excluded to maintain specificity. Standardized morphological descriptors like septal thickness and enhancement improve reproducibility.

DCIS Dilemma: Does Every Diagnosis Require Surgery?

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Ductal carcinoma in situ (DCIS) is increasingly diagnosed through breast cancer screening programs. The traditional approach has been surgical excision, often combined with radiotherapy. However, many DCIS lesions—especially those with low-risk features—may never progress to invasive disease. This raises concerns about overtreatment, unnecessary morbidity, and reduced quality of life. Several international trials are currently evaluating active surveillance (AS) as an alternative to immediate surgery. The COMET study in the United States has reported early results showing that, after two years of follow-up, the risk of ipsilateral invasive cancer in patients managed with AS was not significantly higher compared to those receiving standard treatment. Importantly, patient-reported outcomes such as anxiety and overall quality of life were similar between groups. The LORIS trial in the United Kingdom and the LORD trial in Europe further demonstrate the feasibility and patient acceptance of surveillance strategies for carefully selected cases, usually those with low-grade, hormone receptor–positive DCIS. Radiologists have a central role in this evolving paradigm. Accurate diagnosis, appropriate risk stratification, and reliable imaging follow-up are essential for ensuring patient safety in AS protocols. While longer-term data are needed, current evidence suggests that not all DCIS diagnoses require immediate surgery. Individualized management, balancing clinical risk with patient preference, may provide safer and more patient-centered care.

Decision-Making In Curative Vs. Palliative Care For Gastrointestinal Cancers

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Curative intent: Treatments aimed at complete eradication of the tumor, with the goal of long-term survival or cure. Palliative intent: Treatments aimed at symptom control, prolongation of life, and quality of life improvement, without expectation of cure. Curative approaches Complete surgical resection (e.g., gastrectomy with D2 lymphadenectomy, total mesorectal excision) Multimodality therapy (neoadjuvant/adjuvant chemotherapy or chemoradiotherapy) Radical local treatments

(selected metastasectomy, ablative therapies when feasible) Palliative approaches Systemic therapy (chemotherapy, targeted, immunotherapy) Symptom-directed interventions (stenting, bypass surgery, diverting stoma, radiotherapy for pain/bleeding) Supportive and palliative care services Determinants of Treatment Intent Tumor stage (localized resectable vs. advanced/metastatic) Performance status and comorbidities (patient's ability to tolerate radical treatment) Tumor biology (aggressiveness, molecular profile, response to therapy) Multidisciplinary team decision (oncology, surgery, radiology, pathology) Patient's goals and preferences "Treatment intent in gastrointestinal cancers is not only defined by tumor stage, but also by patient condition, tumor biology, and the overall goals of care." Role of Radiology in Determining Curative vs.

Palliative Intent Staging accuracy: MRI, CT, PET-CT define local extension, nodal status, and distant metastases → crucial for curative resection planning.

Assessment of resectability: Evaluation of vascular invasion, adjacent organ involvement, and surgical margins.

Treatment monitoring: Response evaluation to neoadjuvant therapy (tumor shrinkage, downstaging).

Detection of progression: Identifying recurrence or metastatic spread → may shift from curative to palliative approach. Radiologic curative or palliative interventions: Metastasis ablation, embolization stent placement, drainage,...

Diagnostic Mammography Demystified: Key Techniques And Tips

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Diagnostic mammography is crucial in some situations. The indications of the diagnostic mammography include: a) Breast symptoms in women aged 30 y or older such as palpable lump, nipple changes (inversion or discharge), skin changes, and bloody nipple discharge, b) Further evaluation of suspicious findings seen during a screening mammogram or clinical exam, c) History of breast cancer or atypical breast tissue: To monitor for recurrence or new occurrences, d) Short term follow up for a finding seen on a prior diagnostic mammogram. Since every individual has a different anatomy, there will likely be breast tissues that are not included in the standard projections, particularly the more mobile upper inner quadrant. Additional projections can be performed on a case-by-case basis according to the different anatomy of the patients being imaged. Accurate techniques significantly reduce motion artifacts and overlapping tissue, improving diagnostic accuracy. Additional views include spot compression, magnification view, true lateral, exaggerated craniocaudal lateral/medial view, cleavage view, rolled CC view , and tangential view. Additional views in mammography provide a more comprehensive evaluation of breast tissue . These views are necessary in cases where standard images may not capture all areas adequately or there is overlapping tissue. Diagnostic mammography plays a pivotal role in accurate diagnosis and helps in reducing the chances of missed or misinterpreted findings.

In this review, the details of the additional view in the setting of the diagnostic mammography with key technique tips are provided. Keywords: Diagnostic Mammography, Key Techniques, Indications, Additional View

Diagnostic Mammography Reporting

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"Diagnostic Mammography Reporting: Precision, Protocols, and Pitfalls" This lecture provides an in-depth overview of diagnostic mammography reporting, with a focus on delivering accurate, actionable, and standardized interpretations in alignment with ACR BI-RADS® guidelines. Aimed at radiologists, trainees, and allied professionals, the session will review the clinical indications for diagnostic mammography, technical considerations, and the nuanced interpretation of findings, including asymmetries, architectural distortion, and calcifications. Emphasis will be placed on structured reporting, appropriate use of BI-RADS assessment categories, and the integration of ultrasound and additional views in problem-solving. Common pitfalls in reporting will be addressed, including over-calling versus under-calling findings, as well as communication strategies for conveying results to referring physicians and patients. Real case examples will be discussed to illustrate key learning points and foster practical application.

Differential Diagnosis Of Non-Gynecologic Pelvic Mass Mimicking Ovarian Tumor

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Differential Diagnosis Of Non-Gynecologic Pelvic Mass Mimicking Ovarian Tumor Objective: To provide a systematic imaging approach to distinguish non-gynecologic pelvic masses from ovarian tumors, preventing misdiagnosis and ensuring correct patient referral.

Key Message: Not every pelvic mass is gynecologic. Critical analysis of anatomical relationships and specific imaging clues is essential. Main Categories of Mimics:

1. Gastrointestinal: o Appendiceal Mucocele/ LAMN: Cystic, tubular RLQ mass with characteristic wall calcification.
   - o Colorectal Cancer: Eccentric, enhancing bowel wall mass with luminal involvement.
   - o Diverticular Abscess: Complex collection with fat stranding; clinical signs of infection.
2. Urinary Tract: o Urachal Adenocarcinoma: Midline supravesical mass with cystic/solid components.
3. Peritoneal/Mesenteric:
   - o Peritoneal Inclusion Cyst: Cystic mass conforming to peritoneal spaces with a trapped, normal ovary ("floating ovary sign").

- GIST: Exophytic, hypervascular mass arising from the bowel wall.

Imaging Pearls:

- Crucial Step: Always attempt to identify both ovaries. If they are separate and normal, the mass is likely non-gynecologic.
- Determine the Epicenter: Is it the bowel, bladder, or presacral space?
- Look for Specific Signs: Calcification (appendix), fat (sarcomas), and the mass effect on adjacent organs. Conclusion: A disciplined, anatomy-based approach using CT/MRI is key to accurate diagnosis and appropriate management.

Distinguishing Osteoblastic Reaction From Disease Progression In Bone Metastases

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Understand the flare phenomenon Recognize limitations of conventional imaging Consequences: fractures, spinal cord compression, hypercalcemia High prevalence in breast & prostate cancer Misinterpretation → incorrect treatment decisions Apply a practical algorithm to differentiate healing from progression Osteoclastic cycle: lytic lesions Osteoblastic activity: sclerotic/healing response Flare phenomenon: increased uptake/sclerosis after successful therapy X-ray/CT: sclerosis – progression or healing? Bone Scintigraphy: high sensitivity, low specificity; flare common MRI: low signal in sclerotic lesions; interpretation challenges SPECT/CT: improves specificity with anatomy FDG PET/CT: better for lytic lesions; less flare Fluoride PET/CT: very sensitive, but flare frequent Choline/PSMA PET (prostate): high specificity Whole-body MRI with DWI: ↑ADC = true response

Down Syndrome Screening: NT And NIPT

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Down syndrome screening plays a crucial role in prenatal care, allowing for early detection and informed decision-making. The combination of Nuchal Translucency (NT) measurement and Non-Invasive Prenatal Testing (NIPT) has emerged as a powerful strategy for assessing the risk of Down syndrome. NT, performed during the first trimester via ultrasound, provides crucial information regarding the likelihood of chromosomal abnormalities. Meanwhile, NIPT, utilizing cell-free fetal DNA from maternal blood, offers a highly accurate (about 99%), risk-free method for detecting Down syndrome and other aneuploidies. As radiologists, our role in interpreting these screenings is pivotal, contributing to improved prenatal outcomes and guiding patient management. Continued research and advancements in imaging techniques will further refine our capabilities in this vital area of maternal-fetal medicine.

Ductal Adenocarcinoma Of The Breast

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Ductal adenocarcinoma, formally Invasive Ductal Carcinoma (IDC) NST, is the most prevalent breast malignancy. Radiologically, it most classically presents as a spiculated, high-density mass on mammography, often with associated pleomorphic microcalcifications. Ultrasound typically reveals an irregular, hypoechoic mass with indistinct margins and posterior acoustic shadowing. On MRI, it demonstrates rapid initial enhancement and washout kinetics (Type III curve), appearing as an irregular, spiculated mass with avid rim enhancement. Pathology Correlation: The histologic hallmark is the invasion of malignant epithelial cells through the basement membrane of the duct into the surrounding stroma. These cells form cords, tubules, or solid nests. The desmoplastic stromal reaction provoked by the invasion is the pathologic correlate for the spiculations and acoustic shadowing seen on imaging. Tumor grade (1-3) is based on tubule formation, nuclear pleomorphism, and mitotic rate. Immunohistochemistry for estrogen/progesterone receptors and HER2 is critical for prognostic and therapeutic stratification, defining the major molecular subtypes (Luminal A/B, HER2-positive, Triple-negative). Key Points for Radiologists:

1. Spiculations on imaging directly reflect the invasive, desmoplastic nature of the tumor.
2. Biopsy is mandatory for diagnosis, grade, and biomarker profiling.
3. Assess for multifocality, nodal involvement, and therapy response

DWI: A New Frontier In Breast Cancer Screening

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Breast MRI has superior sensitivity for detecting breast cancer versus other breast imaging techniques and is recommended for screening of high risk women. The high sensitivity of breast MRI related on injection of IV contrast to identify areas of suspicious vascularity, commonly associated with breast malignancies. Dynamic contrast enhanced breast MRI (DCE) provides high sensitivity (> 85%) for breast cancer detection but suffers from moderate specificity, resulting in unnecessary biopsies that cause inconvenience, discomfort and emotional distress for the patient. Diffusion weighted imaging (DWI) is a non-contrast functional MRI technique that provides information of microscopic movement of water molecules in tissues and allows an indirect assessment of tissue microstructure and cellularity. DWI is increasingly incorporated into routine breast MRI examinations and the main applications of DWI are breast cancer detection and characterization, prognostication, and prediction of treatment response to neoadjuvant chemotherapy. In addition, DWI is promising as a noncontrast MRI

alternative for breast cancer screening. Breast malignancies tend to restrict diffusion and DWI has shown clear potential to increase breast MRI diagnostic specificity when used along with DCE. Problems with suboptimal resolution and image quality have restricted the mainstream use of DWI for breast imaging, but these shortcomings are being addressed through several technologic advancements. Diffusion MRI thus appears to be a promising alternative approach to breast cancer screening,

Exploring Radiopaedia Facilities For Radiologists

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Background: Radiopaedia is a globally recognized open-access radiology resource that provides educational materials, case databases, and structured articles for continuous learning and knowledge sharing among radiologists. Despite its widespread use, many radiologists are unaware of its full range of tools and academic opportunities.

Objective: To introduce and explore the various facilities of Radiopaedia that support radiologists in education, clinical practice, and academic growth, and to demonstrate how active participation can enhance both personal and institutional visibility.

Methods: This lecture draws upon extensive personal experience with over 1,800 published Radiopaedia cases and multiple editorial contributions. A practical demonstration of Radiopaedia's main features—including case creation, article referencing, quiz mode, playlists, and contributor metrics—will be provided, emphasizing step-by-step guidance for optimal use.

Results: Participants will gain insights into effective strategies for case documentation, ethical image preparation, referencing standards, and engagement with the Radiopaedia editorial community. The academic and professional benefits of active contribution, including peer recognition, citation potential, and teaching integration, will be highlighted.

Conclusion: Radiopaedia serves as a dynamic educational ecosystem where radiologists can both learn and contribute. Understanding and utilizing its facilities fosters professional growth, enhances diagnostic expertise, and strengthens global collaboration within the radiology community.

Failed Back Surgery Syndrome Cases

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Failed Back Surgery syndrome (FBSS) refers to a condition where a patient continues to experience chronic pain or develops new symptoms after undergoing spinal surgery. FBSS can result from various factors, including incorrect initial diagnosis, scar tissue formation, residual structural issues, nerve damage, recurrence of pathology and psycological factors. Here is a presentation of six patients with different causes of the FBSS refering to our ceneter during 2024-2025.

Failed Back Surgery Syndrome Imaging Interpretation

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Post operative back pain called “failed back surgery syndrome”(FBSS) is a clinical diagnosis. It refers to persistent or newly developed pain after spinal surgery. The imaging role is to identify the specific cause of pain. Computed tomography is excellent for evaluation of bony anatomy and hardware placement but it is not suitable for soft tissue and neuromuscular evaluation. Magnetic resonance imaging is crucial for determining post operative complications. High resolution T1w and T2w sequences are essential for assessment of anatomy, disc space and neural foramina. STIR or T2w fat suppressed sequences are mandatory for detection of bone marrow edema. Pre and post contrast T1w with fat suppression are critical for differentiation of recurrent disc herniation from epidural scar. Other complications include lateral recess stenosis due to facet joint or ligamentum flavum hypertrophy or post laminectomy spondylolisthesis which are evident in post operative CT scan or MRI. Pseudo meningocele with signs of mass effect or CSF hypotension and also radicular pain in case of nerve root entrapment. Arachnoiditis which may be seen as clumped nerve roots (empty sac appearance), peripherally located nerve roots (pseudo cord appearance) or a soft tissue mass filling the thecal sac in MRI. Another serious complication is spondylodiscitis with intervertebral disc and adjacent vertebral bodies signal change and enhancement. A good report for FBSS should contain level of prior surgery, evidence of neural compression due to recurrent disc or scar, situation of cauda equina and thecal sac and assessment of bony structures and hardwares.

Fetal Brain Cortical Malformation

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Cortical folding and operculation of the Sylvian fissure are crucial events in human fetal brain development, reflecting the process of neural migration and cortical organization. The progressive appearance of sulci and gyri during gestation follows a highly predictable sequence that can be visualized by prenatal neurosonography. Understanding these landmarks is essential for differentiating normal maturation from developmental abnormalities. Fetal sulcation begins with the appearance of the parieto-occipital and calcarine sulci around 18-20 weeks, followed by the central sulcus at approximately 20-22 weeks, and the cingulate sulcus after 24 weeks. The Sylvian fissure is initially a shallow indentation in the second trimester, gradually deepens, and becomes covered by the operculum formed by the frontal , temporal, and parietal lobes between 28-32 weeks. Sonographic signs of incomplete or abnormal operculation include wide and uncovered Sylvian fissures or irregular cortical patterns, which may suggest lissencephaly , polymicrogyria, or other cortical dysplasias. The reproducibility of these findings on two- and three-dimensional ultrasound enhances diagnostic confidence. A narrative review of the developmental timeline of major sulci (parieto-occipital, calcarine, Sylvian fissure, central sulcus, and cingulate sulcus) with emphasis on the process of operculation of the Sylvian fissure at 18-32 weeks is described and correlated with neurodevelopmental milestones. The sequential evaluation of sulcal development and operculation by fetal ultrasound is a valuable, non-invasive tool for assessing brain maturation. Familiarity with the normal developmental timeline allows clinicians to detect subtle abnormalities in cortical formation at an early stage, facilitating accurate counseling of families, better prognostication and appropriate perinatal management.

Fetal Echocardiography: Revisiting Indications And Current Challenges In Prenatal Cardiac Screening

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Fetal echocardiography has become an essential tool in prenatal diagnosis, enabling early detection of congenital heart disease and guiding perinatal management. While established indications such as abnormal cardiac findings on routine ultrasound, increased nuchal translucency, or a family history of congenital heart disease are well recognized, several areas remain challenging and controversial. These include the role of maternal conditions such as diabetes and autoimmune disease, extracardiac anomalies, abnormal ductus venosus Doppler, and assisted reproductive technologies. This lecture will review the current evidence, highlight ongoing debates, and provide a practical framework for radiologists in identifying when a detailed fetal echocardiogram is warranted.

Fetal Heart Arrhythmia

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Fetal cardiac arrhythmias are a relatively common finding in fetal ultrasound and echocardiography. In general, fetal cardiac arrhythmias are divided into three groups, which include tachycardia, bradycardia, and transient PAC irregularities. The fetal heart is more sensitive to tachycardia than bradycardia. Some cardiac arrhythmias are associated with structural heart disorders.

From Pixel To Prediction: CTA Plus AI As Gatekeepers In Choosing Surgery Type For Aortic Root Disease

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Aortic imaging is essential for surgical practice, as accurate measurements directly inform clinical decision-making and guide timely interventions. While management strategies for aortic disease remain a topic of debate, sharing and standardizing serial aortic measurements can advance research, improve patient care, and lead to better outcomes. Particular emphasis should be placed on the aortic root, where precise assessment is critical for surgical planning and prevention of adverse events. Recent advances in artificial intelligence provide opportunities to enhance measurement accuracy, reduce interobserver variability, and integrate imaging findings with morphologic parameters and detailed patient history. The combination of these elements allows for a more comprehensive risk stratification framework, supporting individualized patient management and long-term follow-up. Incorporating AI-assisted tools into routine clinical practice may not only improve decision-making but also facilitate multicenter studies and the development of evidence-based guidelines. Future research should focus on validating these tools in larger patient populations and exploring their potential to predict outcomes and optimize intervention timing

Gallbladder Lesions And Management Of Polyps

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Gallbladder adenonyomatosis is a benign condition, which at times can mimic malignancy in some specific forms. Radiological findings such as echogenic foci with comet tail artifact (US) and cystic intramural spaces (MRI) are helpful in differentiation. Gallbladder polyps are mostly benign, but they should be differentiated from malignant ones by their imaging features. Morphologic features (pedunculated, sessile) and size of polyps are the most important criteria for this differentiation which are included in SRU guideline, that is recommended to follow for patients with incidentally detected polyps. Gallbladder wall thickening adjacent to a polypoid lesion should raise concern for malignancy and these lesions should at least be followed up in short intervals, if not referred for surgical consultation.

Head And Neck Paragangliomas: Clinical Manifestations And Evolving Management Strategies

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Head and neck paragangliomas (HNPGLs) are rare neuroendocrine tumors, accounting for only 3–5% of all paragangliomas, with an incidence of 0.3–1 per 100,000 individuals. They typically arise from parasympathetic-associated paraganglia of the lower cranial nerves in the head and cervicothoracic region. Genetic predisposition, particularly mutations in SDH genes, is the most significant risk factor, and genetic testing is now recommended for all patients. Management strategies must balance curative intent with preservation of cranial nerve function. Radical surgery remains the only definitive treatment, particularly for tympanic and tympanomastoid lesions, though the risk of postoperative cranial neuropathies requires careful selection and timing. Radiotherapy and stereotactic radiosurgery offer effective alternatives, especially for larger or surgically challenging tumors, providing high rates of tumor control with relatively low morbidity. Multimodality treatment approaches and preoperative awareness of genetic and anatomical factors are essential for optimizing patient outcomes.

Hepatic Infiltrative Lesions And Pseudolesions: A Case-based Review

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Infiltrative hepatic processes represent a broad and diagnostically challenging spectrum of entities that may mimic one another across imaging modalities. This case-based presentation will review the imaging features and differential diagnosis of true infiltrative liver lesions and their pseudolesion counterparts. True infiltrative lesions include infectious, inflammatory, and neoplastic processes such as liver microbial and granulomatous diseases (tuberculosis, sarcoidosis and IgG4-related disease), hepatocellular carcinoma, intrahepatic cholangiocarcinoma, and infiltrative metastases from melanoma, gastric carcinoma, and neuroendocrine tumors. The discussion will highlight key morphologic characteristics on Ultrasound, CT and MRI and ancillary findings that aid in differentiation. In contrast, hepatic pseudolesions such as focal fat deposition or sparing and transient perfusion abnormalities will be addressed as common mimickers that can simulate infiltrative disease. Characteristic imaging clues and the influence of vascular and metabolic factors will be illustrated. Through representative cases and correlation with pathology and clinical context, this session aims to refine diagnostic knowledge, reduce pitfalls, and guide appropriate follow-up or intervention in patients presenting with hepatic infiltrative patterns.

Imaging Approach To Pediatric Abdominal Tumors: Case-based Discussion

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This presentation provides a systematic, case-based review of the imaging approach to common pediatric abdominal tumors. The discussion emphasizes a practical, multimodality algorithm, beginning with ultrasound as the primary initial investigation for its ability to characterize masses and guide further workup. The critical roles of Computed Tomography (CT) for staging and Magnetic Resonance Imaging (MRI) for superior tissue characterization and surgical planning are detailed. The presentation underscores how patient age and specific imaging findings are integral to narrowing the differential diagnosis, thereby guiding optimal patient management within a multidisciplinary team. Attendees will gain a structured framework for the confident imaging assessment of these conditions.

Imaging Approach To Pediatric Chest Tumors: Case-based Discussion

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Background: Pediatric thoracic tumors are a heterogeneous group of neoplasms, accounting for 15–20% of all malignant tumors in childhood. Primary and metastatic thoracic tumors are classified according to where they originate, i.e., the lung parenchyma, the mediastinum, and the chest wall.

Methods: In this essay, characteristic imaging findings in common and uncommon pediatric chest tumors are illustrated.

Results: The imaging evaluation of these children is initially directed by clinical presentation and usually begins with a chest radiograph. Further imaging with CT, MRI, or rarely ultrasonography may be performed to better detect, localize, or characterize the lesion(s).

Imaging Approach To Sellar And Suprasellar Lesions In Pre/post Surgical Status

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Imaging evaluation of sellar/suprasellar masses requires a systematic approach due to complex anatomy of mentioned area. Pituitary gland and infandibulum, optic chiasm, hypothalamus, cavernous sinus, ICA and cranial nerves are some of the structures which pathologies can affect this region. Magnetic resonance imaging is the modality of choice however computed tomography could have a key role in detection of bony changes and calcification. Pituitary adenomas are the most common sellar masses in adults which can extend to para, supra and infrasellar areas. Dynamic imaging of the pituitary gland is the best exam for localization of microadenomas, follow up of the patients treated with trans sphenoidal surgery and also for diagnosis of specific conditions of pituitary gland such as lymphocytic hypophisitis or rathke cleft cysts. There are other various suprasellar masses like craniopharyngioma, meningioma, glioma, germinoma, dermoid cyst, ...which could be differentiated by their tissue characteristics revealed in special MRI sequences. In addition to the standard MRI protocols, advanced imaging techniques such as 3D volumetric sequences, MRS and also PET are newly available methods used for surgical planning and achieving confident diagnosis. Pituitary stalk involvement in inflammatory conditions like LCH, sarcoidosis, GPA, or lymphoma is rare but this condition is well known through dedicated sellar and suprasellar imaging. Due to close proximity of vascular structures to sella, aneurysms,AVF and thrombosis are other possible pathologies one should suggest during interpretation of sellar/suprasellar imaging. So for making a confident differential diagnosis neuroradiologists should be familiar with different techniques of sellar/suprasellar imaging, their indication and interpretation.

Imaging Features And Embolization Techniques In Head And Neck Paragangliomas Including Jugular Paraganglioma: Pre- And Post-Embolization Perspectives

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Head and neck paragangliomas, including carotid body, vagal, and jugular paragangliomas, are rare, hypervascular tumors originating from parasympathetic paraganglia. Among them, jugular paraganglioma is particularly challenging due to its proximity to the skull base, lower cranial nerves, and venous sinuses. Preoperative embolization has become an essential step in reducing intraoperative bleeding and improving surgical safety. On diagnostic imaging, these lesions typically present as well-defined, intensely enhancing masses. MRI demonstrates the classic "salt-and-pepper" appearance due to flow voids and hemorrhagic foci. CT and MRI are crucial for defining the extent of bone erosion and soft tissue involvement, particularly in jugular paraganglioma, where expansion of the jugular foramen is a hallmark finding. Digital subtraction angiography (DSA) remains the gold standard for vascular assessment, revealing arterial feeders commonly arising from branches of the external carotid artery such as the ascending pharyngeal, occipital, or posterior auricular arteries. In jugular lesions, contributions from the internal carotid or vertebral artery may also occur. Superselective catheterization and controlled embolization using particles or liquid embolic agents result in significant devascularization, as demonstrated by reduction of tumor blush on post-embolization angiography. Post-procedure MRI or CT typically shows decreased enhancement and tumor necrosis, confirming treatment efficacy. This educational review outlines characteristic imaging findings, technical aspects, and post-embolization changes in head and neck paragangliomas, emphasizing careful angiographic mapping and embolization strategy, particularly in jugular variants, to optimize patient outcomes and procedural safety.

Imaging In CSF Circulation Disorders: Diagnostic Insights And Emerging Techniques

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Disorders of cerebrospinal fluid (CSF) circulation represent a diverse group of conditions ranging from hydrocephalus and idiopathic intracranial hypertension to CSF leaks and normal pressure hydrocephalus (NPH). Neuroimaging plays a crucial role in understanding CSF dynamics, identifying underlying pathologies, and guiding treatment decisions. This session will review current and advanced imaging approaches in the evaluation

of CSF circulation disorders. Conventional MRI remains the cornerstone, providing detailed anatomical assessment of ventricular size, periventricular changes, and structural causes of obstruction. However, recent advancements have enabled functional assessment of CSF flow using phase-contrast MRI, time-spatial labeling inversion pulse (Time-SLIP) sequences, and 3D constructive interference in steady state (CISS) imaging. These techniques allow visualization and quantification of CSF flow patterns within the ventricular system and subarachnoid spaces, offering valuable information for differentiating communicating from non-communicating hydrocephalus and for assessing shunt function postoperatively. Emerging methods, such as diffusion tensor imaging (DTI) and arterial spin labeling (ASL), further expand the diagnostic potential by revealing microstructural and perfusion changes related to altered CSF dynamics. The panel discussion will emphasize the interpretation of imaging findings in clinical context, pitfalls to avoid, and the integration of imaging data with clinical and physiological information. Ultimately, the goal is to demonstrate how modern imaging tools contribute to precise diagnosis and improved management of CSF circulation disorders.

Imaging In Pediatric Seizure With Presentation Of Some Challenging Cases

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Seizures are among the most common neurological emergencies in childhood and may arise from a wide range of structural, metabolic, infectious, or genetic causes. Imaging plays a pivotal role in identifying underlying etiologies, guiding treatment, and assessing prognosis. While electroencephalography remains central to seizure evaluation, neuroimaging provides essential structural and functional information. Magnetic resonance imaging (MRI) is the modality of choice in pediatric seizure assessment due to its superior sensitivity in detecting cortical malformations, hippocampal sclerosis, tumors, and sequelae of perinatal injury. A comprehensive MRI protocol is crucial, typically including high-resolution T1-weighted sequences for anatomical detail, T2-weighted and FLAIR sequences for identifying cortical dysplasia, gliosis, or white matter abnormalities, and diffusion-weighted imaging (DWI) for acute ischemia or cytotoxic edema. Gradient echo or susceptibility-weighted imaging (SWI) enhances the detection of hemosiderin deposits, calcifications, and vascular malformations. Coronal oblique T2 and volumetric T1 sequences through the temporal lobes are particularly important for assessing mesial temporal sclerosis. Advanced techniques, such as MR spectroscopy, diffusion tensor imaging, and functional MRI, provide further metabolic and connectivity insights and are especially valuable in surgical planning for refractory epilepsy. Computed tomography (CT) retains value in acute settings, particularly for detecting hemorrhage, calcifications, or fractures when MRI is unavailable or contraindicated. Timely and appropriate use of imaging is critical to distinguish between acute symptomatic seizures and chronic epileptic disorders, enabling tailored interventions and improved long-term outcomes. The integration of imaging findings with clinical and electrophysiological data remains essential in optimizing the care of children with seizures.

Imaging In Spinal Cord Disease In Pediatrics

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Spinal cord diseases in pediatric patients are highly variable and they have different pathogenesis and etiology. Some of the most common diseases are autoimmune (multiple sclerosis, acute disseminated encephalomyelitis, and acute transverse myelitis), congenital (dysraphism, split cord malformation, and tethered cord syndrome), tumor (juvenile pilocytic astrocytoma, ependymoma, ganglioglioma and hemangioblastoma), and vascular (cavernous malformations, arteriovenous malformations, and dural arteriovenous fistulas). MRI is the primary imaging modality for examining spinal cord lesions and is crucial to a timely and accurate diagnosis. MRI usually differentiates neoplastic from non-neoplastic spinal cord lesions; however, MRI is limited in defining tumor histology and biopsy is necessary most of the time. A focal abnormal intramedullary signal in combination with a cord expansion is the leading criterion for a spinal neoplasm. If a significant focal mass effect is lacking other causes for the signal alteration such as demyelinating disease and vascular disease should be considered. MRI has also an important role in localization of the pathology such as intramedullary, intradural and extradural lesions which is important for both differential diagnosis and clinical approach. In neonatal period ultrasound is a great tool for screening for spinal dysraphism and also in definition of the pathology. MRI helps ultrasound exam after neonatal period for decision making and clarifying of ultrasound findings. The aim of this presentation is to highlight the pertinent features of the pediatric spinal cord disease in the form of case presentation.

Imaging Of Head And Neck Paraganglioma

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We will begin by providing a general description of paraganglioma tumors in the body, followed by an epidemiological review of those located in the head and neck region. Next, the clinical signs and characteristics that suggest their presence will be presented by clinical colleagues. A discussion of imaging characteristics, the variety and preference of methods, along with a review of case reports will be covered. The role of angiography in diagnosis and treatment, as well as common embolization techniques, will be the subsequent topic of discussion. The crucial imaging features that are important for surgical and therapeutic methods will be emphasized. The factors that necessitate treatments such as gamma knife radiosurgery will be considered in this section. Finally, post-surgical imaging, the frequency of these studies, and important findings for the diagnosis of recurrence, stable disease, and post-operative changes will be addressed. Thanks

Imaging Work Up Of Precocious Puberty: What Radiologist Should Know

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Precocious puberty is defined as development of secondary sex characteristics before the age of 8 years in girls and 9 years in boys. Two types of precocious puberty are central (true) precocious puberty (CPP) and peripheral (pseudo) precocious puberty. Precocious puberty may be isosexual (involving secondary sex characteristics that are gender matched) or heterosexual (involving sex characteristics of the opposite gender). CPP is always isosexual, whereas PPP may be isosexual or heterosexual. Discriminating between the common normal pubertal variants and true central precocious puberty, especially in the early stages, can be a diagnostic challenge. The gold standard method in the diagnosis of CPP and ruling out of the condition from PPP is gonadotropin releasing hormone (GnRH) stimulation test. However, the test is not accessible in all laboratory settings and is not an easy assessment method. Clinical examination, evaluation of growth charts, bone age, and hormonal tests are part of the workup. For girls, pelvic US must be done with two purposes: evaluation for ovarian cyst or tumor (PPP) and evaluation for uterine and ovaries maturation (CPP or PPP with secondary CPP). For boys with PPP or unilateral testicular enlargement, testicular ultrasonography (US) is indicated. . Adrenal US exam is also done and Brain MRI is essential in boys with CPP. CNS imaging should be performed if CPP is suspected in girls younger than 6 years of age. In this presentation imaging findings and detailed imaging work up in precocious puberty is considered.

Indeterminate Solid Renal Mass Lesions

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The incidental detection of small renal masses has increased dramatically, presenting a significant management challenge. A substantial portion of these masses are benign or exhibit indolent behavior, yet definitive therapeutic intervention for small tumors has not yielded a clear benefit in overall cancer-specific mortality. A major limitation of conventional imaging is that neither CT nor MRI can reliably distinguish solid benign tumors (such as oncocytoma or fat-poor angiomyolipoma) from malignant renal cell carcinoma (RCC). Dedicated multiphase CT and MRI remain the mainstays of evaluation. The Clear Cell Likelihood Score (ccLS), derived from multiparametric MRI (mpMRI), provides a standardized five-tier Likert scale to predict the likelihood of clear cell RCC, the most common and aggressive subtype. Implementation of the

ccLS is feasible and provides helpful data for both physicians and patients. High ccLS scores (4 or 5) are highly predictive of clear cell RCC, with diagnostic accuracy for ccLS 5 reaching 93%. Herein, a review of the ccLS is presented, including a step-by-step guide for image interpretation and additional guidance for its implementation in clinical practice.

Inflammatory Spinal Disease

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Inflammatory disorders of the spine can be caused by a variety of conditions including : spondylioarthritis , infection, modic type I ,degeneration, acute cartilaginous node, SAPHO syndrome and spinal neuropathic arthropathy. Confirmation and localization of spinal inflammation usually depend on imaging findings. Magnetic resonance imaging is preferred , because of its high sensitivity and specificity . The specificity of MR imaging depends on the signal characteristics and anatomic distribution of the inflammation, associated findings and the patients clinical history. We will review the mentioned above disease MRI findings briefly in-order to remind their differences.

Interventional Treatment Of Pulmonary Embolism

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Pulmonary embolism (PE) remains a leading cause of cardiovascular morbidity and mortality worldwide. While systemic anticoagulation and thrombolysis have long been the mainstay of treatment, their limitations particularly the risk of major bleeding, have driven the development of targeted, image-guided interventional approaches. Over the past decade, interventional radiology has played an increasingly vital role in the management of acute and submassive PE, providing effective and safer alternatives for hemodynamically unstable or deteriorating patients. This educational session reviews the current interventional strategies for PE, focusing on catheter-directed thrombolysis (CDT), ultrasound-assisted thrombolysis (EKOS system), mechanical thrombectomy, and aspiration devices such as Penumbra Indigo and FlowTriever. Patient selection criteria, angiographic anatomy of pulmonary circulation, procedural techniques, and post-procedural care will be discussed in detail. Emphasis will be placed on optimizing lytic dosing, minimizing bleeding complications, and achieving rapid right ventricular recovery. Recent evidence from major studies and the 2022 ESC and 2023 SIR guidelines will be summarized, demonstrating improved hemodynamic outcomes and survival in appropriately selected patients. The session will also highlight the importance of multidisciplinary Pulmonary Embolism Response Teams (PERTs) and the growing role of interventional radiologists in acute PE care.

Itroduce TNM Staging System

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At Gorgan University Of Medical Sciences.

- history of TNM system since 1952 -the important and goal of staging(determine the prognosis, choose the best treatment,.....) -staging as a common international language of cancer -components of TNM staging system and how to use it -a case example

Key Indications For Breast MRI

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Magnetic Resonance Imaging (MRI) of the breast has become an indispensable tool in the diagnostic and therapeutic pathway of breast diseases, particularly breast cancer. This abstract delineates the key clinical indications for breast MRI, emphasizing its utility in high-risk screening, diagnostic problem-solving, preoperative staging, and treatment response assessment. Screening in High-Risk Populations Breast MRI is strongly recommended as an adjunct screening modality for women at high lifetime risk (>20%) of breast cancer, including carriers of BRCA1/2 mutations, those with significant familial breast cancer history, or prior thoracic irradiation before age 30. Diagnostic Problem-Solving In cases where mammography and ultrasound yield inconclusive or discordant findings, breast MRI serves as a valuable problem-solving tool. It is particularly advantageous in patients with dense breasts, post-surgical or post-radiation changes, and equivocal lesions identified on other modalities. Dynamic contrast-enhanced MRI (DCE-MRI) aids in differentiating benign from malignant lesions by analyzing enhancement kinetics, morphology, and internal characteristics, thereby refining diagnostic confidence and guiding management. Preoperative Staging Accurate tumor staging is crucial for surgical planning. Breast MRI provides detailed assessment of tumor size, multifocality, multicentricity, and contralateral disease. Monitoring Treatment Response Breast MRI is integral in evaluating response to neoadjuvant chemotherapy. Additional Indications Beyond these primary uses, breast MRI is employed in implant integrity evaluation, inflammatory breast cancer assessment, differentiation of post-treatment fibrosis from recurrence, and localization of occult primary tumors. It also aids in guiding biopsies in complex clinical scenarios.

Knee MRI: A Practical Approach To The Interpretation

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Knee MRI is one of the most common examinations in daily radiological practice. There are several methods for interpreting knee MRI scans; among them, the "systematic approach" is the most practical. This is because knee anatomy is quite complex, and pathologies and injury patterns are varied. These conditions rarely affect only a single structure; instead, they often present with diverse findings that can influence patient management. This approach exemplifies how to create a radiological report for an MRI of the knee, covering the most common anatomical sites where pathology may occur. A systematic review of the knee MRI is essential. The systematic review includes the following components:

1. Menisci (medial and lateral),
2. Ligaments (anterior and posterior cruciate ligaments, medial and lateral collateral ligaments, and posterolateral corners),
3. Extensor mechanism (distal quadriceps tendon, retinacula, patellar ligament, and patella),
4. Fluid (joint effusion and bursae), and
5. Osseous and articular structures, including bones and the patellofemoral, medial, and lateral compartments.

Lugano Staging In Lymphoma And Its Role In Clinical Practice

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Lugano Classification is a critical system for lymphoma staging and response assessment. Understanding these guidelines is paramount for accurate diagnosis, treatment planning, and monitoring of patients with lymphoma.

Mastering Mammography BI-RADS: Interpreting With Confidence

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Accurate BI-RADS application is the backbone of screening and diagnostic mammography. This educational abstract presents breast density and common mimics, then deep-dive the lexicon for masses (shape, margin, density), calcifications (morphology, distribution), architectural distortion, and asymmetries, emphasizing developing asymmetry and subtle distortion detectable on digital breast tomosynthesis. Management nuances for categories 0–6 are distilled, with practical thresholds for BI-RADS 3 short-interval follow-up versus tissue diagnosis in BI-RADS 4A–4C and 5, and how to phrase actionable reports. Correlation with targeted ultrasound or MRI and with clinical data is integrated to limit false positives and negatives. Quality metrics—recall rate, PPV, and cancer detection rate—and checklist-based peer learning are proposed for daily audit. Special sections address interpretation in dense breasts, post-operative and post-therapy changes, and the pregnant or lactating patient, where pathways prioritize ultrasound first and permit mammography when indicated with appropriate shielding. We also review imaging-surgery communication for pre-operative localization and margin assessment in breast-conserving therapy. Conclusion: a reproducible, BI-RADS-driven workflow that increases reader confidence, sharpens communication with surgeons and oncologists, and improves patient outcomes.

Mechanical Thrombectomy In Large Vessel Occlusion Stroke: Practical Anesthetic Considerations, Hemodynamic Management, And Technical Pearls

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Mechanical thrombectomy has revolutionized the management of acute ischemic stroke due to large vessel occlusion (LVO), offering substantial improvement in neurological outcomes when performed timely and efficiently. Optimal patient selection and peri-procedural management play pivotal roles in achieving favorable results. One of the key controversies remains the choice between general anesthesia and conscious sedation, each having distinct advantages depending on patient cooperation, airway safety, and hemodynamic stability. Careful blood pressure control before, during, and after thrombectomy is essential to maintain adequate

cerebral perfusion while minimizing the risk of hemorrhagic transformation. Pre-procedural optimization includes maintaining systolic blood pressure typically within the range of 140–180 mmHg, avoiding sudden drops during induction or device manipulation. Post-procedure, tighter control is crucial, tailored to reperfusion status and infarct size. Technical nuances such as proper device selection, aspiration versus stent retriever strategies, and management of challenging vessel anatomies significantly influence procedural success. Familiarity with bailout techniques, minimizing distal embolization, and ensuring complete reperfusion are among the most valuable procedural pearls. This educational review summarizes current best practices in anesthesia, hemodynamic management, and technical aspects of thrombectomy for LVO stroke, aiming to enhance procedural safety, efficiency, and neurological outcomes.

Merging Digital Breast Tomosynthesis With Biopsy Skill

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Digital breast tomosynthesis (DBT) has had a significant impact on breast cancer detection and image-guided breast procedures. With the integration of DBT imaging, biopsy of findings visible only on DBT has become feasible, eliminating the need for localization or surgical excision to obtain a pathologic diagnosis. It is therefore essential for radiologists to be familiar with pre-procedural considerations, patient preparation, and the appropriate use of biopsy equipment. In this presentation, we will review the basic principles and procedural components of DBT-guided biopsy, discuss alternative approaches and techniques, and compare its clinical performance with that of prone stereotactic vacuum-assisted biopsy (PS-VAB).

Mesenteric And Bowel Traumatic Injury

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Traumatic injury to the mesentery and bowel represents a critical yet often subtle spectrum of findings in abdominal trauma imaging. Accurate and timely diagnosis is essential to prevent delayed complications such as perforation, ischemia, or peritonitis. This case-based presentation will review the mechanisms, imaging appearances, and diagnostic approach to mesenteric and bowel trauma, with a focus on CT scan as the cornerstone of evaluation. The session will begin with an overview of mechanisms of blunt abdominal trauma, including deceleration, compression, and burst forces, and their characteristic injury patterns. The CT protocol optimization—covering timing, contrast phases, and use of multiplanar reformats—will be discussed to maximize detection sensitivity. Typical CT findings of bowel injury such as wall thickening, mural discontinuity,

pneumoperitoneum, and unexplained free fluid will be demonstrated through example cases. Mimics of bowel and mesenteric injury, including shock bowel, over resuscitation and preexisting pathology, will also be reviewed to highlight diagnostic pitfalls. The discussion will further address mesenteric injury patterns, including contusion, hematoma, and vascular injury, and outline grading system that correlate with surgical relevance. The session will conclude with a structured imaging-based approach to interpretation and reporting, emphasizing key findings that warrant surgical consultation versus conservative management. Through practical examples and evidence-based discussion, this session aims to enhance diagnostic knowledge in evaluating bowel and mesenteric trauma on CT.

MR Enterography In IBD: Structured Reporting

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MR enterography is the imaging modality of choice for comprehensive, non-invasive assessment of IBD, particularly Crohn's disease. It provides detailed visualization of mural and extramural disease activity, strictures, fistulas, and complications. However, variability in image interpretation and reporting can limit its diagnostic impact and hinder multidisciplinary communication. Structured reporting in MR enterography enhances the clarity, completeness, and reproducibility of radiologic assessment in IBD. Adoption of standardized templates and activity scores facilitates more effective communication with clinicians, supports disease monitoring, and improves patient outcomes.

MR Urography And CT Urography In Evaluating Urothelial Mass Lesions Of The Renal Pelvis And Ureter: The Technique, Practical Points And Pitfalls

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Urothelial Carcinoma (UC) is the most common malignancy of the upper urinary tract. Accurate non-invasive detection, differentiation from benign entities and precise preoperative staging are paramount for guiding surgical management. This lecture aims to provide a comprehensive review of the technical protocols, comparative advantages, and common interpretative pitfalls associated with CT Urography (CTU) and MR Urography (MRU) in the assessment of upper tract urothelial mass lesions. Practical tips for effective contrast timing and radiation dose reduction in CTU will be discussed. Special attention will be paid to the contribution of advanced functional techniques, such as Diffusion-Weighted Imaging

(DWI), in increasing diagnostic confidence and differentiating malignant tumors from inflammatory or post-procedural changes. The lecture will highlight the key radiological features of UC, focusing on sessile versus papillary morphology, associated wall thickening, and related obstruction. Specific practical points and pitfalls will include: Recognizing of common imaging mimics will be discussed. A comparison of the inherent strengths of each modality—CTU's superior spatial resolution and calcification detection versus MRU's role in patients with renal impairment, iodine contrast allergy, or in young patients requiring surveillance. Comparative utility of both modalities in assessing the depth of mural invasion, detecting regional lymphadenopathy, and identifying distant metastases. Conclusion While CTU remains the standard-of-care, MRU is emerging as an indispensable alternative, particularly when iodine contrast or ionizing radiation is contraindicated. Radiologists must possess a thorough understanding of the technical intricacies and common pitfalls of both MRU and CTU to optimize diagnostic performance and ensure timely, accurate staging information crucial for the multidisciplinary management of upper tract urothelial carcinoma.

MRI Of Bone Marrow In Lymphoproliferative Diseases

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Hematologic malignancies are a heterogeneous group of disorders that frequently involve the bone marrow, including lymphomas, leukemias, and multiple myeloma. MRI plays a central role in evaluating marrow infiltration, as it provides excellent soft tissue contrast and allows assessment of both focal and diffuse patterns of disease. Knowledge of normal marrow maturation and its age-related signal changes is essential to avoid misinterpretation, since treatment and hematologic stress may also alter marrow appearance. Characteristic MRI findings in lymphoproliferative diseases range from subtle diffuse signal alterations to destructive focal lesions, and accurate recognition of these patterns is critical for staging and therapeutic planning. Post-treatment changes further complicate evaluation, requiring familiarity with imaging pitfalls. This review highlights the MRI features of bone marrow involvement in lymphoproliferative diseases and emphasizes their role in disease detection, staging, and follow-up.

MRI Of The Ankle: A Structured Approach To Normal Anatomy And Reporting

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Magnetic Resonance Imaging (MRI) of the ankle is a cornerstone in musculoskeletal radiology due to the joint's complex anatomy and frequent involvement in trauma and sports-

related injuries. Precise interpretation demands a systematic understanding of normal anatomy, selection of appropriate imaging planes and sequences, and adoption of structured reporting for clarity and clinical value. This presentation outlines a stepwise approach to normal ankle MRI evaluation, based on widely accepted educational frameworks such as Radiopaedia and RSNA RadReport. The assessment begins with a review of: Bones and cartilage – talus, calcaneus, tibia, fibula, articular surfaces, and marrow signal. Ligamentous structures – lateral (ATFL, CFL, PTFL), medial (deltoid complex), and syndesmotic (AITFL, PITFL) ligaments. Tendons and soft tissues – anterior, medial, lateral, and posterior groups, including tendon sheaths and bursae. Joint capsule and synovium – effusion, thickening, and synovitis patterns. The second part of the lecture focuses on structured reporting, presenting key elements that improve communication, reduce errors, and facilitate research and AI-based data mining. Examples include RSNA's RadReport ankle templates and the European Society of Musculoskeletal Radiology (ESSR) recommendations. By integrating anatomical precision with standardized reporting, radiologists can enhance diagnostic accuracy, streamline workflow, and produce AI-ready reports. Attendees will gain a clear, reproducible approach for interpreting and documenting ankle MRI studies in daily clinical practice.

MWA Of Renal Mass And Follow Up

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Microwave ablation (MWA) is a minimally invasive and effective option for managing small renal masses, especially in patients unfit for surgery. It generates rapid tissue heating through electromagnetic energy, causing coagulative necrosis. Compared with radiofrequency ablation, MWA offers faster ablation, higher intratumoral temperatures, and less heat-sink effect, resulting in excellent local control for tumors ≤4 cm. Pre-procedural imaging—mainly multiparametric MRI (mpMRI) and CT—is crucial for patient selection, tumor characterization, and planning. mpMRI techniques such as diffusion-weighted and dynamic contrast-enhanced imaging provide detailed assessment of tumor size, location, and vascularity, guiding applicator positioning and ablation parameters. Post-ablation follow-up relies on mpMRI or CT at 1, 3, 6, and 12 months to confirm treatment success, identify residual or recurrent disease, and monitor complications. mpMRI, with its superior soft-tissue contrast and ADC mapping, distinguishes post-ablation changes from viable tumor tissue. Reported local recurrence rates after MWA are 5–10% at 5 years for T1a lesions, with a low risk of hemorrhage or ureteral injury. Recent advances—including real-time temperature monitoring and improved imaging guidance—are enhancing accuracy and safety. Overall, MWA is a reliable, image-guided therapy for small renal masses, offering durable oncologic control and minimal morbidity in carefully selected patients.

Localization of non-palpable breast lesions

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Introduction: Screening mammography and improvements in imaging have increased detection of non-palpable clinically occult breast lesions, which require preoperative localization. In females with non-palpable breast cancer, various randomized trials showed that BCS is the treatment of choice. The main challenge when resecting non-palpable tumors is to obtain clear margins, while minimizing resection of healthy breast tissue with associated good cosmetic outcomes. Different technics of lesion localization. Notably, although there are many drawbacks in wire-guided localization, it can ignore the depth of the lesion, and allow replacement, which is currently the most broadly used localization technology. Alternative localization methods have been developed to address the limitations of WL, including: *radioactive seeds, *radar reflectors, *magnetic seeds, and radiofrequency identification *(RFID) tags Each one of them has its own limitations and drawbacks. In this brief review the wire localization technic and interesting cases will be discussed.

Nodes and metastasis: Navigating N and M staging

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Axillary ultrasound is routinely used as part of the pretherapeutic clinical evaluation of patients with early breast cancer and is recommended by recent guidelines. It plays an important role in the determination of the pretherapeutic axillary lymph node status, which is an important prognostic factor for disease recurrence and overall survival and which aids in the selection of therapy regimens for invasive breast cancer. Furthermore, new staging approaches in the context of neoadjuvant systemic treatment, such as targeted axillary dissection (TAD) and axillary marking, aim to identify patients not requiring axillary lymph node dissection. These new staging approaches require pretherapeutic identification of suspicious lymph nodes via ultrasound and their re-evaluation after neoadjuvant treatment [4,5. ACOSOG Z0011, a prospective randomized trial, showed that in cases with limited metastasis in the SLN, ALND can be omitted with equal overall survival for patients receiving breast conservative treatment (including radiotherapy and adjuvant systemic treatment). Also in the era since the ACOSOG Z0011 trial, ultrasound also might gain more importance in the pretherapeutic quantification of axillary nodal burden and in the selection of eligible patients that do not benefit from axillary surgery. CT of thorax & abdomen and pelvis (CT-TAP) remains the standard in the identification of metastatic disease in patients with newly diagnosed breast cancer. PET is a useful test for staging or re-staging breast cancer because its higher accuracy for finding local or distant disease, when compared to other imaging modalities. PET is sensitive in detection of clusters of tumor cells that have taken hold in other tissues or organs in the body.

Neuroanatomic Considerations In Percutaneous Tumor Ablation

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Background: Percutaneous tumor ablation is increasingly used for oncologic management, but proximity to critical neural structures poses risk of thermal or mechanical nerve injury.

Methods: Relevant neuroanatomic pathways in thoracic, abdominal, and pelvic regions were reviewed. Mechanisms of nerve injury from radiofrequency, microwave, cryoablation, and electroporation were analyzed. Protective techniques such as fluid or gas insulation, balloon displacement, and neurophysiologic monitoring were emphasized.

Results: Nerve injury can occur at ≥44°C or ≤–10°C. Proper anatomic mapping, use of insulation methods, and real-time monitoring (EMG, MEPs) significantly reduce complications. Case examples demonstrated safe cryoablation near the brachial and lumbar plexuses using displacement and monitoring strategies.

Conclusion: Detailed neuroanatomic knowledge and tailored protective techniques are essential for safe and effective percutaneous tumor ablation.

Neuroradiology Interactive Cases Presentation

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Professor Of Radiology

Shamim Shafieyoon MD

Assistant Professor Of Radiology
Isfahan University Of Medical Sciences

This session will focus on the presentation of interesting and challenging cases in neuroradiology. The aim is to provide participants with a dynamic and interactive learning environment in which various cases from different subspecialty areas of neuroradiology will be discussed. Through case-based presentations, participants will be encouraged to actively engage in diagnostic reasoning, differential diagnosis, and problem-solving. The interactive format is designed to promote knowledge exchange, stimulate critical thinking, and enhance practical skills in everyday radiological practice.

New Contrast Agent In US And MRI

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Contrast-enhanced ultrasound (CEUS) and hepatobiliary (HB) magnetic resonance imaging (MRI) provide complementary strategies for lesion characterization. CEUS uses microbubble-based agents to enhance real-time vascular perfusion and microvascular dynamics with high temporal resolution, aiding rapid differentiation of benign from malignant lesions and guiding biopsies. HB MRI employs hepatocyte-specific gadolinium-based agents to achieve a delayed HB phase, enabling distinction between hepatocyte-rich tissue and non-hepatocellular pathology via signal behavior on T1-weighted imaging and related sequences. The HB phase leverages active hepatocyte uptake and biliary excretion to improve lesion characterization, particularly for focal nodular hyperplasia, adenoma, hepatocellular carcinoma, metastases, and cholangiocarcinoma.Also this provides a functional map of biliary tract integrity which is particularly relevant in biliary injuries.

Non-Surgical Management Of Uterine Myoma In Women with AUB

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Background: Uterine fibroids are the most common benign tumors of the uterus, often causing bleeding, pain, and infertility. Minimally invasive interventional radiology techniques offer effective alternatives to surgery with faster recovery and uterine preservation.

Methods and Techniques: Uterine Artery Embolization (UAE): Performed via femoral or radial access under fluoroscopy. Embolic particles occlude uterine arteries, inducing ischemic necrosis and fibroid shrinkage.

Microwave Ablation (MWA): Under ultrasound or MRI guidance, energy at 2.45 GHz creates rapid coagulative necrosis within the fibroid. Suitable for solitary or dominant lesions with precise localization.

High-Intensity Focused Ultrasound (HIFU): A noninvasive, MRI- or US-guided technique focusing acoustic energy to thermally ablate fibroid tissue without skin puncture.

Results and Outcomes: All three methods effectively reduce fibroid volume and symptoms. MWA and HIFU provide targeted, localized therapy with minimal discomfort, while UAE is preferred for multiple or large fibroids. Complications are rare and usually self-limited.

Conclusion: Interventional therapies such as UAE, MWA, and HIFU represent safe, uterus-sparing options for symptomatic fibroids. Selection should be individualized based on fibroid size, number, location, and patient fertility goals.

NST And Biophysical Profile (BPP)

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Assessment of fetal well-being is a critical component of obstetric care, particularly in pregnancies complicated by risk factors for hypoxia or intrauterine death. The primary objective is to identify fetuses at risk so that timely interventions, including early delivery, can be undertaken to reduce morbidity and mortality. Several techniques are available, including ultrasound-based biophysical profile (BPP), nonstress test (NST), and amniotic fluid assessment. The BPP, usually performed after 28 weeks of gestation, integrates ultrasound parameters—fetal movement, tone, breathing activity, and amniotic fluid volume—with or without an NST. Each parameter is scored as 0 or 2, producing a total of 8 (ultrasound only) or 10 (with NST). Scores of 8–10 are generally reassuring, 6 is considered equivocal, while 0–4 indicates significant fetal compromise requiring urgent intervention. The modified BPP, which combines an NST with amniotic fluid assessment, offers a simpler yet effective alternative. The NST evaluates fetal heart rate reactivity, reflecting the premise that a well-oxygenated fetus will show spontaneous accelerations. A reactive NST suggests normal status, whereas nonreactive results may indicate hypoxia or be influenced by fetal sleep, maternal medications, or chronic conditions, necessitating further testing. Amniotic fluid assessment provides essential information on placental function and fetal condition. While both the amniotic fluid index (AFI) and the single deepest vertical pocket (DVP) are used, current guidelines favor DVP as it reduces unnecessary interventions without compromising perinatal outcomes. Collectively, the BPP, NST, and amniotic fluid assessment are reliable and reproducible tools for antenatal surveillance. Their combined use improves risk stratification, guides management, and optimizes perinatal outcomes in high-risk pregnancies.

NT & Normal Fetal Anatomy In First Trimester (hand On)

Reza Mardani MD

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The NT and first trimester scan workshop aims to provide radiologists with dedicated training in both basic and advanced first trimester anomaly scans, focusing on aneuploidy risk assessment and the detection of structural anomalies. The scan will be performed between 11 and 14 weeks of gestation (when the crown-rump length is between 45 mm and 84 mm). NT measurement methods based on FMF criteria will be explained. Key aspects to be practiced for obtaining a standard NT measurement include sufficient image magnification, acquiring a standard mid-sagittal view of the face, ensuring the fetus is in a neutral position, correct placement of calipers on the nuchal line, and measuring NT in cases with a nuchal cord. Newer sonographic markers for aneuploidy will also be discussed, including nasal bone (how to interpret as present or

absent), ductus venosus (PI, positive or reversed a-wave), tricuspid regurgitation, hepatic artery PI, and aberrant right subclavian artery (ARSA), all explained according to standard criteria. After aneuploidy risk assessment, a systematic approach to evaluating different fetal parts will be presented, with a focus on pearls and pitfalls in early fetal echocardiography (how to assess situs, axis, four-chamber view, three-vessel and trachea view, etc.) and neurosonography (common posterior brain anomalies, etc.).

NT & Normal Fetal Anatomy In First Trimester (hands On)

Seyedeh Mahdieh Seyedebrahimi MD

Department Of Radiology,
Faculty Of Radiology,Mahdieh Hospital,
Shahid Beheshti University Of Medical Sciences,
Tehran, Iran

The NT and first trimester scan workshop aims to provide radiologists with dedicated training in both basic and advanced first trimester anomaly scans, focusing on aneuploidy risk assessment and the detection of structural anomalies. The scan will be performed between 11 and 14 weeks of gestation (when the crown-rump length is between 45 mm and 84 mm). NT measurement methods based on FMF criteria will be explained. Key aspects to be practiced for obtaining a standard NT measurement include sufficient image magnification, acquiring a standard mid-sagittal view of the face, ensuring the fetus is in a neutral position, correct placement of calipers on the nuchal line, and measuring NT in cases with a nuchal cord. Newer sonographic markers for aneuploidy will also be discussed, including nasal bone (how to interpret as present or absent), ductus venosus (PI, positive or reversed a-wave), tricuspid regurgitation, hepatic artery PI, and aberrant right subclavian artery (ARSA), all explained according to standard criteria. After aneuploidy risk assessment, a systematic approach to evaluating different fetal parts will be presented, with a focus on pearls and pitfalls in early fetal echocardiography (how to assess situs, axis, four-chamber view, three-vessel and trachea view, etc.) and neurosonography (common posterior brain anomalies, etc.).

Obstetric Emergencies: Role Of Imaging

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Obstetric emergencies are among the most critical conditions radiologists encounter, demanding rapid diagnosis and clear communication. The guiding principle is “maternal survival first”, as stabilizing the mother optimizes fetal outcomes.

- Ultrasound: is the frontline modality—safe, fast, and accessible.
- MRI: serves as a problem-solving tool for stable patients when sonographic findings are unclear.

- CT: is justified when maternal life is threatened, using dose-minimizing techniques. Major maternal emergencies include:
  1- Ectopic pregnancy: empty uterus, adnexal mass, and hemoperitoneum indicating rupture.
  2- Placental abruption: retroplacental hematoma on US or hemorrhage on MRI.
  3- Placenta accreta spectrum: loss of clear zone, placental lacunae, uterine bulge.
  4- Uterine rupture: wall discontinuity, fetal parts outside uterus, hemoperitoneum.
  5- HELLP syndrome/hepatic rupture: subcapsular hematoma or active bleeding, best seen on CT.
  6- Ovarian torsion: enlarged ovary with peripheral follicles and a twisted pedicle.

Fetal emergencies include "cord prolapse", "fetal demise", and "acute amniotic fluid changes", which may be confirmed or supported by imaging.

Key takeaways: recognize life-threatening conditions quickly, use imaging judiciously, and communicate decisively. In obstetric crises, the radiologist's timely interpretation and teamwork can be lifesaving for both mother and fetus.

Optimized Contrast-Free MRI Protocols For Multiple Sclerosis Lesion Activity Detection Using Machine Learning

Mohammadreza Elhaie MD

Editor At The Saudi Journal Of Radiology;
International Advisory Board,
Journal Of Medical Imaging And Interventional Radiology

Introduction (Background & Objectives): To evaluate the efficacy of contrast-free MRI sequences—T1-weighted (T1W), T2-weighted (T2W), Fluid-Attenuated Inversion Recovery (FLAIR), Diffusion-Weighted Imaging (DWI), and Susceptibility-Weighted Imaging (SWI)—alone and in combination, for classifying Multiple Sclerosis (MS) lesion activity using a radiomics-driven machine learning framework, aiming to reduce reliance on gadolinium-enhanced imaging.

Material & Methods: Retrospective analysis of MRI data from 31 MS patients (187 lesions; 39% active) was conducted using a 1.5 T Siemens scanner. Approximately 7,500 radiomic features were extracted from T1W, T2W, FLAIR, DWI, and SWI, refined to 214–108 features via correlation filtering and sequential forward selection. LightGBM models were trained on individual sequences, pairwise, and multi-sequence combinations, with performance assessed on a 28-lesion test set via AUC-ROC, sensitivity, specificity, and precision-recall AUC. Noise robustness was tested.

Results: FLAIR led single-sequence performance with an AUC-ROC of 0.83 (95% CI: 0.77–0.89), followed by T2W (0.80) and SWI (0.76), surpassing DWI (0.72) and T1W (0.69). The FLAIR+T2W+SWI triplet achieved an AUC-ROC of 0.88 (95% CI: 0.83–0.93), matching the five-sequence model (0.89, p=0.31). Texture (52.3%) and wavelet (31.8%) features were critical, with robust performance under noise (AUC 0.86).

Conclusion: The FLAIR+T2W+SWI combination provides high accuracy for MS lesion activity classification without gadolinium, supporting safer and cost-effective MRI protocols. Single-center results require multi-center validation to ensure generalizability.

Ovarian Masses In Pregnancy: Who Is Required To Be Referred To Gyneco-Oncologist?

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Adnexal masses are identified in pregnant patients at a rate of 2 to 20 in 1000, approximately 2 to 20 times more frequently than in the age-matched general population. Although most adnexal masses in pregnancy can be safely observed and approximately 70% spontaneously resolve. Characterising an ovarian mass during pregnancy is essential to avoid unnecessary treatment and, if treatment is required, to plan it accordingly. IOTA ultrasound morphological classification seems useful in the characterization of ovarian masses during pregnancy. A clinical and morphological based algorithm for counseling patients has been designed.MRI of the pelvis with post-contrast sequences is indicated when adnexal masses are indeterminate at the US examination. However, the administration of intravenous gadolinium-based contrast agents is a method that should have a limited use in pregnant women. the diagnostic accuracy of the Non-Contrast MRI Score (NCMS) in pregnant women, using subjective assessment (SA) is helpful. Due to the risk of adverse fetal and maternal outcomes associated with surgery during pregnancy, conservative management is preferred when it is deemed safe. Multi-disciplinary team approach is recommended for complicated and malignant adnexal masses.

Ovarian Torsion Imaging, Considering Massive Ovarian Edema

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Ovarian torsion is a critical condition that requires timely diagnosis to prevent permanent ovarian damage. The challenge arises when massive ovarian edema simulates the imaging characteristics of torsion, complicating the diagnostic process. Ovarian torsion is identified by a combination of enlarged ovary, associated free fluid, and often a twisted vascular pedicle. In cases of massive edema, imaging might demonstrate stromal swelling and peripheral follicular presence, mimicking torsion without vascular compromise. Due to the overlapping imaging findings, the distinction between massive ovarian edema and torsion is crucial. Misdiagnosis may lead to unnecessary surgical interventions or, conversely, a delay in life-saving procedures. Radiologists must remain aware of the subtle differences in imaging presentations of ovarian torsion and massive ovarian edema.

Papillomas And Papillomatosis: When Is It More Than Benign?

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Women's Imaging Fellowship,
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Zanjan University Of Medical Sciences, Zanjan,Iran

Abstract Papillary lesions of the breast, encompassing solitary papillomas and diffuse papillomatosis, present a wide imaging spectrum that often overlaps between benign and malignant entities. Radiologic evaluation plays a pivotal role in their detection, characterization, and management planning. On multimodality imaging, these lesions commonly manifest as intraductal or intracystic masses with variable internal vascularity and cystic-solid architecture. Benign papillomas typically demonstrate smooth or lobulated margins, internal echogenic fronds, and a vascular stalk on ultrasound, often correlating with circumscribed or partially obscured subareolar masses or focal asymmetries on mammography. In contrast, irregular borders, heterogeneous internal echoes, or associated microcalcifications raise suspicion for atypia or malignancy. MRI further refines assessment through its superior tissue contrast and kinetic analysis; lesions exhibiting smooth margins with persistent or plateau enhancement patterns tend to be benign, whereas rapid initial enhancement, washout kinetics, and internal septations suggest malignant potential. Integration of findings across all imaging modalities, supported by targeted image-guided biopsy, is essential for accurate diagnosis. Recognizing discordant features—such as radiologic suspicion with benign histology—should prompt careful multidisciplinary review. A comprehensive multimodality approach not only enhances diagnostic confidence but also minimizes unnecessary surgery while ensuring prompt identification of lesions with malignant transformation. Awareness of subtle imaging patterns and their correlation with pathology remains key to distinguishing when a papilloma is more than benign.

Paraganglioma

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surgery of paraganglioma and the best treatment of tumor and complications of surgery

PASH Incovered: Case-Based Lessons From A Benign Mimicker.

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Title: Insights into Pseudoangiomatous Stromal Hyperplasia (PASH) in Diagnostic Radiology Abstract: In this presentation, I will delve into the intriguing condition known as pseudoangiomatous stromal hyperplasia (PASH), a rare but significant benign breast pathology often encountered in clinical practice. Through a series of clinical cases, I will highlight the key radiological features of PASH, including its presentation on mammography, ultrasound, and MRI. I will discuss the characteristic imaging findings, such as irregular masses with well-defined margins, which can often lead to diagnostic challenges when differentiating PASH from malignant lesions. Furthermore, I will share insights from our recent study, which analyzed multiple cases to better understand the clinical implications and management strategies for patients diagnosed with PASH. The goal of this talk is to enhance awareness among radiologists regarding the distinctive features of PASH, promote accurate diagnosis, and reduce the likelihood of unnecessary interventions. By the end of the presentation, attendees will have a clearer understanding of PASH, its implications in diagnostic radiology, and the importance of a nuanced approach in interpreting breast imaging findings.

Pediatric Demyelinating And Inflammatory Brain Lesions

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Demyelinating and inflammatory brain diseases in the pediatric population represent a heterogeneous group of disorders, including acute disseminated encephalomyelitis (ADEM), pediatric-onset multiple sclerosis, myelin oligodendrocyte glycoprotein antibody–associated disease (MOGAD), and neuromyelitis optica spectrum disorders. Early and accurate imaging evaluation is essential to distinguish these conditions, as clinical presentations often overlap and management strategies differ. Magnetic resonance imaging (MRI) is the modality of choice, offering high sensitivity for detecting white matter abnormalities, lesion distribution, and disease activity. Typical features include large, bilateral, and asymmetric lesions in ADEM, periventricular and callosal plaques in multiple sclerosis, and optic nerve or brainstem involvement in MOGAD and NMOSD. Advanced MRI techniques, such as diffusion tensor imaging, magnetization transfer imaging, and MR spectroscopy, provide additional information on microstructural and metabolic alterations. Recent developments in volumetric analysis, lesion quantification, and machine learning are further improving diagnostic accuracy and long-term monitoring.

Pediatrics Pelvic Tumors

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Tabriz University Of Medical Sciences

Ovarian malignancy, in children and adolescents is reported in 10%–20% of all ovarian masses or neoplasms and comprises approximately 1%–2% of all childhood malignancies. These tumors are rare compared with in adults but are the most common genital tumor, accounting for 60%–70% of all gynecologic malignancies in this age group. ovarian tumors constitute an important part of pediatric oncology and often create diagnostic dilemmas. germ cell tumors(GCTs), are the most common type(60%–80%) of pediatric ovarian tumor, followed by surface epithelial stromal tumors and sex cord–stromal tumors(SCSTs) and dysgerminoma is the most common malignant GCT in childhood and adolescence. Ovarian teratoma is composed of mature or immature tissues derived from more than one of the three primitive embryonic layers (ectoderm, mesoderm, and endoderm) and some are incidental findings and can become apparent as a large painless mass. they can also twist, especially when the diameter is > 5 cm and cause an acute abdomen. Sacrococcygeal teratoma is arising in the sacrococcygeal region and composed of all three germ cells.it is most common congenital tumor in the fetus and neonate and thought to arise from totipotent cells from the node of Hensen at the anterior aspect of the coccyx and thus coccyx is almost always involved. Rhabdomyosarcoma is the most common soft tissue tumors, in children and can develop almost anywhere but mostly in the head and neck region and in the genitourinary tract and the age of the patient, generally below 15 years. Ewing sarcoma, is second most common malignant primary bone tumors of childhood (after osteosarcoma) and usually present as moth-eaten, destructive, and permeative lucent lesions in the shaft of long bones, with a large soft tissue component and typical onion skin periostitis. These tumors may also involve flat bones and can appear sclerotic in up to 30% of cases.

Percutaneous Management Of Malignant Biliary Strictures

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Medical Imaging Research Center,
Shiraz University Of Medical Sciences.

This review outlines the critical role of Interventional Radiology (IR) in managing malignant biliary strictures (MBS). When endoscopic drainage is not feasible, percutaneous transhepatic biliary drainage (PTBD) serves as the primary IR procedure for decompressing the obstructed system. Following PTBD, internalization of flow can be achieved with internal-external catheters or, for longer-term patency, via the placement of self-expandable metal stents (SEMS). The approach is particularly valuable for complex hilar obstructions (Bismuth

III/IV), where selective catheterization of specific ducts is necessary. Technical success rates for PTBD and subsequent stenting exceed 90%, effectively relieving jaundice and improving quality of life. Major considerations include managing catheter-related discomfort and the risk of complications such as cholangitis, hemorrhage, or bile leakage. In conclusion, percutaneous interventions are palliative care for MBS, offering a safe and effective alternative or adjunct to endoscopic techniques. The optimal management strategy requires a multidisciplinary approach tailored to individual patient anatomy and prognosis.

Perihepatic Space: Anatomy And Implications

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The perihepatic space represents a complex anatomical region that serves as a key crossroads between the liver, diaphragm, peritoneal reflections, and adjacent visceral structures. A thorough understanding of its anatomy is essential for accurate interpretation of imaging findings, particularly in radiology practice where subtle changes in this compartment may provide early clues to underlying disease. The intricate arrangement of the coronary, triangular, and falciform ligaments, along with potential recesses such as the subphrenic and subhepatic spaces, creates distinctive pathways for disease spread and fluid accumulation. From a clinical perspective, the perihepatic space is frequently involved in inflammatory and infectious processes. Conditions such as perihepatitis, abscess formation, and secondary extension of intra-abdominal infections demonstrate characteristic imaging features within this region. Similarly, malignant disease often exploits these anatomic recesses, demonstrating preferential seeding or direct invasion patterns. Recognizing these patterns is crucial for staging, treatment planning, and prognostication. Moreover, lesions with fat attenuation in the perihepatic space—ranging from benign entities such as pseudolipoma of glisson capsule and lipomas to malignant liposarcomas—pose diagnostic challenges. Differentiating these lesions relies on careful analysis of imaging characteristics across CT and MRI, in conjunction with clinical context. This presentation will review the normal anatomy of the perihepatic space and highlight its implications in inflammatory, infectious, and malignant processes, as well as fat-containing lesions. Emphasis will be placed on practical imaging pearls and potential diagnostic pitfalls that radiologists encounter in daily practice. By correlating anatomy with pathologic processes, this session aims to enhance confidence in interpreting perihepatic findings and improve diagnostic accuracy.

Pitfalls Of The Vague Radiology Report

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Birjand University Of Medical Sciences

For various reasons, referrals to specialists and radiology departments have increased and are increasing today. One of the most important reasons is that modern medicine is based on evidence and documentation, or Evidence-based medicine (EBM). Although this has provided good professional opportunities for radiologists, it can also bring with it numerous legal problems and responsibilities. This lecture will give some interesting examples in this regard. The bridge between the radiologist and the clinician is one thing: the radiology report. And this is the most important issue that can be judged in problematic and legal cases. The radiology report should be free from ambiguity and vague, generalization, or exaggeration. Two important features of a radiology report are: Clarity and meaningfulness. In their valuable book Principles as Radiology Reporting: Principles and Practice, Riwak et al. explain 16 important and key points about radiology reports, and I will also mention them in this lecture. There are five most Common Errors in Radiology that a radiologist should be familiar with them and try to resolve them.

These are include:

1. Misdiagnosis Errors,
2. Incidentalomas,
3. Technical Errors,
4. Miscommunication Errors,
5. Inadequate Training Errors.

Ultimately, a radiologist should try to provide a standard and complete report that can properly explain the patient's problem and convey the importance of the issue to the treating physician for appropriate action and treatment.

Post Op Evaluation Of Soft Tissue Tumors: Normal Features, Recurrence And Updates Of Advanced Techniques:

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Postoperative imaging of soft tissue tumors has a significant diagnostic challenge. Regarding the type of primary soft tissue tumor and their biology and extensions, there are several surgical plans as intralesional, marginal, wide and radical excisions (with different amounts of tissue removal) and adjuvant therapy including Radiotherapy and chemotherapy. The normal post op imaging findings, complications, nonmalignant imaging findings as seroma, hematoma, lymphocele, scar and pseudotumor, post radiation changes and finally recurrence pattern could be dependent not only to surgical procedure but also to other adjuvant therapy. This is a short review for the radiologist to be familiar with different post treatment radiological findings of soft tissue tumors and updates of advanced imaging to differentiate them.

Post Treatment Imaging Of Prostate Cancer

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The Prostate Imaging for Recurrence Reporting (PI-RR) scheme was introduced in 2021 in an effort to formalize the performance and interpretation of pelvic MRI for the assessment of local recurrence after RP and RT. Whether assessing the post-RP or post-RT pelvis, subtraction imaging for DCE acquisitions helps increase the conspicuity of early enhancement of suspicious lesions. Most local recurrences after RT occur at the site of the primary tumor, with less than 10% occurring elsewhere. DWI and DCE are considered dominant sequences for PI-RR scoring after RT, with the higher of either score resulting in the final PI-RR characterization. The VUA and perianastomotic region is the most common site of local recurrence after RP. Other potential sites include the rectovesical space, seminal vesicles, pelvic floor abutting the levator ani muscles, and, less commonly, the penis.

Practical Imaging Interpretation In Nodular Opacities Of Lung

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-The anatomic distribution of small nodules is generally of more value in differential diagnosis. -nodular pattern can appear perilymphatic (lymphatic), randomly distributed, or centrilobular -Centrilobular Distribution; Useful first step to see whether nodules have a branching, V- or y-shaped configuration (tree in-bud pattern),the differential diagnosis is limited, and infection or aspiration -other useful data for approach; Ancillary findings(coexistent bronchiectasis) ,Attenuation of centrilobular nodules, Distribution of centrilobular nodules, History (e.g., Acute vs. Chronic symptoms, fever, exposures) -diffuse and symmetrical distribution :HP, RB/RB-ILD, FB, viral infections, pulmonary edema, and other vascular abnormalities -Asymmetric, patchy, or multifocal distribution:endobronchial spread of infection (e.g., bacterial, mycobacterial, fungal), aspiration, and invasive mucinous adenocarcinoma -Random Distribution;Disorders associated with hematogenous spread to the lungs; Miliary infection, Metastatic Cancer -Perilymphatic /Lymphatic Distribution: classically seen in patients with sarcoidosis, Lymphangitic spread of carcinoma or lymphoma, Certain pneumoconioses (silicosis, CWP, berylliosis, talcosis), Lymphoproliferative diseases such as lymphoid interstitial pneumonia (LIP), amyloidosis, some patients with tuberculosis

Practical Imaging Interpretation In Reticular Opacities Of Lung

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University Of Medical Science, Tehran, Iran

The most common cause of reticular opacities of lung is Interlobular septal thickening (ILST). ILST is a High-Resolution Computed Tomography (HRCT) finding indicating fluid or other infiltrative substances within the lung's interlobular septa, which define the secondary pulmonary lobules. The morphology of the thickening—smooth, nodular, or irregular—and the location of involvement provide clues for the differential diagnosis. Smooth ILST can suggest pulmonary edema or viral infection, nodular ILST points towards processes like sarcoidosis or lymphangitic carcinomatosis, and irregular ILST is associated with fibrotic lung diseases. Herein, a review of the approach to lung reticular opacities is presented, including a step-by-step guide for image interpretation and additional guidance in clinical practice

Prenatal Diagnosis Of Fetal Hands And Feet Anomalies: Sonographic Findings

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Fetal ultrasonography is the most important tool to provide prenatal diagnosis of fetal hand or foot anomalies. Looking for other associated abnormalities is helpful to suspect chromosomal abnormalities or a single-gene disorder. According to the pathogenic point of view, limb abnormalities are classified as malformation (resulting from an intrinsically abnormal developmental process), deformation (abnormal shape or position of part of the body caused by mechanical forces), or disruption (morphologic defect of an organ, part of an organ, caused by an extrinsic factor with a normal developmental process). Anomalies of the hands and feet may involve all limbs or be focal. In cases with a positive family history of limb anomalies or a previous exposure to known teratogens, a focused US examination of the fetal hand and foot is mandatory. The fetal hand and foot malformations are categorized as follows:

(a) position/alignment abnormalities (clenched hand, camptodactyly, clinodactyly, hypokinesia, clubhand),
(b) abnormal size (macrodactyly, trident hand),
(c) abnormal number of digits (polydactyly, syndactyly, ectrodactyly),
(d) abnormal thumb,
(e) abnormal echogenicity (calcifications),
(f) Amniotic band sequence.

The following anatomic structures must be identified, including their presence, number, size, morphology, position, and relationship:

(a) unossified hypoechogenic carpus
(b) Five hyperechoic and cylindrical metacarpal bones
(c) five independent digits of different length with three ossified phalanges (two for the thumb)

(d) and a normal radius, ulna, and humerus Complete fetal and cardiac ultrasound examinations are essential to determine the presence or absence of associated abnormalities.

The goal of this review is to describe the prenatal diagnosis of fetal hand or foot anomalies in ultrasonography.

Keywords: Fetal Hands and Feet; Prenatal Diagnosis; Anomaly; ultrasound

Prostate Cancer Diagnosis And Management A Multidisciplinary Panel Discussion

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The Prostate Imaging for Recurrence Reporting (PI-RR) system was introduced in 2021 to standardize the performance and interpretation of pelvic MRI after whole-gland treatment with radical prostatectomy (RP) or radiation therapy (RT). The Prostate Imaging Reporting and Data System (PI-RADS) defines technical and reporting standards for imaging prostate cancer before treatment. Although similar imaging techniques can be applied in assessing the treated prostate gland, the interpretation varies substantially between PI-RADS and PI-RR. With PI-RADS, T2-weighted and diffusion-weighted imaging are emphasized for cancer detection. After treatment, the emphasis shifts in PI-RR to detect recurrence with dynamic contrast enhancement (DCE) imaging. Focal early enhancement on DCE images, and to a lesser degree marked diffusion restriction, are the key MRI findings of recurrence after RP and RT. Using nomenclature similar to that of PI-RADS version 2.1, PI-RR uses established knowledge of recurrent prostate cancer MRI features and systematically codifies scoring elements. The authors discuss the PI-RR rationale, technical standards, and reporting guidelines. The scoring system for posttreatment MRI after RT and RP is reviewed, exploring the relevant T2-weighted, diffusion-weighted, and DCE features for both scenarios. The use of PI-RR is illustrated through instructive cases.

Radiology Pathology Correlation

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"Radiology-Pathology Correlation in Breast Imaging: Ensuring Diagnostic Accuracy and Optimal Patient Care" This lecture focuses on the critical role of radiology-pathology correlation in breast imaging, emphasizing its importance in ensuring diagnostic accuracy, guiding patient management, and maintaining quality assurance in breast care. Through a systematic review of core biopsy results, imaging findings, and histopathologic outcomes, attendees will learn to identify concordant and discordant cases and understand the appropriate steps

to take when discrepancies arise. The lecture will cover the correlation of imaging features—such as masses, calcifications, and architectural distortions—with corresponding benign, high-risk, and malignant pathology. Real-world case examples will illustrate common pitfalls, interpretive challenges, and decision-making algorithms following image-guided biopsies. Special focus will be placed on communication between radiologists and pathologists, and how multidisciplinary collaboration improves diagnostic confidence and patient outcomes. This session is ideal for radiologists aiming to refine their interpretative skills and strengthen their role in breadt imaging

RECIST (Response Evaluation Criteria In Solid Tumors)

Dr. Hourieh Soleimani Bami MD

Assistant Professor Of Mashhad University Of Medical Science

RECIST criteria Baseline Study CT with IV contrast is the preferred imaging modality. Baseline and follow up CT scans should have identical scan parameters. Target lesions Measurable solid lesions must be 10 mm in the longest dimension. Measurable lymph nodes must be 15 mm in SAD. A maximum of five measurable target lesions (maximum of two lesions per organ) can be selected and measured. Non-target lesions Non-measurable lesions Lesions located in an area, that has been subjected to loco-regional therapy. New lesions Any new lesion means progressive disease a new lesion should be unequivocal Response categories Progressive Disease (PD) ≥ 20% increase in the sum of diameters of target lesions, taking as reference the smallest sum on the study. The appearance of one or more new lesions is always considered progression Unequivocal progression of non-target lesions is also considered progression Stable Disease (SD) Neither sufficient shrinkage to qualify for partial response nor sufficient increase to qualify for progressive disease, taking as reference the smallest sum of length diameters (SLD) while on the study. Partial Response (PR) At least a 30% decrease in the sum of length diameters (SLD) of target lesions, as compared to baseline sum diameters. Complete Response (CR) Disappearance of all target and non-target lesions. Any pathological lymph nodes must have reduction in short axis to <10 mm.

Rectal Cancer Staging — MRI Challenges And Treatment Impact

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Rectal cancer staging hinges on high-quality MRI to accurately assess tumor depth, nodal involvement, and circumferential resection margin (CRM). A key challenge is differentiating tumor invasion from inflammatory or desmoplastic tissue, which can blur boundaries and lead to misinterpretation. Image quality variability across scanners and protocols further

contributes to inconsistent staging between institutions. The tumor's location and proximity to the anal sphincter complicate evaluation of invasion into adjacent structures. Advanced techniques such as high-resolution 3D and multiparametric MRI can enhance accuracy, but they demand specialized expertise and longer acquisition times. Overstaging from edema or biopsy-related changes may push clinicians toward unnecessarily aggressive therapy, while understaging risks inadequate neoadjuvant planning and higher local recurrence. CRM status on MRI is a critical predictor of local control and heavily informs surgical decisions. Ultimately, MRI findings guide choices between neoadjuvant chemoradiation, total mesorectal excision, or organ-preserving strategies.

Rectal Cancer: Posttreatment Challenges In MRI

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Posttreatment MRI for rectal cancer faces key challenges: distinguishing residual tumor from fibrosis, edema, and inflammation; timing of assessment after neoadjuvant therapy; and surgical/anatomic distortions that complicate localization. Lymph node evaluation remains unreliable post-therapy, as micro-metastases may exist in normal-sized nodes and reactive nodes may enlarge. Radiation-induced injuries (enteritis, proctitis, strictures) and artifacts from motion or hardware further hinder interpretation.A multiparametric approach is recommended:High-resolution T2-weighted imaging plus diffusion-weighted imaging (DWI) with ADC measurements.Integrate MRI findings with clinical exam, endoscopy, and pathology to guide watchful waiting vs. salvage surgery.

Revisiting Breast Cancer: Classifying By Anatomical Origin And Imaging Biomarkers

Zahra Ghahremani MD
Taban Imaging Center

This presentation introduces a new way to classify breast cancer based on its anatomical site of origin, using mammographic imaging biomarkers. By linking large-format histopathology with imaging data, three fibroglandular tissue origins are highlighted: terminal ductal lobular units (TDLUs), major lactiferous ducts, and mesenchymal stem cells. Approximately 75%, 20%, and 5% of breast cancers arise from these respective sites. Each subgroup shows distinct clinical, histopathological, and imaging features, which closely relate to patient prognosis. This anatomical classification clarifies inconsistencies in traditional ductal-lobular terminology and emphasises the role of imaging biomarkers in breast cancer management.

Role Of Imaging For GI Bleeding: IR

Reza Naseri MD

Fellowship In Interventional Radiology
Assistant Professor Shahid Beheshti Medical University Loghman E Hakim Hospital

This is important to explore the critical role of various imaging modalities in the diagnosis and management of gastrointestinal (GI) bleeding, different types of GI bleeds, the challenges in identifying their sources, and how advanced radiological techniques provide crucial insights and therapeutic options.

Sarcoma Updates

Masih Rikhtehgar MD

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Soft tissue sarcomas (STS) represent a rare and heterogeneous group of mesenchymal malignancies with diverse histologic, molecular, and clinical characteristics. Recent updates in the World Health Organization (WHO) classification have redefined several tumor categories through integration of molecular and genetic insights, enhancing diagnostic precision and refining prognostic stratification. These developments underscore the growing importance of a multidisciplinary approach that combines pathology, radiology, surgical oncology, and medical oncology expertise. Imaging remains fundamental across all stages of STS management—from initial detection and characterization to local staging, treatment planning, and follow-up. Magnetic resonance imaging (MRI) continues to be the modality of choice for local assessment, providing superior soft tissue contrast and functional information through diffusion-weighted and perfusion sequences. Computed tomography (CT) and positron emission tomography (PET) complement MRI by evaluating tumor extent, guiding biopsy, and detecting metastatic disease. Characteristic imaging features of major sarcoma subtypes will be reviewed, emphasizing radiologic–pathologic correlation and differentiation from benign mimickers. This lecture will highlight key updates in classification, summarize characteristic imaging patterns, and review principles of local staging within a multidisciplinary framework. By integrating the latest diagnostic advances with evidence-based imaging and staging strategies, the session aims to enhance collaboration among specialties, improve diagnostic accuracy, and optimize patient outcomes in soft tissue sarcoma management

Screening Mammography Essentials: The Nuts & Bolts

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Introduction Screening mammography is a foundational public health intervention to detect breast cancer at an early, treatable stage in asymptomatic women. Its success hinges not just on imaging technology, but on the rigor of protocols, quality assurance, interpretive strategy, and system-level logistics. In this manuscript, I delineate the essential ("nuts and bolts") components of effective screening mammography programs, discuss current evidence, recognize limitations, and highlight evolving innovations that refine performance and mitigate harms. 1. Rationale, Benefits, and Harms 1.1 Rationale for Screening Breast cancer is among the leading causes of cancer morbidity and mortality in women globally. Early detection through imaging before clinical symptoms offers the potential to reduce advanced disease and mortality. Screening mammography aims to identify lesions not palpable or symptomatic, enabling earlier intervention and improved outcomes. 1.2 Quantitative Effectiveness Meta-analyses and trials estimate relative reductions in mortality of approximately 13–17 % in observational settings, and 15–25 % in earlier trials. 1.3 Harms and Trade-offs Screening mammography carries recognized harms: False positives and recall: Some screening exams prompt further diagnostic imaging or biopsy in women who ultimately are benign. Overdiagnosis: Detection of cancers Radiation exposure: Although mammographic radiation doses are low, cumulative exposure over repeated screening is considered in risk models. Psychological and procedural burden: Anxiety from recalls, biopsies, and the burden of additional procedures, which may deter repeat participation.

Resource use and cost: False positive workups, invasive procedures, and infrastructural demands impose system costs and patient burden. Thus, the net benefit of screening depends on optimizing sensitivity, specificity, and minimizing avoidable harms.

Segment Two: New Pathology Classifications

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the terminal ductal lobular units (TDLUs), the major lactiferous ducts, and in the stem cells of the mesenchyme. The resulting three cancer subgroups have distinctly different clinical, histopathological and mammographic presentations and different long-term outcomes. The relative frequency of these three breast cancer subgroups is approximately 75%, 20% and 5%, respectively. Classification of breast cancers according to their anatomic site of origin, as demonstrated with breast imaging and confirmed by subgross histopathology, correlates closely with the long-term patient outcome. Classification of breast cancers according to their site of origin helps overcome the inconsistencies in the current histopathologic terminology

with its ductal-lobular dichotomy. The ability of the imaging biomarkers to determine the site of tumor origin and serve as a prognostic indicator emphasizes the increasingly crucial role of breast imaging in the management of breast cancer. Basing breast cancer management upon anatomically relevant terminology challenges the conventional mindset. Our proposals are based on research results from an unprecedented number of prospectively collected nonpalpable breast cancers diagnosed at their earliest detectable phases and followed up for several decades.

Sellar–Suprasellar Masses Mimicking Pituitary Macroadenoma: Radiologic Differentiation

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Abstract The sellar and suprasellar regions are among the most diagnostically challenging areas in neuroimaging. While pituitary macroadenomas account for most masses, several non-pituitary lesions can mimic them clinically and radiologically. These lesions may expand the sella turcica, eroding its bony margins, and extend into the suprasellar cistern, compressing the optic chiasm and displacing the pituitary gland. Recognizing these entities is critical to avoid surgical misdirection and inappropriate endocrine treatment. Summary Several lesions can occupy the sella and exhibit solid or mixed enhancement, mimicking the imaging profile of a pituitary macroadenoma. Key non-pituitary mimics include meningioma (tuberculum or diaphragma sellae), papillary craniopharyngioma, Rathke's cleft cyst, pituicytoma and other posterior lobe tumors, lymphocytic or IgG4-related hypophysitis, metastases, germinoma, lymphoma, and thrombosed or giant aneurysms of the carotid or superior hypophyseal artery. Destructive skull-base tumors like chordoma and chondrosarcoma must also be considered. Conclusion In middle-aged patients—where macroadenomas are most common—the challenge is not only identifying the adenoma but confidently excluding its mimics. Our presentation outlines a structured radiologic approach that helps distinguish macroadenomas from look-alike lesions. This includes evaluating lesion origin, signal characteristics, enhancement pattern, bone involvement, and stalk morphology. A systematic strategy enables radiologists and clinicians to make high-confidence, high-impact decisions, avoiding unnecessary surgery and guiding appropriate systemic work-up. Ultimately, this ensures accurate presurgical planning and optimizes multidisciplinary care.

Silent Geometry Of The Coronaries – AI-Enhanced CAD-RADS And Plaque Quantification For Streamlined Workflow And Diagnostic Harmony

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CCTA is a first line test in stable symptomatic patient's, in intermediate to high pretest probability of obstructive coronary disease or among intermediate risk acute chest pain patients. CAD RAD2 is an extensively validated reporting system for coronary artery stenosis grading prognostic information and management suggestion. AI tools enhance CAD RAD 2 accuracy for plaque burdens evaluation and plaque characterization.

SIS Findings In Tamoxifen Related AUB: Challenges In The Gynecological Care Of Premenopausal Women With Breast Cancer

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For premenopausal breast cancer patients on tamoxifen, Abnormal Uterine Bleeding (AUB) presents a significant diagnostic challenge. Tamoxifen's estrogenic effect on the endometrium, combined with ongoing ovarian activity, creates a complex environment. Transvaginal Ultrasound (TVUS) is the first-line imaging tool, however, sometimes with equivocal findings, as tamoxifen-induced subendometrial cystic change artificially thickens the endometrial stripe, obscuring true pathology. Saline Infusion Sonohysterography (SIS) is the critical problem-solving modality. It accurately distinguishes benign findings from significant pathology. Key SIS findings include:

1. Benign Atrophy / Cystic Change: Prominent subendometrial cysts with a thin endometrial lining.
2. Endometrial Polyps: The most common pathologic finding; often multiple and large.
3. Endometrial Hyperplasia / Carcinoma: Appearing as diffuse irregular thickening or a heterogeneous mass.

The radiologist's report must be descriptive and actionable, guiding further management. It should clearly state whether findings are benign, suggest direct hysteroscopic resection for polyps, or recommend biopsy for suspicious lesions. Effective collaboration within the oncology-gynecologic team is dependent on precise SIS interpretation and reporting to ensure optimal patient care.

Skin And Cosmetic Ultrasound

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Cosmetic ultrasound in dermatology refers to the use of high-frequency ultrasound to visualize superficial skin structures, aiding in both assessment and treatment planning. This modality typically employs frequencies more than 17 MHz, which provide excellent resolution of the epidermis and dermis, as well as the superficial subcutaneous tissue. In cosmetic contexts, ultrasound helps identify filler type and its complications, guide noninvasive procedures, and document treatment response with objective, reproducible measurements.It also guides injections for fillers enabling precise targeting and reducing the risk of vascular injury. Beyond cosmetic assessment, dermatologic ultrasound has several indications that enhance patient care. It can distinguish inflammatory or infectious processes, characterize cysts, benign tumors, and vascular malformations, and assess depth and extent of lesions prior to procedures. In monitoring and follow-up, dermatologic ultrasound offers real-time, noninvasive imaging to track treatment outcomes.

Small Bowel Neoplasm

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Although , Small bowel accounts for more than 90 % of GI surface, Small bowel tumors represent less than 5 percent of GI tract tumors. However, they could be challenging due to variable clinical presentation, low index of suspicion and difficulties in their detection and these lead to delay in their diagnosis. Despite benign nature of most of them , the ones which require resection are mostly malignant. Four main histologic small bowel cancers include neuroendocrine tumors, adenocarcinoma, GIST and lymphoma. Adenocarcinoma and GIST are more common in duodenum and NETs and lymphoma are more common in ileum. Radiologists play a pivotal role in diagnosis of small bowel neoplasms. CT enterography and MR enterography provide the opportunity to increase detection and characterization of these tumors. Appropriat protocols are critical to success in detecting and characterizing these tumors. Besides benign and malignant small bowel tumors ,other nonneoplastic entities could be in differential diagnosis of focal small bowl lesions. Some of them include diverticulitis, crohn's disease, intramural hemorrhage, heterotopic pancreas and sclerosing mesenteritis. In this pictorial presentation, benign and malignant small bowel tumors will be reviewed and their imaging features especially will be described. Practical points about imaging techniques and clues to differential diagnosis will also be discussed.

Some Interesting Cases In Pediatric Brain Tumors

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Interesting cases in pediatric brain tumors Brain tumor is the most common type of solid organ malignancy and the most common cause of death due to solid neoplasm in children. Tumor location tends to vary with the age of the patient. Tumors in the first year of life occur with relative equal frequency in the infra and supratentorial compartments. After 1 year of age ,an infratentorial location is more common. Astrocytomas are the most common brain tumor in children. Pilocytic type is grade 1 tumor and make up 20-30% af all pediatric CNS tumors .Medulloblastoma is the most common posterior fossa tumor and most common brain tumor in children between the ages 6 and 11 is classically hyperdense on CT. Tumor is mildly hypointense on T2, restricted diffusion at DWI and elevated choline, reduced NAA and some times elevated taurine peak in MRS. All its subtypes are grade IV. CSF dissemination up to 30% at the time of diagnosis in MB and post contrast MRI of the brain and spine is the most sensitive imaging for netastasis. ATRT at posterior fossa tends to be similar to MB but younger children (<3Y) or more hemorrhage. Ependymoma has a bimodal incidence with peaks between the ages 1 and 5 years and in the 4th decade of life.Heterogenity within the tumor and pattern of growth through 4th ventricular outlet foramina, is suggestive of this tumor. Brain stem glioma vary from favorable prognosis of tectal tumor to pontine diffuse type as most common location with poor prognosis. Other or more rare brain tumors are also discussed or illustrated in real cases.

Sonographic Evaluation of Parametrium In Cervical Cancer (Can be an Altrrnative for MRI)

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Abstract Accurate assessment of parametrial involvement is a cornerstone in staging cervical cancer and guiding therapeutic decisions. While magnetic resonance imaging (MRI) remains the gold standard for evaluating parametrial invasion, transvaginal and transrectal ultrasonography have emerged as valuable, accessible, and cost-effective alternatives. Advances in high-resolution ultrasound and the expertise of gynecologic radiologists allow detailed visualization of the cervical stroma, tumor extent, and parametrial fat planes. Recent studies demonstrate comparable sensitivity and specificity of ultrasound to MRI in detecting parametrial infiltration, particularly when performed by experienced operators. Moreover, ultrasound offers additional advantages such as real-time assessment, dynamic evaluation, and availability in resource-limited settings. This lecture will review the sonographic technique for parametrial evaluation, discuss diagnostic criteria, highlight pitfalls and limitations, and

compare performance with MRI. The goal is to emphasize the evolving role of ultrasound as a reliable tool in the local staging of cervical cancer, potentially serving as a practical alternative to MRI in selected patients.

Sport Injuries Panel

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As a moderator of the Sports Injury Panel with a focus on the pelvis, ankle, knee, and lower limb muscles, I am dedicated to advancing clinical knowledge and research in the field of sports-related musculoskeletal injuries. With a background in physical medicine and rehabilitation, my role involves coordinating expert discussions, reviewing current evidence-based practices, and promoting interdisciplinary approaches to injury prevention, diagnosis, and treatment. I am Dr. Razieh ShahNazari, Associated Professor at Iran University of Medical Sciences, committed to fostering academic collaboration and improving patient outcomes through research-driven insights and clinical education in sports medicine.

Stent Assisted Coiling And Balloon Remodeling Techniques

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Abstract Background and purpose: Stent-assisted coiling and balloon-assisted coiling are 2 well-established techniques for treatment of wide-neck intracranial aneurysms. A direct comparative analysis of angiographic outcomes with the 2 techniques has not been available. We compare the angiographic outcomes of wide-neck aneurysms treated with stent-assisted coiling versus balloon-assisted coiling.

Stepwise Approach To Soft Tissue Mass What Modalities Are Useful Stepwise Approach Regardless Of Lesion Nature When We Need Bx And When Not

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Soft tissue lesions represent a frequent diagnostic challenge, with most being benign but some requiring thorough evaluation due to malignant potential. Imaging plays a pivotal role in differentiating these conditions, often reducing the need for invasive procedures. However, the considerable overlap in imaging features necessitates a structured diagnostic approach. Key elements include confirming the existence of a lesion, assessing clinical presentation, and considering lesion location, which often provides important diagnostic clues. Additional parameters—such as solid versus cystic composition, fat or calcification content, and characteristic signal intensities on MRI—further refine the differential. Specific imaging features, including size, deep location, heterogeneity, ill-defined borders, neurovascular encasement, and diffusion restriction, are suggestive of malignancy. By applying a systematic framework, imaging not only improves diagnostic accuracy but also guides patient management, highlighting cases that require biopsy or close follow-up.

Structural Reporting Of Uterine Niche In Non-Pregnant Women

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The global cesarean section (CS) rate is rising, raising concern about potential complications. One of the consequences is the development of a uterine niche, also known as diverticula, isthmocele, uterine pouch, or CSD (cesarean scar defect), defined as an indentation or defect at least 2 mm in the myometrium at the site of a previous cesarean scar, measured by transvaginal ultrasound. The majority of uterine niches are asymptomatic and often seen incidentally during an ultrasound. For assessment of the uterine niche, some basic rules should be kept in mind as follows:

1. The endometrium should not be included for the niche measurements.
2. The length, depth, and width of the niche are measured in the plane that is largest.
3. The residual myometrial thickness (RMT) is measured at its thinnest region.
4. The transverse plane is used only for measuring the width of the niche and to detect branches.

After measuring the largest length and depth of CSD in the sagittal plane, you should determine the transverse plane for width measurement and seek niche branches. Then

measure the adjacent myometrial thickness (AMT) and the residual myometrial thickness (RMT). AMT is measured at the thickest part, near the CSD base, and perpendicular to the cervical canal. RMT is measured at the site of the thinnest myometrium, from the tip of the main niche perpendicular to the serosa. There are some scoring systems for uterine niche assessment using CSD volume or surface area and supplementary features, which are discussed in this review in detail. Large niches are defined as residual myometrium thickness of < 50% of that of the adjacent myometrium or RMT under 2.2mm in TVS or under 2.5 mm in Saline infusion sonohysterography (SIS). A structural approach to uterine niche evaluation in non-pregnant women is provided in this review.

Keywords: Cesarean section; uterine niche; Cesarean scar defect; transvaginal ultrasonography

Structured Reporting Of Pancreatitis

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Background: Acute and chronic pancreatitis present with a wide spectrum of imaging findings, often associated with local and systemic complications. Conventional narrative reports may lack consistency and clarity, making clinical decision-making difficult. Structured reporting provides a standardized approach that improves communication between radiologists and clinicians.

Methods: We reviewed current literature and international recommendations, including the Revised Atlanta Classification and radiological severity indices. Based on these, we designed a structured reporting template for pancreatitis applicable to CT and MRI examinations. The template covers pancreatic parenchyma, peripancreatic collections, vascular and biliary complications, and severity assessment.

Results: The structured template enables comprehensive yet concise reporting. It ensures accurate description of necrosis extent, classification of collections (APFC, pseudocyst, ANC, WON), and recognition of complications such as venous thrombosis or biliary obstruction. Adoption of this system enhances interobserver consistency and facilitates multidisciplinary management by providing reproducible, clinically relevant information.

Conclusion: Structured reporting of pancreatitis integrates established classification systems into daily radiology practice. It improves clarity, reduces ambiguity, and strengthens radiologist–clinician communication. Implementation of such templates can standardize reporting, aid in treatment planning, and ultimately improve patient outcomes.

Temporal Bone CT Scan Anatomy In Brief

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Abstract: The temporal bone has a complex anatomy, housing the auditory, vestibular, and critical neurovascular elements. Computed tomography (CT) scanning plays a pivotal role in evaluating the temporal bone, providing high-resolution images that facilitate the assessment of the anatomy and pathology. The temporal bone comprises four parts: the squamous, mastoid, tympanic, and petrous parts. The squamous part is a thin, flat bony plate forming the anterior and superior aspects of the temporal bone. The mastoid part, posteriorly located, contains multiple air cells that communicate with the middle ear cavity and are important in mastoiditis evaluation. The tympanic part encircles the external auditory canal, and the petrous part contains the cochlea, vestibular apparatus, internal auditory canal, and critical neurovascular structures such as the facial nerve canal and carotid canal. High-resolution temporal bone CT allows detailed visualization of the ossicular chain (malleus, incus, and stapes), which is essential for assessing conductive hearing loss and middle ear pathology. The anatomy of the middle ear cavity, including the epitympanum, mesotympanum, and hypotympanum, is well delineated, aiding in the identification of middle ear pathologies. The external auditory canal and tympanic membrane can also be evaluated for trauma or infection. The internal auditory canal (IAC) and its contents—the facial nerve and vestibulocochlear nerve—are critical landmarks in the petrous temporal bone. CT imaging assists in detecting fractures, congenital anomalies, and neoplastic processes such as facial nerve schwannomas or vestibular schwannomas. In conclusion, temporal bone CT is vital for comprehensive anatomical assessment and diagnosis of a wide range of otologic and neurotologic disorders. A thorough understanding of the temporal bone's complex anatomy on CT is essential for accurate interpretation, guiding surgical planning, and improving patient outcomes.

The 3 Vessel-trachea-view: Normal And Common Abnormalities

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Congenital heart anomalies (CHDs) are one of the most common forms of congenital anomalies and are responsible for about 40% of perinatal deaths. The heart should ideally be assessed between 20 and 22 weeks' gestation. The 3VT view is a very important plane for the assessment of great vessels and the upper venous system, in addition to the neighboring anatomic structures in the upper mediastinum. For increasing the detection rate, teaching should not only include how to obtain this plane, but it should also focus on the patterns of detectable anomalies. The transverse aortic arch is better visualized and its relationship with the trachea and the pathologies

related (co- aorta, right aortic arch, double arch, and vascular rings). The aberrant right subclavian artery can be assessed in this view. In addition, life-threatening ductus-dependent cardiac malformations can be diagnosed, especially by using color Doppler.

The Importance Of Post-Biopsy Markers: Why And When

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Percutaneous image-guided biopsy procedures are the standard of care for histologic assessment of suspicious breast lesions. Post-biopsy tissue markers (clips) optimize patient management by allowing for assessment on follow-up imaging and precise lesion localization. Markers are used to ensure accurate correlation between imaging modalities, guide preoperative localization for ma- lignant and high-risk lesions, and facilitate accurate identification of benign lesions at follow-up. Local practices differ widely, and there are no data detailing the exact frequency of use of clips for different breast biopsies. There are many indications for biopsy marker deployment, and some dif- ficulties may be encountered after placement. The placement of biopsy markers has many advan- tages and few disadvantages, such that deployment should be routinely used after percutaneous biopsy procedures with rare exception.

The Renal Vasculature: What The Radiologist Needs To Know

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The kidneys are highly vascular organs, receiving up to one-quarter of the cardiac output, and their function depends on the integrity of the renal vasculature. Comprehensive knowledge of normal renal vascular anatomy, embryologic development, and common anatomic variants is essential for radiologists, as these factors directly influence surgical planning, transplantation, and interventional procedures. Imaging modalities such as Doppler ultrasonography, CT angiography, and MR angiography play pivotal roles in evaluating both normal and diseased renal vessels. Intrinsic vascular pathologic conditions—including renal artery stenosis, fibromuscular dysplasia, vasculitis, aneurysms, pseudoaneurysms, and arteriovenous shunts—may present with secondary hypertension, hematuria, or acute renal dysfunction, and require prompt recognition. Radiologists must also identify vascular involvement by neoplasms, especially renal cell carcinoma and other rare vascular tumors, to ensure accurate staging and guide management. Incorporating routine assessment of the renal vasculature into imaging interpretation improves diagnostic accuracy, facilitates appropriate treatment decisions, and reduces procedural complications.

The Role Of Interventional Radiology In Managing Renal Mass Lesions: An Update

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Interventional radiology (IR) plays an increasingly central role in the diagnosis and treatment of renal mass lesions, which range from benign cysts to malignant renal cell carcinomas (RCC). Image-guided percutaneous biopsy, using ultrasound or CT, provides accurate histopathologic diagnosis with high sensitivity and specificity, supported by advanced techniques such as coaxial systems and molecular profiling that improve yield and safety. For small renal masses (≤4 cm), thermal ablation methods—radiofrequency ablation (RFA), cryoablation, and microwave ablation (MWA)—offer effective, nephron-sparing alternatives to partial nephrectomy, achieving comparable oncologic control with lower morbidity and faster recovery. Innovations such as image fusion and robotic guidance have further enhanced precision. In more complex or advanced cases, transarterial embolization is used for preoperative devascularization or palliative management, while targeted embolization treats complications like hemorrhage or vascular malformations. Emerging approaches, including irreversible electroporation (IRE) and stereotactic ablative radiotherapy, are expanding IR's therapeutic scope. Despite these advances, challenges persist in patient selection, standardization, and long-term outcome validation. Overall, IR has transformed the multidisciplinary management of renal mass lesions, providing personalized, minimally invasive solutions and setting the stage for continued technological and clinical innovation.

The Role Of Second-Trimester Anomaly Scan In Prenatal Diagnosis: Current Standards And Evolving Perspectives

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The second-trimester anomaly scan represents a cornerstone in prenatal imaging, providing a comprehensive assessment of fetal anatomy between 18–22 weeks of gestation. This lecture will highlight the critical role of systematic sonographic evaluation in the early detection of structural anomalies, with emphasis on central nervous system, cardiac, abdominal, face and skeleton. Standardized protocols, including views recommended by international guidelines, will be discussed alongside the diagnostic challenges that radiologists may encounter. Special attention will be given to the integration of more deep look on the CNS. The session will also explore the clinical impact of soft marker on pregnancy management, counseling, and outcome prediction. By combining

evidence-based practice with illustrative cases, this lecture aims to update radiologists on the evolving scope of second-trimester fetal anomaly scans and reinforce their pivotal role in multidisciplinary prenatal care.

Normal Shoulder MRI: A Radiologic Overview Of Anatomy And Imaging Landmarks

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Abstract: Magnetic Resonance Imaging (MRI) plays a pivotal role in the evaluation of shoulder pathology due to its superior soft tissue contrast and multiplanar imaging capabilities. However, accurate interpretation begins with a thorough understanding of normal shoulder anatomy on MRI. Misinterpretation of normal anatomical structures or variants can lead to overdiagnosis and inappropriate clinical management. This presentation provides a comprehensive overview of the normal MRI anatomy of the shoulder joint, focusing on standard imaging planes and radiologic landmarks. Key structures, including the rotator cuff tendons (supraspinatus, infraspinatus, subscapularis, and teres minor), the glenoid labrum, the biceps tendon and pulley system, the acromioclavicular joint, and the glenohumeral cartilage, will be discussed in detail. High-resolution images in axial, coronal oblique, and sagittal oblique planes will be used to illustrate the normal appearance and signal characteristics of each structure. Common anatomical variants and imaging pitfalls—such as the magic angle effect, normal interstitial tendon signal, and physiological joint recess fluid—will be highlighted to help differentiate normal from pathological findings. Understanding the baseline MRI anatomy of the shoulder is crucial not only for detecting abnormalities but also for planning interventions and avoiding diagnostic errors. This session is designed for radiologists, radiology residents, and clinicians interested in musculoskeletal imaging, aiming to strengthen their foundational knowledge and diagnostic accuracy in shoulder MRI interpretation.

Trigeminal Neuralgia As A Manifestation Of Increased Intracranial Pressure

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Background: Trigeminal neuralgia (TN) is most often attributed to neurovascular compression, but secondary causes should be considered in refractory cases. We report a case of idiopathic intracranial hypertension (IIH) manifesting primarily as TN, with complete symptom resolution after intracranial pressure (ICP) reduction.

Case: A 36-year-old woman (BMI 27) presented with 2 years of electric-shock-like pain in the maxillary (V2) distribution, triggered by pressure on maxillary molars and refractory to carbamazepine, baclofen, and pregabalin; two maxillary nerve blocks produced only transient (≈3-month) relief. High-resolution MRI (FIESTA) showed no neurovascular contact but revealed enlarged Meckel's cave and thickened optic nerve sheaths, suggestive of raised ICP. Lumbar puncture opening pressure was 220 mmH_2O. The pain resolved immediately after cerebrospinal fluid drainage and remained controlled on acetazolamide. long-standing pulsatile tinnitus—previously unreported by the patient—also abated. She remained symptom-free on follow-up for several months.

Discussion: While cranial nerve VI palsy is a recognized consequence of IIH, TN is rarely reported. Mechanistically, dural tethering and stretch or Meckel's cave distention may irritate the trigeminal root, paralleling mechanisms proposed for other IIH-related cranial neuropathies.

Conclusion: In medically refractory or atypical TN, targeted evaluation for IIH may be decisive. Recognition of this association is clinically important because simple ICP-lowering measures can provide rapid, durable pain relief and avert IIH-related visual morbidity.

Ultrasound-Guided Core-Needle Biopsy Of Breast Lesions

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For decades Ultrasound-guided core-needle biopsy of breast lesions has been a common, safe and accurate method of diagnostic breast pathology. All lesions classified as BI-RADS 4 and 5 and visible on ultrasound are indications of Ultrasound-guided core-needle biopsy. There was no statistically significant difference in diagnostic accuracy of US-guided CNB of breast masses performed with 14-gauge, 16-gauge and 18-gauge needles. There are no statistically significant differences in hematoma formation between patients taking anticoagulant therapy daily and non-treated patients, so it is not necessary to stop that therapy to perform an ultrasound CNB. As a general rule, the shortest route from the skin to the lesion should be chosen, parallel to the chest wall. It is useful to move the patient to lateral decubitus position, especially in the case of deeply located lesions or peripheral masses. It is important to insert the tip of the needle inside the mass.

In addition, pre-fire and post-fire images are important to ensure the correct position of the needle and to rule out complications. The first biopsy is the most important one and the macroscopic evaluation of the specimens is also important. At least 4 strips are recommended to obtain overall conformity of pathological biomarkers. The number of samples should be greater for those lesions with complex radiological features. The use of biopsy markers after percutaneous biopsy plays a key role in optimal patient management. No significant differences were witnessed in false-negative, results, underestimation and complications of vacuum-assisted breast biopsy in comparison with core needle biopsy. Radiological–pathological correlation is important and five situations of radiological–histological correlation can occur. The complications of ultrasound CNB are infrequent and insignificant and include hematoma, infection, pneumothorax.

Uncovered Understanding Lobular Neoplasia In 2025

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Lobular carcinoma (LC) has diagnostic challenges and asymptomatic presentation with subtle imaging findings leading to delays in diagnosis and management. Lobular neoplasia (LN) is a histopathologic entity consists of classic type as both lobular carcinoma in situ (LCIS) and atypical lobular hyperplasia (ALH) and variants as pleomorphic LCIS and florid LCIS and necrotic type that each has different pathological description. LN is most often diagnosed histopathologically and is incidental in imaging in classic type but non incidental with target imaging findings in variant type, that the most common findings is calcification and the nonclassical type could be upgraded to malignancy In this short review, we will describe the differences between classic and variant LN, cancer risk assessment, imaging findings and misleading situations and pathological -radiological correlation and management plannings.

Upright Stereotactic-guided Breast Biopsy: Tips, Tricks, And Troubleshooting

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Stereotactic-guided biopsy can be performed with the patient prone or upright, depending on the table or unit used. Upright positioning enables improved patient comfort, particularly in patients who have restricted mobility, weight-related limitations, and/or difficulty lying prone for an extended period. Upright DBT guided breast procedures require a cohesive team approach with overlapping radiologist and technologist responsibilities. Since this is a common breast procedure, the radiologist should be familiar with preprocedural considerations, patient preparations, and use of the biopsy equipment. The basic principles of upright DBT-guided breast biopsy are described in this comprehensive review.

Varicose Vein Sclerotherapy

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Sclerotherapy is a definitive procedure for treating varicose and telangiectatic veins by injecting a sclerosant to cause endothelial damage, fibrosis, and eventual vein reabsorption. This presentation details the critical technical aspects of the procedure, emphasizing precision in needle selection, superficial injection technique, and aspiration confirmation to minimize complications like hyperpigmentation, matting, and ulceration, especially in high-risk areas like the ankle. Post-procedure care, including compression and ambulation, is vital for optimal aesthetic outcomes. The presentation differentiates between the mechanisms of common detergent sclerosants, such as the anionic, protein-denaturing Sodium Tetradecyl Sulfate (STS) and the non-ionic, fast-acting Polidocanol (POL), highlighting how their chemical properties affect potency, speed, and clotting. A key recommendation is the use of low concentrations, aided by precise dilution calculations, to enhance safety and efficacy. The role of foam versus liquid sclerosants is discussed, noting the lack of definitive evidence for foam's clinical superiority. For deeper reticular veins and ultrasound-guided sclerotherapy (UGS), the focus shifts to aspiration, volume control, and sonographic visualization to prevent deep vein thrombosis and intra-arterial injection. Absolute and relative contraindications are reviewed, alongside potential complications ranging from minor pigmentation to major events like pulmonary embolism, underscoring the need for careful patient selection and technique.

Venous Anomalies

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Title: Understanding Fetal Central Venous Anomalies: A Diagnostic Radiology Perspective
Abstract: In this presentation, I will explore the critical topic of fetal central venous anomalies, which encompass a range of congenital malformations affecting the fetal venous system. These anomalies can have significant implications for fetal development and postnatal outcomes, making accurate diagnosis essential in prenatal care. I will begin by outlining the various types of central venous anomalies, including agenesis, hypoplasia, and malposition of major veins such as the superior vena cava and inferior vena cava. Through a series of clinical cases, I will illustrate the key imaging features observed on ultrasound and fetal MRI, emphasizing the importance of early detection. The discussion will include the potential impact of these anomalies on fetal hemodynamics and the associated risks for perinatal complications. By the conclusion of this talk, attendees will gain a deeper understanding of fetal central venous anomalies, their implications for prenatal diagnosis and management, and the vital role of radiologists in ensuring optimal outcomes for affected pregnancies.

Venous Leak Embolization

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Background: Venogenic erectile dysfunction caused by penile venous leak is a challenging condition in patients unresponsive to medical therapy. Endovascular embolization of the venous outflow system has recently emerged as a minimally invasive and effective therapeutic option. This study focuses on the technical aspects and practical considerations of venous leak embolization.

Materials and Methods: Under local anesthesia, selective venography was performed through an antegrade or retrograde deep dorsal penile vein puncture using a 21G micropuncture set. The venous outflow pathways—including the deep dorsal vein, periprostatic plexus, and internal pudendal veins—were opacified to identify the leak. Embolization was performed using a combination of N-butyl cyanoacrylate (NBCA) glue mixed with Lipiodol, delivered under fluoroscopic guidance. Care was taken to avoid non-target embolization by slow, controlled injection and temporary manual compression of proximal veins.

Results: The procedure was technically successful in all treated patients, with complete occlusion of the venous leak confirmed by post-embolization venography. No major complications such as non-target embolization or penile necrosis were observed. Minor transient penile pain or edema occurred in a few cases and resolved spontaneously.

Conclusion: Venous leak embolization using NBCA glue via a deep dorsal venous approach with an angiocatheter is a feasible, safe, and effective minimally invasive treatment for venogenic erectile dysfunction. Precise anatomical knowledge and controlled injection technique are key to optimal outcomes.

Ventriculomegaly

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Fetal ventriculomegaly (VM) is defined by atrial width ≥10 mm on axial transventricular ultrasound. Acquire at the level of the atria and glomus; calipers inner-to-inner, perpendicular to the ventricle. Ensure a true midline, avoid obliquity, and repeat measurements; a “dangling choroid” supports true dilatation. Grade: mild 10–12 mm, moderate 13–15 mm, severe >15 mm; report unilateral/bilateral and symmetry. After detection, targeted neurosonography confirms lateral ventricular morphology and right-left symmetry, distinguishing VM from physiologic variants (minor side-to-side differences or late-gestation prominence) and artifactual overestimation (off-axis plane, skull molding). Document midline integrity (CSP/CC), posterior fossa, third ventricle/aqueduct, and cortical sulcation to screen for obstruction or maldevelopment; when acoustic windows are limited or discordant with clinical risk, add fetal

MRI. Follow-up uses periodic ultrasound across gestation, with attention to stability, progression, or resolution, head-circumference trajectory, and emergence of new findings; ancillary testing (aneuploidy screening or diagnostic genetic testing, and CMV/toxoplasma work-up) is tailored to clinical and imaging risk. Counseling integrates grade and context: isolated mild VM has high likelihood of normal neurodevelopment; risks rise with increasing atrial width, progressive enlargement, or additional anomalies. Radiology deliverables: a standardized report stating plane, atrial width(s) with laterality, symmetry, third-ventricle/aqueduct appearance, choroid position, posterior fossa survey, cortical pattern; explicit statement on isolated vs non-isolated disease and whether MRI/genetic or infection testing is recommended. This pragmatic approach improves reproducibility, triage, and prenatal decision-making.

Distinguishing Residual Disease from Post-Treatment Fibrosis on FD6-PET Imaging

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روش اصلی کاربردی پزشکی هسته‌ای در بیماری‌های لنفوپرولیفراتیو fdg PET/CT می باشد که سعی می‌کنم روش‌های افتراق بیماری فعال را در این مدالیته توضیح دهم و رادیو داروهای جدید و مفید را در این زمینه معرفی کنم.

New Aspects of Imaging for Radiologists

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"New Aspects of Imaging for Radiologists" explores recent advancements in diagnostic imaging techniques tailored for the maxillofacial region, emphasizing their role in enhancing accuracy for radiologists. Key topics include the transition from traditional 2D radiographs to advanced modalities such as cone-beam computed tomography (CBCT), multidetector helical CT, MRI, and ultrasound, which provide superior 3D visualization of hard and soft tissues. Discussions cover applications in trauma assessment, jaw lesions, temporomandibular joint disorders, oncology, and implant planning, with a focus on radiation dose optimization, AI integration for image analysis, and interdisciplinary collaboration between radiologists and maxillofacial surgeons. The presentation underscores the evolution of imaging from diagnostic aid to treatment planning tool, highlighting reduced radiation exposure via CBCT and emerging AI-driven segmentation for precise pathology detection. This lecture provides radiologists with an updated framework for maxillofacial imaging, addressing the shift toward low-dose, high-resolution technologies like CBCT, which excels

in evaluating dental impactions, bone loss, and fractures while minimizing soft tissue contrast limitations through hybrid systems. It reviews common pathologies, including cysts, neoplasms, infections, and post-treatment complications such as osteonecrosis, and integrates emerging tools like AI for automated segmentation of teeth, mandibular canals, and alveolar bone to improve diagnostic efficiency and treatment outcomes Emphasis is placed on anatomical considerations, such as pathways of disease spread in the oral cavity, and the complementary use of MRI for soft tissue evaluation and PET for functional insights in oncology. Practical guidelines for image interpretation, protocol selection, and collaboration with surgeons are highlighted to optimize patient management in trauma, orthodontics, and surgical planning. Overall, it positions radiologists at the forefront of evolving technologies, promoting evidence-based practices to bridge dentistry and medical radiology.

Improving workplaces for Radiologists

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Radiologists operate in highly specialized environments that demand prolonged visual concentration, repetitive hand movements, and extended periods of sedentary work. These occupational conditions place radiologists at significant risk for developing musculoskeletal disorders, visual fatigue, and work-related stress. As the reliance on digital imaging and Picture Archiving and Communication Systems (PACS) continues to grow, the ergonomic design of radiology workspaces becomes increasingly critical to ensure both clinician well-being and diagnostic accuracy. This abstract explores the importance of workplace ergonomics in radiology, emphasizing the need for adjustable workstations, optimal monitor placement, ambient lighting control, and ergonomic input devices. Key ergonomic interventions include the use of sit-stand desks, chairs with lumbar support, voice recognition software to reduce repetitive strain, and scheduled microbreaks to alleviate physical fatigue. Proper monitor positioning—such as maintaining a viewing distance of 25–28 inches and aligning the top of the screen with eye level—can significantly reduce neck and eye strain. Additionally, ambient lighting that minimizes glare and supports high-resolution image interpretation is essential for visual comfort. Studies have shown that implementing ergonomic principles in radiology departments leads to measurable improvements in clinician health, job satisfaction, and diagnostic performance. Radiologists who work in ergonomically optimized environments report fewer instances of back pain, carpal tunnel syndrome, and burnout. Moreover, institutions that invest in ergonomic infrastructure often experience enhanced workflow efficiency and reduced absenteeism. In conclusion, workplace ergonomics is not merely a matter of comfort—it is a strategic component of clinical excellence in radiology. By prioritizing ergonomic design and promoting healthy work habits, healthcare organizations can safeguard the physical and mental health of radiologists while supporting high-quality patient care.

Imaging of Degenerative Disc Disease (DDD)

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Background: Degenerative Disc Disease (DDD) represents a spectrum of age-related and mechanical changes in the intervertebral discs, which can be detected through various radiological modalities. Accurate recognition of imaging features is essential for diagnosis, grading, and management planning.

Objective: To summarize the key radiological signs of DDD with emphasis on CT and MRI findings.

Methods: Review of characteristic imaging findings of DDD in plain radiography, CT, and MRI.

CT is superior in detecting osseous changes such as marginal osteophytes, endplate irregularities, and calcification within the disc.

MRI is the modality of choice for evaluating disc pathology, revealing loss of disc height, decreased T2 signal intensity (disc desiccation), high-intensity zones, annular fissures, Modic changes of vertebral endplates, Schmorl's nodes, and disc bulging or herniation. MRI also allows assessment of neural element compression and epidural changes.

Conclusion: Radiological signs of DDD are diverse and modality-dependent. While X-ray and CT provide valuable information on bony alterations, MRI remains the gold standard for comprehensive evaluation of disc degeneration and its complications. Recognition of these imaging features is crucial for early diagnosis, clinical correlation, and therapeutic decision-making.

Bone-RADS, Is It Useful? A Structured Diagnostic Approach for Solitary Bone Lesions

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Background: Incidental bone lesions are frequently encountered in musculoskeletal imaging, often creating diagnostic uncertainty. To address this, the Society of Skeletal Radiology (SSR) introduced the Bone Reporting and Data System (Bone-RADS) as a standardized framework for evaluating solitary bone lesions detected on CT or MRI.

Purpose: To review the Bone-RADS algorithm, describe its radiographic scoring features, and assess its clinical usefulness in differentiating benign from malignant bone lesions.

Methods: Bone-RADS integrates specific imaging features—margination, periosteal reaction, endosteal erosion, pathologic fracture, soft tissue mass, and prior malignancy—into a structured scoring system. Additional factors such as radiodensity, internal matrix, and lesion location assist in predicting histopathology. The system stratifies lesions into four risk categories (Bone-RADS 1–4), each associated with management recommendations ranging from observation to biopsy or referral.

Results: Studies have shown substantial interobserver agreement across Bone-RADS categories and good diagnostic performance in distinguishing benign from aggressive lesions (AUC 0.82–0.92). Bone-RADS provides consistent risk assessment and facilitates multidisciplinary communication. Illustrative clinical cases

demonstrate its applicability and reliability in daily radiologic practice.

Conclusion: Bone-RADS represents a practical, evidence-based, and reproducible tool for structured reporting of incidental bone lesions. It improves diagnostic confidence, supports clinical decision-making, and promotes standardized terminology in musculoskeletal radiology, although further validation in diverse populations is warranted.

Educational Case-Based Panel on Challenging Imaging Findings in Endometriosis: Diagnostic Pearls in Ultrasound and MRI

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Endometriosis is a chronic inflammatory disease with heterogeneous imaging manifestations, ranging from superficial peritoneal implants to deep infiltrating endometriosis (DIE). Accurate imaging plays a crucial role in diagnosis, surgical planning, and detection of complications. This educational case-based panel reviews challenging imaging findings of endometriosis using ultrasound and magnetic resonance imaging (MRI), with emphasis on deep disease, diagnostic pitfalls, and post-procedural complications.

Transvaginal ultrasound is the first-line imaging modality and demonstrates high diagnostic accuracy for ovarian endometriomas and many DIE lesions when performed with appropriate pre-imaging preparation and dynamic assessment. Typical ultrasound features of DIE include hypoechoic solid nodules, irregular margins, stiffness, and organ tethering. Differentiation between true DIE nodules and fibrotic adhesion bands is essential, while superficial endometriosis remains difficult to detect with ultrasound.

MRI is indicated for equivocal ultrasound findings, posterior compartment involvement, and comprehensive disease mapping. High-resolution T2-weighted imaging is the cornerstone for evaluation of uterosacral ligament (USL) involvement, while fat-suppressed T1-weighted sequences are essential for detecting hemorrhagic foci.

A major diagnostic pitfall is differentiation of USL DIE from focal adenomyosis of the outer myometrium (FAOM). FAOM typically originates from the myometrium and demonstrates ill-defined outer myometrial thickening, low T2 signal intensity, absence of mass effect, and lack of retraction, in contrast to DIE, which appears as a discrete hypointense fibrotic lesion with spiculated margins and surrounding anatomic distortion, and is beyond the uterine serosa.

The panel also addresses imaging features of bowel and ureteral involvement, post-procedural pelvic inflammatory disease following ovarian puncture, including diffuse peritonitis and perihepatitis (Fitz–Hugh–Curtis syndrome). Presence of a cystic structure with non-endometriotic fluid which shows restriction in DWI sequences, is highly suggestive for an ovarian abscess.

Imaging criteria suggestive of malignant transformation within endometriomas are reviewed, including loss of T2 shading, enhancing mural nodules, solid components with diffusion restriction, rapid growth, and occurrence in older patients.

Structured, anatomy-based reporting is strongly recommended to optimize multidisciplinary communication and patient management in complex endometriosis.

Scientific Oral Accepted Abstract of ICR2025

Comparative study of liver fibrosis staging and grading by MRI(DWI) and biopsy

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Introduction: Liver fibrosis is known as a life threatening disease due to its side effects such as portal hypertention and liver disfunction. The disease is curable at early stages which makes the diagnostics of Fibrosis a crucial matter. The golden standard for Liver Fibrosis evaluation is the liver biopsy. However, this method is considered to be invasive and is followed by side effects. Thus, there is a growing demand for non-invasive methods to diagnose Liver Fibrosis and the stage of the disease. One of the non-aggressive approaches is Diffusion-Weighted Imaging (DWI).

Materials and Methods: This study covers a group of patients suffering from chronic liver disease who are referred to an Imaging Centre located in Mashhad city in 1395-96. The experienced radiologists in the field of intervention performed the biopsy procedure and the tissue samples were tested in the pathology laboratory to determine the stage and severity of the Fibrosis. Furthermore, the patients were scanned by MRI (MRI 1.5 Tesla siemens symphony) with all the required sequences (T1,T2, ADC,...) and b values 500, 1000 s/mm2. The results were collected by the radiologist and analysed by SPSS software.

Results: It is found that a negative correlation exists between Apparent Diffusion Coefficient (ADC) value and the Liver Fibrosis severity level. At lower ADC values the Fibrosis is more severe. Additionally, the ADC value was evaluated versus the Fibrosis stage. The results show a statistical difference between Stage 1,4, Stage 2,3, Stage 2,4 and no obvious statistical difference between F1,F2 and F3,F4.

Conclusion: Based on the experimental results in the current study, DWI is a useful method to observe and diagnose at the middle and final stages of Fibrosis. However, DWI can not used as a valid approach to differentiate between early stages of the disease.

Keywords: ADC, Liver Fibrosis, Non-invasive methods.

Relationship between thalamic size and volume by MRI and disability in patients with multiple sclerosis

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Introduction: Multiple sclerosis is one of the most common neurological disorders in young adults, which myelin is damaged by pathogens throughout life as high prevalance of the disease and the fact that it is the third cause of neurologic disabilities in Adults and thalamus involvement in this disease, which can cause cognitive impairment and motor disabilities and lower quality of lif.

Materials and Methods: In this descriptive cross-sectional study, 40patients with Multiple sclerosis were assigned consequently considering the inclusion criteria after assigning informed consent . Then, EDSS questionnaire was completed for them. Thalamus size and volume were assesed by MRI. Then, the results were analyzed by SPSS software version 24.

Results: In this study, 40 subjects participated in 23 women (57.5%) and 17 men (42.5%) with a mean age of 36.3 ± 9.3. Also, 15 (37.5%) were single and Twenty-five (62.5%) were married. Bachelor's degree and higher (32.5%) and housewives (30%), 8 (20%) were the most frequent.

The duration of the disease was 1.4 ± 3.5 years. In the present study, the results showed significant reverse correlation between thalamus volume and disability (P> 0.05) and thalamus size and disability (P> 0.05) and direct linear relationship Between thalamus size and thalamus volume (P> 0.05).

Conclusion: Generally, it can be concluded that in patients with multiple sclerosis, decreasing the size and volume of thalamus increases the incidence of patients' disability.

Keywords: thalamus, multiple sclerosis, MRI

Evaluating the frequency of White Matter Lesions in the MRI of Transient Ischemic Attack patients and its correlation with the Complications and Recurrence of Vascular Brain Accident

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Introduction: Transient Ischemic Attack (TIA) is a focal reversible episode lasting less than 24 hours that causes cerebral dysfunction. White matter lesions (WMLs) are closely related to the occurrence, recurrence and prognosis of vascular events. The purpose of this study was

to investigate the frequency of WMLs in brain MRI of patients with transient ischemic attacks and its relationship with complications and recurrence of cerebrovascular accidents.

Materials and Methods: This prospective cohort study was conducted on 53 patients referred to a private radiology clinic in Mashhad in 1401 with the first TIA within 48 hours of the onset of symptoms.

Sampling was done with the convenience method. After the MRI, the patients were reassessed during a 6-month follow-up regarding complications and cerebrovascular events.

Results: he mean and standard deviation of age in patients was 45.87±15.63 years and the ratio of male to female was 1.03. There was a significant difference in the frequency distribution of the number of lesions according to age groups (P<0.001). There was no significant difference in the frequency distribution of the number of lesions according to gender (P=0.875). The frequency and volume of WMLs in brain MRI of patients had no significant relationship with complications in patients within 6 months after TIA (P<0.05). Cerebrovascular accidents did not occur again in any of the patients.

Conclusion: he number of WMLs was related to the age of patients, unlike gender. The number and volume of WMLs were not related to complications other than cerebrovascular accidents.

None of the patients had a re-attack or re-vascular accident.

Keywords: TIA; White Matter; MRI

Comparative study of shear wave elastography findings in acute and chronic kidney disease

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Introduction: Kidney disease occurs in two types: acute (AKD) and chronic (CKD). Differentiating AKD from CKD is clinically important for making appropriate and timely diagnostic and treatment decisions. Renal elastography has been considered as a new method to evaluate kidney tissue and the amount of tissue fibrosis during the last decade. This study was conducted with the aim of evaluating kidney tissue changes in kidney elastography in cases of AKD and CKD and the possibility of using elastography as an available and non-invasive tool in differentiating acute and chronic cases of renal failure.

Materials and Methods: This is a cohort study and aimed at evaluating the diagnostic value. From the patients aged 18 to 70, based on the entry and exit criteria and after obtaining informed consent, 27 patients with a definite diagnosis of AKD and 27 patients with a definite diagnosis of CKD were included in the study. 27 healthy people with no history of kidney disease and with GFR>90 were also included in the study. All groups were subjected to kidney shear wave

elastography and findings related to kidney size, cortex thickness, YM elasticity modulus (Young's modulus) were examined and recorded. Finally, the results of elastography findings and other information of people in these groups were entered into SPSS version 27 and MedCalc version 22 software and were subjected to statistical analysis.

Results: The mean (standard deviation) age in AKD patients was 43.89 (11.69) with a 95% confidence interval of 38.69-49.09 and in CKD patients it was 54.78 (10.75) with a 95% confidence interval -59.03. It was 50.52 and this difference was statistically significant (P-Value < 0.001). 14 people (51.9%) in the AKD group were male and 16 people (59.3%) were female in the CKD group, and this difference was not statistically significant (P-Value = 0.70). The Young modulus of kidney tissue in AKD patients was 9.73 (10.40) with a 95% confidence interval of 5.62-13.85 and in CKD patients 17.83 (11.87) with a 95% confidence interval 13.22-52. It was 13.

Finally, with the AUC of 0.805 (95% CI= 0.67-0.90), the cut-off point >9.85 kPa has a sensitivity of 81% (95% CI= 61.9-93-7) and specificity of 74% (95% CI= 53.7-88.9) was obtained for differentiating AKD from CKD.

Conclusion: Based on findings of this study, the modulus of elasticity in CKD patients is higher than AKD, and elastography can help in differentiating between acute and chronic cases of kidney disease.

Keywords: Elastography, shear wave, AKD, CKD

Automated segmentation of PET/CT images using deep learning in lung cancer patients

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Introduction: Lung cancer remains a leading cause of mortality worldwide, emphasizing the critical need for accurate and timely diagnostic and therapeutic interventions. Advanced imaging techniques, such as positron emission tomography/computed tomography (PET/CT), are crucial tools for diagnosing malignancies, as they provide comprehensive metabolic and anatomical data. This dual-modality imaging plays a pivotal role in ensuring precise tumor localization and characterization, particularly in lung cancer patients. Accurate tumor segmentation is essential for effective treatment planning, treatment response evaluation as well as initial diagnosis, but manual segmentation is time-consuming and subject to significant inter-observer variability, which can adversely affect treatment outcomes. To overcome these challenges, this study proposes an automated tumor segmentation method based on deep learning (DL) techniques, utilizing the nnU-Net architecture for dual-modality PET/CT images.

Materials and Methods: This research involves data from 44 initial-stage lung cancer patients who underwent preoperative PET/CT imaging for initial staging and treatment planning. Manual tumor segmentation was conducted by two nuclear medicine experts using 3D Slicer 5.2.2 software, which served as the gold standard for training the deep learning model. nnU-Net training pipeline was used for training two different models using different modalities, model #1 using PET and model #2 using CT images. The training was continued for 1000 epochs in five fold cross validation data split and the model performance was evaluated in terms of dice coefficient.

Results: The cross-validation dice coefficient was 0.8 ± 0.1 using PET/CT images. It also outperformed models using either CT or PET alone with the same network, which had DSCs of 0.6 and 0.7, respectively. The dice values were significantly higher using PET images compared to CT images.

Conclusion: The findings underscore that dual-modality imaging integration enhances segmentation accuracy. Our results showed the importance of PET metabolic information compared to structural information of CT images for automated segmentation tasks. Owing to its high precision and reduced processing time, this method can be a valuable adjunct in the diagnostic and therapeutic planning for lung cancer. Consequently, the proposed system represents a robust tool for early lung cancer detection.

Keywords: Auto-Segmentation, PET/CT, Deep Learning, Cancer

Radiomics-Based Machine Learning for Abdominal Injury Detection in CT Scans

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Introduction: Efficient trauma assessment is crucial in providing optimal patient care and poses a formidable and time-intensive challenge. This study aims to scrutinize the diagnostic efficacy and utility of integrating machine learning models with radiomics features for the identification of blunt traumatic abdominal injuries in abdominal CT images.

Materials and Methods: For this study, a dataset of 1800 CT images containing individuals with mild and severe traumatic injuries, as well as healthy individuals, was collected from the Kaggle database. Experienced radiologists segmented axial images, and radiomics features were extracted from each region of interest. Initially, 30 machine learning models were deployed, and four models—Light Gradient Boosting Machine (LGBM), Adaptive Boosting

(AdaBoost), Ridge Classifier, and Extreme Gradient Boosting (XGBoost)—were ultimately selected for detailed evaluation. Model performance was assessed using metrics such as accuracy, precision, sensitivity, specificity, area under the receiver operating characteristic curve, F1 score, and misclassification criteria.

Results: The two criteria of precision and specificity of LGBM and XGBoost models in diagnosing mild liver injury were calculated to be 100%. The LGBM model achieved 100% sensitivity and 99% accuracy in diagnosing severe liver injury. The AdaBoost model exhibited notable performance in diagnosing mild kidney injury, achieving accuracy and sensitivity rates of 93% and 94%, respectively. Furthermore, for severe kidney injury, the AdaBoost model demonstrated a remarkable sensitivity of 96% and an accuracy of 97%. The LGBM model exhibited superior effectiveness in diagnosing mild spleen injuries, achieving an accuracy of 98%, precision of 100%, and specificity of 100%

Conclusion: These machine learning models exhibited remarkable capability in automatically detecting traumatic injuries on abdominal CT scans. By integrating radiologist expertise into the analytical framework, our method enables rapid pre-screening of a large number of cases for different abdominal injuries.

Keywords: Liver, Kidney, Radiomics, Machine Learning

Estimating of effective doses, risk of exposure-induced cancer death, and diagnostic reference level of CT procedures in Tabriz city, Iran

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Introduction: Medical X-rays are a significant source of ionizing radiation exposure for the public. While computed tomography (CT) offers accurate diagnosis, it comes with potential risks due to higher patient doses than conventional radiation procedures. This study aimed to assess

radiation doses in CT examinations conducted at Tabriz hospitals and establish Diagnostic Reference Levels (DRLs).

Materials and Methods: There was a prospective cross-sectional study carried out at four public hospitals that provided CT examinations. A total of 75 adult patients undergoing abdominopelvic, chest, and head CT examinations were included. Data were gathered on the patient's characteristics, exposure parameters, and dosage descriptors. At each center, the minimum, maximum, mean, median, and third quartile values were included in the analysis. The Dose Length Product (DLP) and Volume CT Dose Index (CTDIvol) were computed.

Results: The CTDIw values for brain, sinus, chest, and abdomen & pelvic ranged from 15.6 to 73, 3.8 to 25.8, 4.5 to 16.3, and 7 to 16.3, respectively. The corresponding DLP values ranged from 197.4 to 981, 41.8 to 184, 131 to 342.3, and 283.6 to 486, respectively. The proposed DRLs were determined based on the third quartile of CTDIw for each examination, resulting in DRLs of 59.5 mGy for the brain, 17 mGy for the sinus, 7.8 mGy for the chest, and 11 mGy for the abdomen & pelvic.

Conclusion: This study revealed significant variations in dose levels for the same examination across different centers. However, the obtained values were comparable to national and international standards. These findings emphasize the importance of establishing DRLs to optimize patient safety and ensure consistent radiation doses in CT examinations.

Keywords: DRL, CT, Tabriz, CTDI, DLP.

Multiple Sclerosis Identification Based on Machine Learning Techniques

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Introduction: This study presents a novel approach to identifying multiple sclerosis (MS) using advanced machine learning techniques. Multiple sclerosis, a complex autoimmune disorder affecting the central nervous system, often presents diagnostic challenges due to its varied symptoms and progression patterns. Our research leverages a dataset of clinical, imaging, and biochemical markers from MS patients and healthy controls to develop a robust machine learning model for early and accurate MS detection.

Materials and Methods: We employed a combination of feature selection methods and ensemble learning algorithms, including random forests and gradient boosting, to create a predictive model. The model was trained on a diverse individuals, comprising both MS patients and controls, with data collected from multiple medical centers.

Results: Our results demonstrate that the machine learning model achieves a sensitivity of 92% and specificity of 89% in identifying MS cases, outperforming traditional diagnostic methods. The model shows particular strength in detecting early-stage MS and differentiating it from other neurological disorders with similar presentations.

Conclusion: This research not only offers a promising tool for clinicians to aid in MS diagnosis

but also provides insights into the most significant biomarkers and clinical features associated with the disease. The implementation of this machine learning technique in clinical settings has the potential to expedite diagnosis, improve patient outcomes, and reduce healthcare costs associated with multiple sclerosis management.

Keywords: Multiple Sclerosis machine learning AI

Discriminating amygdala resting-State functional connectivity in Individuals at Risk of Alzheimer's Disease: Machine Learning Approach Utilizing Whole-Brain measurements

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Introduction: Studies of mild cognitive impairment (MCI) have uncovered significant changes in the connectivity and structure of the amygdala. Analysis combining data from multiple studies has consistently shown reduced grey matter in both amygdalae of MCI patients, which is linked to declining cognitive function. Functional connectivity analysis is a valuable tool for investigating higher-level cognitive processes and brain organization by examining how different brain regions communicate. Various measures of functional connectivity using fMRI, such as seed-to-voxel and ROI-to-ROI correlations, have shown strong consistency across scans and can be used for different purposes. Machine learning, a subset of artificial intelligence, allows computers to learn from data without explicit programming. The goal of this study was to use amygdala functional connectivity and machine learning algorithms to distinguish between early-stage MCI(EMCI) and late-stage MCI(LMCI).

Materials and Methods: In our research, we analyzed data from 131 patients with LMCI, 137 with EMCI, and 150 cognitively normal CN individuals using resting-state functional Magnetic Resonance Imaging (rs-fMRI) data .we preprocessed and analyzed the data using MATLAB CONN toolbox.this study focused on evaluating the efficacy of a classification framework in distinguishing between these two stages by utilizing features derived from amygdala and whole-brain connectivity functional connectivity measurements. To achieve our goal, various machine learning algorithms such as Support Vector Machine(SVM), XGBoost, lightgbm, catboost, and K Nearest Neighbors KNN were employed to differentiate between the disease stages.

Results: In the CN group, our study revealed strong functional connectivity of the amygdala with various sensory and associative brain regions, indicating its role in integrating diverse types of information, such as the superior

temporal gyrus and temporal pole, piriform cortex and central operculum. Moreover, there were notable connections from somatosensory cortex, memory-related areas including the hippocampus and parahippocampal cortex, as well as motor-related areas such as the globus pallidus, putamen, caudate nucleus and nucleus of accumbens. The ANOVA statistical analysis using SPSS indicated reduced connectivity of this region with putamen, temporal fusiform cortex and central operculum, as well as nucleus of accumbens in both groups of MCI. Furthermore, employing machine learning classifiers revealed that XGB was able to differentiate between LMCI and EMCI with an accuracy of 0.8167, precision of 0.8257, recall of 0.8167, F1 score of 0.8154 and an AUC value of 0.8133 .

Conclusion: Our results support the notion that utilizing a range of machine learning algorithms and functional connectivity analysis can improve the accuracy of predictions. This suggests potential applications for using fMRI connectivity measurements as a dependable biomarker for monitoring the progression of MCI. We argue that this research represents a significant contribution to the investigation of functional connectivity in the amygdala across the three cohorts. Nevertheless, we posit that expanding the incorporation of additional brain regions associated with Alzheimer's disease pathology and employing supplementary analysis measures could enhance the effectiveness of our classification.

Keywords: MCI amygdala functional connectivity ML

Evaluation of the impact of volume segmentation variations on [18F]FDG PET/CT radiomics feature stability: application to colon cancer patients with liver metastasis

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Introduction: Positron emission tomography (PET) plays a crucial role in cancer management (e.g., tumor staging and prognosis). While parameters like standard uptake value (SUV) and metabolic tumor volume (MTV) are associated with patient outcomes, they do not

fully capture tumor characteristics. Radiomics potentially overcomes this issue by extracting meaningful quantitative features from medical images assessing tumor heterogeneity. However, radiomics features may be sensitive to segmentation approaches, raising concerns about their robustness and stability. This study examines how threshold variations during PET automatic segmentation affect radiomics features derived from PET imaging.

Materials and Methods: [18F]FDG PET/computed tomography (CT) data was collected from 24 colon cancer patients with liver metastases. After resampling the images to 64 gray levels, volumes of interest (VOIs) were automatically delineated four times on each patient's PET scan using SUV thresholding of 10%, 20%, and 30%, along with the full-size standard VOI (equivalent to 40% threshold). Forty-four radiomics features of textural, shape, and histogram-based were extracted from the segmentations. The stability of features across the changes in the segmentation threshold was assessed by calculating the coefficient of variation (COV). Features with a COV≤20% were considered stable for clinical interpretations.

Results: Out of the 44 extracted radiomics features, nine exhibited a COV of less than 20% for colon masses. These include HISTO_Entropy_log10, HISTO_Entropy_log2, SHAPE_Sphericity, GLCM_Homogeneity, GLCM_Correlation, GLCM_Entropy_log10, GLCM_Entropy_log2, GLRLM_SRE, and GLRLM_RP. In contrast, only four features demonstrated high stability in liver metastasis cases. These include GLCM_Homogeneity, GLCM_Correlation, GLRLM_SRE, and GLRLM_RP.

Conclusion: Although the automatic segmentation threshold significantly impacts radiomics feature values, several remain stable. Consequently, the segmentation method and intensity discretization should be carefully considered when interpreting the clinical outcomes and biological significance of radiomic features.

Keywords: Radiomics, Stability, Segmentation, Colon cancer

Functional Imaging and Its Role in the Treatment of Mental Disorders: A Review of How fMRI Can Be Used to Better Understand Mental Disorders and Its Impact on Treatment

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Introduction: Mental disorders are one of the major public health challenges of the 21st century that have profound impacts on the quality of life of individuals. In recent years, functional brain imaging, especially functional magnetic resonance imaging (fMRI), has been introduced as a key tool in understanding the neural mechanisms associated with these disorders. By providing real-time images of brain activity, fMRI allows researchers and clinicians to identify patterns of brain activity in patients with mental disorders and evaluate the effectiveness of treatments. This review article examines how fMRI can be used to better understand mental disorders and its impact on treatment.

Materials and Methods: A thorough search

methodology encompassed various electronic databases including PubMed, Medline, and Google Scholar. A detailed search string was incorporated with keywords such as functional Imaging, fMRI, mental disorders, treatment.

Results: Numerous studies have shown that fMRI can help identify functional changes in the brain of patients with disorders such as depression, anxiety, schizophrenia, and bipolar disorders. The technique is particularly effective in identifying brain regions involved in cognitive and emotional processes. For example, results show that patients with depression often have abnormal activity in areas such as the prefrontal cortex and amygdala. fMRI can also help assess the impact of various treatments, including medications and psychotherapy, on functional changes in the brain. This information can lead to personalized treatments and improved clinical outcomes for patients.

Conclusion: Functional magnetic resonance imaging (fMRI) has great potential as a new tool in understanding and treating mental disorders. This technique not only helps identify patterns of brain activity associated with mental disorders, but can also assess the effectiveness of treatments. With technological advances and increased access to this technique, fMRI is expected to play an increasingly important role in the future treatment of mental disorders and lead to improved quality of life for patients.

Keywords: fMRI Mental Disorders Treatment

Enhancing Imaging Sensitivity in Cancer Diagnosis: The Role of Radiolabeled Nanoparticles in PET and SPECT

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Introduction: Nanoparticle-based imaging shows promise for enhancing cancer diagnosis and treatment. Contrast-enhanced NPs increase signal sensitivity in biomedical research. Encapsulating radioactive molecules in nanoparticles improves the pharmacokinetics and biodistribution of PET and SPECT tracers, leading to better imaging contrast. This study assessed various radiolabeled nanoparticles for their effectiveness in PET and SPECT contrast enhancement.

Materials and Methods: A systematic review assessed the effectiveness of radiolabeled nanoparticles in PET and SPECT imaging. Articles were gathered from PubMed, Scopus, and Google Scholar using terms related to “radiolabeled nanoparticles,” “PET,” and “SPECT.” Inclusion criteria focused on cancer imaging studies, while non-imaging articles were excluded. Key data on nanoparticle types, radiolabels, imaging methods, and contrast enhancement findings were extracted.

Results: Among In PET imaging, SPION-coated 64Cu-DOTA nanoparticles exhibited a significantly longer and more favorable circulatory half-life. For SPECT imaging of sentinel lymph nodes, 99mTc-dextran molecular conjugates bound to dextran-coated albumin nanoparticles demonstrated superior contrast enhancement. The integration of cRGD peptides onto a 125I-labeled nanoprobe showed significantly enhanced imaging sensitivity in αvβ3 receptor-positive cells compared to non-targeted probes. Targeted peptide-labeled

nanoparticles directed towards tumors with high MMP9 expression yielded notable SPECT signal enhancement.

Conclusion: Advancements in methods to study nanoparticles have led to innovations in radiochemistry for PET and SPECT. Despite challenges, nanoparticles enable the development of multimodal radiotracers. Future research may focus on nanodrugs labeled for imaging specific disease biomarkers. Identifying unique diagnostic applications for NP-based agents could further their development and improve patient care.

Keywords: SPECT, PET, Contrast, Nanoparticles, Cancer

Evaluation of the association between brain metabolites and cognitive condition in patients with mild traumatic brain injury using magnetic resonance spectroscopy

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Introduction: The relationship between neurometabolic changes after mild traumatic brain injury (mTBI) and psychological disorders is not well defined.

Objectives: The aim of this study was to compare the relationship between the neurometabolic state of the brain and cognitive tests in mTBI patients and healthy individuals.

Materials and Methods: This cohort study included 21 mTBI patients (exposed group) and 21 individuals without trauma (non-exposed group).The demographic and trauma information of patients including age, sex, the mechanism of trauma and the GCS score were recorded. Then, the psychological status of the two groups were evaluated by Wechsler, Stroop, and Wisconsin test. Moreover, the levels of neurometabolites were measured by magnetic resonance spectroscopy (MRS). Data were analyzed by SPSS software and $P<0.05$ was considered statistically significant.

Results: The amount of brain metabolites (NAA, choline, creatine, Chol/Cr ratio and NAA/Cr ratio) in the white matter of bilateral frontal lobe in the two exposer and non-exposer groups had no significant difference ($P>0.05$). Additionally, there was a significant difference between the two groups regarding the correct answers of the Wisconsin test ($p=0.027$), and the time to complete the Stroop test ($p=0.009$). No significant difference was observed in the Wechsler memory test score between the two groups ($p>0.05$).

Conclusion: Mild TBI does not lead to changes in brain metabolites in the acute phase after trauma. However, the scores of psychological tests of Stroop and Wisconsin in mTBI patients had a statistically significant difference with healthy individual.

Keywords: Brain injury metabolite psycology

Classifying Posttraumatic stress disorder (PTSD), Traumatic brain injury (TBI), and PTSD+TBI Using Olfactory-Related Connectivity Features: A Machine Learning Approach with resting-state functional magnetic resonance imaging (rs-fMRI) Data

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Introduction: TBI and PTSD are prevalent issues among military personnel, both of which have been linked to an increased risk of nervous system dysfunction. A common feature in neurodegenerative diseases is the disruption of olfactory networks, with olfactory dysfunction often serving as an early indicator. While machine learning-based pattern recognition methods have recently been applied in neuroscience research to predict various psychiatric disorders, they have not yet been extensively utilized to classify PTSD and TBI groups based on olfactory network features. This study aimed to develop an automated classifier to distinguish patients with TBI, PTSD, and PTSD+TBI from healthy controls (HCs) by analyzing olfactory network connectivity in rs-fMRI.

Materials and Methods: The neuroimaging dataset comprised rs-fMRI scans from 270 participants, categorized into PTSD (n = 69), TBI (n = 66), PTSD+TBI (n = 69), and HCs (n = 66). Data were obtained from the DOD ADNI database, which includes information on Vietnam War veterans. Functional and effective connectivity analyses of olfactory networks were performed using rs-fMRI data. Four targeted olfactory regions—orbital frontal cortex (OFC), piriform cortex, uncus, and amygdala—were analyzed.Using supervised machine learning algorithms, including SVM, KNN, ANN, XGBoost, LightGBM, and CatBoost, we classified patient groups relative to HCs. The dataset was split into training (80%) and testing (20%) sets, and ten-fold cross-validation was employed to evaluate model performance.

Results: Features extracted from olfactory network connectivity analyses, encompassing both functional and effective connectivity, were utilized alongside psychological test results to train the machine learning models. Among the evaluated algorithms, CatBoost demonstrated superior performance. The CatBoost models achieved accuracy rates of 80%, 70%, and 79% for distinguishing PTSD, TBI, and PTSD+TBI groups from the control group, respectively. These results highlight the effectiveness of

CatBoost in pairwise classification of patient groups compared to other classifiers.

Conclusion: The present investigation achieved achieved acceptable classification accuracy, highlighting the potential of functional and effective connectivity analyses of rs-fMRI as complementary tools for distinguishing patient groups. Furthermore, the identification of olfactory disturbance patterns provided critical insights into differentiating patient groups from healthy controls. These findings suggest that machine learning algorithms, particularly CatBoost, represent a promising approach for detecting patients with TBI, PTSD, and PTSD+TBI, and could serve as potential imaging biomarkers for patient identification at an individual level

Keywords: PTSD, TBI, olfactory network, fMRI

Evaluating the Impact of Platelet-Rich Plasma Injections on Knee MRI Imaging and Pain Severity in Patients with Knee Osteoarthritis: A Comparative Before-After Study

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Introduction: Knee osteoarthritis affects 40% of people over 70 years old worldwide, making non-surgical treatments like platelet-rich plasma (PRP) injections an essential focus. Recognizing that osteoarthritis impacts all joint components, magnetic resonance imaging (MRI) has become crucial for monitoring treatment effectiveness. Our study examines changes in pain intensity and knee MRI imaging of patients with knee osteoarthritis following PRP injections, contributing to the advancement of non-surgical interventions and improved patient outcomes.

Materials and Methods: This interventional before-after study recruited patients with knee osteoarthritis who were referred to physical medicine and rehabilitation and orthopedics clinics at Shahid Rahnamon and Shahid Sadoughi hospitals in Yazd and were considered suitable candidates for platelet-rich plasma (PRP) injections by specialists. Participants received PRP injections on two separate occasions, spaced one month apart.

The study examined three time points: before the PRP injection, one month post-injection, and six months post-injection. MRI findings were assessed before the injection and six months afterward. Patients' pain intensity was evaluated based on Visual Analog Scale (VAS) and Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) criteria, while the quality of life was measured using the Short Form 36 (SF36) criteria. The collected data were analyzed using SPSS software version 26 with a paired t-test for statistical analysis.

Results: The study involved 25 patients with

36 affected knees (14 patients with one affected knee and 11 patients with two affected knees). The mean age of the participants was 64.27 years, with 3 male patients (12%) and 22 female patients (88%).

Comparison of MRI findings six months post-PRP injection to pre-injection revealed no significant changes for most parameters. However, a statistically significant difference was observed in the mean pain intensity score and quality of life score when comparing measurements one month post-injection to pre-injection, six months post-injection to pre-injection, and after the second injection (six months post-injection) to the first injection (one month post-injection) based on the utilized criteria ($p<0.05$).

Conclusion: In conclusion, the findings of this study indicate that platelet-rich plasma (PRP) injections effectively reduce pain intensity and improve the quality of life in patients with knee osteoarthritis. However, the treatment does not lead to significant changes in the MRI findings for these patients. Therefore, while PRP injections can be a beneficial therapeutic option for managing symptoms and enhancing patients' daily lives, they may not alter the underlying structural pathology of knee osteoarthritis as visualized on MRI.

Keywords: Knee Osteoarthritis, MRI, PRP

Predictors of 12-month recurrence of hemoptysis after bronchial artery embolization

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Introduction: Despite high success rate of bronchial artery embolization (BAE), hemoptysis probably recurs. This study investigated risk factors of hemoptysis recurrence after BAE in an Iranian population.

Materials and Methods: In this prospective cohort, we followed up 101 patients for 12 months after BAE. Outcome of interest was recurrence of hemoptysis. Target arteries were super-selectively catheterized and embolized with polyvinyl alcohol. Success of BAE was confirmed using post-BAE angiography. Independent t-test, and chi-square and Fisher's exact test were used to compare variables between "recurrence" and "non-recurrence" groups. We investigated predictors of recurrent hemoptysis through univariate and multivariate logistic regression modeling. We analyzed receiver operating characteristic curve to find optimal cutoff point for continuous risk factors. Recurrence-free rates stratified by risk factors were plotted against time using Kaplan-Meier method

Results: BAE was immediately successful in all patients. During a 12-month follow-up, hemoptysis recurred in 13.9% of participants. Mean (±standard deviation) recurrence-free time was 6.9 (±3.3) months. Lung destruction (odds ratio=5.40 [95% confidence interval: 1.41–20.58]) and arterial diameter ≥2 mm (12.51 [1.51–103.59]) were independent predictors of 12-month hemoptysis recurrence.

Conclusion: Patients with destroyed lungs and embolized arteries wider than 2.0 mm are at higher risk of hemoptysis recurrence in the first year after BAE.

Keywords: Bronchial artery embolization; Recurrence.

Evaluation of diagnostic value of CT scan in comparison with sonography report in patients with abdominal pain referred to Imam Ali Hospital in Bojnurd between 2016 and 2021

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Introduction: Abdominal pain is a common complaint in emergency department cases. The differential diagnosis of abdominal pain includes a wide spectrum from benign disorders to urgent surgery. The purpose of this study was to investigate the diagnostic value of CT scan compared to ultrasound in patients presenting with abdominal pain.

Materials and Methods: This retrospective cross-sectional study was conducted on patients with abdominal pain who visited Imam Ali (AS) Bojnord Hospital between 1395 and 1400 and underwent ultrasound and CT scan. The previous findings of ultrasound and CT scan, the results of diagnostic tests and the patient's clinical symptoms, including pain location, pain intensity, whether it is progressive or regressive, final and practical diagnosis were statistically evaluated.

Results: In this study, the average age of the participants was 43.78 ± 20.78 years, the minimum age was 2 years and the maximum age was 93 years. The highest age frequency was related to the age group between 21 and 30 years. 61.7% of the participants were male and 38.3% of the participants were female. 8% of the participants had diabetes, 14.7% blood pressure, 5.3% hyperlipidemia, 8.7% heart disease, 5% respiratory disease, 7.7% kidney disease, 5.7% stomach upset, 8% Cholecystectomy, 8.3% appendectomy, 1.7% hypothyroidism or hyperthyroidism, 2.7% ovarian cyst, 3.7% hysterectomy, 1.7% cancer and 12% were suffering from other diseases.

Conclusion: The results of the present study indicate that, in general, the sensitivity was 47%, the specificity was 93%, and the diagnostic accuracy was 76%. The highest sensitivity was in diagnosing the biliary system and the lowest was related to bone, pancreas and blood vessels.

Keywords: Abdominal Pain, CT scan, Sonography.

Prevalence of non-alcoholic fatty liver disease by CT scan and its effective factors in non-liver patients admitted to Imam Ali Hospital in Bojnourd in 2016-2022

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Introduction: Currently, the world is moving from health to non-communicable and chronic diseases such as non-alcoholic fatty liver, the main cause of which is the change in people's lifestyle. The aim of this study is to investigate the prevalence of non-alcoholic fatty liver by CT scan and the factors affecting it in non-hepatic patients.

Materials and Methods: This retrospective cross-sectional study was conducted on patients under the age of 40 hospitalized in different departments of Imam Ali (AS) Hospital. The sample size was calculated based on statistical equations and the prevalence of 39% of non-alcoholic fatty liver in a study conducted in Isfahan, at least 571 people. Demographic information and risk factors related to fatty liver, which include (gender, age, history of diabetes, high blood pressure, history of blood fat, BMI), were collected and recorded by checklists designed from patients' files, and finally, the information was used by software Statistics were analyzed and the prevalence of this disease and the impact of each risk factor in the study population were evaluated.

Results: In this study, 62.6% of the participants were male and 37.4% were female. Also, 2.7% of the participants had diabetes, 0.5% blood pressure, 0.3% gestational blood pressure, 0.7% blood fat, 11.1% fatty liver, and 32.2% alcohol consumption. The frequency of fatty liver in people based on age groups was 0% in the age group of 0 to 10 years, 9.2% in the age group of 11 to 20 years, 11.1% in the age group of 21 to 30 years, and 12.7% in the age group of 31 to 40 years. Also, the prevalence of fatty liver in diabetics was 31.3%.

Conclusion: The results of the present study indicate that the prevalence of non-alcoholic fatty liver disease in the studied community is 11.1%, and among the above variables, there is a significant relationship between the probability of developing fatty liver disease and diabetes, as compared to people who have diabetes. they don't have, the possibility of fatty liver is 85.3 times higher in people with diabetes.

Keywords: Non-alcoholic Fatty Liver, CT scan

Evaluation of the outcomes and complications of uterine artery embolization using the GELFOAM technique in patients with ectopic pregnancy located in the cervix and ectopic pregnancies resulting from previous surgical incisions

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Introduction: A descriptive cross-sectional study was conducted to evaluate the outcomes and adverse events associated with uterine artery embolization using the GELFOAM technique in patients with ectopic pregnancies located in the cervix and ectopic pregnancies resulting from previous cesarean section at the Razi Hospital's Vascular Surgery Super specialty Center in Rasht over one year. Data of maternal characteristics, including age, β-HCG levels, mass size, history of ectopic pregnancy, specific and nonspecific complications, and treatment success, were collected from patient medical records.

Materials and Methods: Out of the 41 patients examined, the uterine artery embolization procedure using the GELFOAM technique successfully preserved the uterus in 40 patients (97.6%). With its high success rate, this technique provides reassurance about its effectiveness. Importantly, no patients (0%) experienced procedure-specific complications, and only one (2.4%) developed a non-specific post-operative hematoma, further confirming the safety of the GELFOAM technique.

Results: The findings of this study indicate that uterine artery embolization using the GELFOAM technique is an effective and safe therapeutic option for the treatment of ectopic pregnancies located at the incision site and cervix. The results need to be fully confirmed, and the application of this method needs to be expanded. It is not just recommended; further studies with a more robust design are urgently required. This emphasis on the need for additional research should underline the importance and urgency of the topic to the audience.

Conclusion: The present study demonstrated that uterine artery embolization using the GELFOAM technique, as a minimally invasive method, has shown positive results in the management of ectopic pregnancies. In 96.6% of the 41 cases, the uterus was preserved. A single patient required a total abdominal hysterectomy secondary to postpartum hemorrhage. This was attributed to a delayed presentation and the contraindication to methotrexate therapy while breastfeeding. These findings demonstrate the high efficacy of this method in managing the dangerous complications of ectopic pregnancy; the only reported adverse event was a single case of non-specific post-operative hematoma.

Keywords: Uterine embolization, gel foam, ep

Optimized Contrast-Free MRI Protocols for Multiple Sclerosis Lesion Activity Detection Using Machine Learning

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Introduction: To evaluate the efficacy of contrast-free MRI sequences—T1-weighted (T1W), T2-weighted (T2W), Fluid-Attenuated Inversion Recovery (FLAIR), Diffusion-Weighted Imaging (DWI), and Susceptibility-Weighted Imaging (SWI)—alone and in combination, for classifying Multiple Sclerosis (MS) lesion activity using a radiomics-driven machine learning framework, aiming to reduce reliance on gadolinium-enhanced imaging.

Materials and Methods: Retrospective analysis of MRI data from 31 MS patients (187 lesions; 39% active) was conducted using a 1.5 T Siemens scanner. Approximately 7,500 radiomic features were extracted from T1W, T2W, FLAIR, DWI, and SWI, refined to 214–108 features via correlation filtering and sequential forward selection. LightGBM models were trained on individual sequences, pairwise, and multi-sequence combinations, with performance assessed on a 28-lesion test set via AUC-ROC, sensitivity, specificity, and precision-recall AUC. Noise robustness was tested.

Results: FLAIR led single-sequence performance with an AUC-ROC of 0.83 (95% CI: 0.77–0.89), followed by T2W (0.80) and SWI (0.76), surpassing DWI (0.72) and T1W (0.69). The FLAIR+T2W+SWI triplet achieved an AUC-ROC of 0.88 (95% CI: 0.83–0.93), matching the five-sequence model (0.89, p=0.31). Texture (52.3%) and wavelet (31.8%) features were critical, with robust performance under noise (AUC 0.86).

Conclusion: The FLAIR+T2W+SWI combination provides high accuracy for MS lesion activity classification without gadolinium, supporting safer and cost-effective MRI protocols. Single-center results require multi-center validation to ensure generalizability.

Keywords: MRI Radiomics Machine Learning

T1 Hypointense Brain Lesions in NMOSD and Its Relevance with Disability: A Single Institution Cross-sectional Study

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Introduction: T1 hypointense lesions are considered a surrogate marker of tissue destruction. Although there is a dearth of evidence about T1 hypointense brain lesions, black holes, in patients with Neuromyelitis Optica Spectrum Disorder (NMOSD), the clinical significance of these lesions is not well determined.

Objectives: The impact of T1 hypointense brain lesions on the clinical status and the disability level of patients with NMOSD, was sought in this study.

Materials and Methods: A total of 83 patients with the final diagnosis of NMOSD were recruited.

Aquaporin-4 measures were collected. The expanded disability status scale (EDSS) and MRI studies were also extracted.

T1 hypointense and T2/FLAIR hyperintense lesions were investigated. The correlation of MRI findings, AQP-4, and EDSS was assessed.

Results: T1 hypointense brain lesions were detected in 22 patients. Mean ± SD EDSS was 3.7± 1.5 and was significantly higher in patients with brain T1 hypointense lesions compared to those without them (p-value = 0.01). Noticeably, patients with more than four T1 hypointense lesions had EDSS scores ≥ 4. The presence of T2/FLAIR hyperintense brain lesions correlated with EDSS, as well (3.6±1.6 vs 2.3±1.7; p-value = 0.01). EDSS was similar between those with and without positive AQP-4 (2.7± 1.6 vs. 3.2± 1.7; p-value= 0.17). Also, positive AQP-4 was not more prevalent in patients with T1 hypointense brain lesions compared to those without them (50.9 vs 45.4%; p-value= 0.8).

Conclusion: We demonstrated that the presence of the brain T1-hypointense lesions corresponds to a higher disability level in NMOSD

Keywords: NMO Neuroradiology Blackhole EDSS

FibroHybridNet: A Deep Learning Framework for Fibroglandular Tissue Classification with a Statistically Validated Comparison to the BI-RADS Maximum Rule

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Introduction: Breast cancer is the most common cancer among women, with variations in fibroglandular tissue (FGT) linked to different breast cancer risks. While segmentation methods have been applied, they are time-consuming due to the need for ground truth labels, and classification approaches remain underexplored with limited accuracy. This study introduces FibroHybridNet, a deep learning framework that integrates 2D and 3D models to improve FGT classification.

Materials and Methods: We propose a hybrid approach combining pre-trained 2D models (MobileNetV2, ResNet26, CaiT-S24) with a 3D model (DenseNet121) for FGT classification. To address class imbalance, data augmentation techniques were applied. Two decision rules, Probability Averaging and the BI-RADS Maximum Rule, were evaluated during validation and testing. The dataset and source code are publicly available to support reproducibility.

Results: The FibroHybridNet framework using Probability Averaging achieved accuracy, precision, recall, and F1 scores of 0.869, 0.905, 0.832, and 0.857, outperforming individual models. With the BI-RADS Maximum Rule, metrics were 0.758, 0.816, 0.672, and 0.680, respectively. The framework achieved a kappa statistic of 0.813 with Probability Averaging (almost perfect agreement) and 0.651 with the BI-RADS Maximum Rule (substantial agreement).

Conclusion: Combining 2D and 3D models

in the FibroHybridNet framework enhances FGT classification by capturing both localized and global features. The Probability Averaging approach outperformed the BI-RADS Maximum Rule, demonstrating the value of multi-model integration for improved classification and understanding of breast tissue composition.

Keywords: FibroHybridNet, Fibroglandular tissue, Breast MRI

Vascular lesions of head and neck region: A pictorial review

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Introduction: Vascular lesions in the head and neck region show diverse appearances and a broad pathological spectrum. Multiple classification systems exist, considering histologic features, flow rate, and anatomical position. The International Society for the Study of Vascular Anomalies (ISSVA) provides the most widely used system, updated in 2018, categorizing anomalies into tumors, with true proliferative properties, and malformations, resulting from morphogenetic defects. Tumors can be benign, malignant, or locally aggressive, while anomalies are classified as high- or low-flow, assessed via Doppler studies and MRI. Their clinical significance stems from their location and interaction with adjacent structures. Understanding imaging characteristics is crucial for diagnosis and management. This review highlights key imaging features and clinical considerations of vascular anomalies affecting the head and neck region.

Materials and Methods: Vascular lesions in the head and neck region encompass a wide spectrum of malformations and tumors, ranging from hemangiomas to arteriovenous fistulas. The International Society for the Study of Vascular Anomalies classification system categorizes these anomalies into vascular tumors and malformations. Vascular tumors are further divided into benign, borderline, and malignant

types, while vascular malformations are classified based on flow characteristics as high or low flow. Accurate delineation of these lesions is crucial due to their clinical implications, particularly their location and potential involvement of adjacent structures. Imaging modalities such as ultrasound, computed tomography, magnetic resonance imaging, and digital subtraction angiography play a vital role in diagnosis, surgical planning, and follow-up. Ultrasound is useful for superficial lesions, while computed tomography and magnetic resonance imaging provide detailed information on deep-seated anomalies. Vascular tumors include benign lesions like hemangiomas and pyogenic granuloma, borderline tumors such as hemangioendothelioma, and malignant tumors like angiosarcoma and Kaposi sarcoma. Vascular malformations include venous, lymphatic, capillary, arteriovenous malformations and combined lesions like lymphangiohemangioma. Each type has distinct imaging features, with magnetic resonance imaging being particularly valuable for assessing soft tissue involvement and lesion extent. This review highlights the importance of imaging in the diagnosis and management of head and neck vascular anomalies, emphasizing the need for a multidisciplinary approach to optimize patient outcomes.

Keywords: Hemangioma Kaposi-sarcoma Pyogenic-granuloma Aneurysm Ultrasound

Chronic Foreign Body Reaction After EVD Placement Mimicking a Cerebellar Tumor: A Diagnostic Challenge

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Introduction: Foreign body reaction (FBR) is an inflammatory process that occurs to varying degrees upon implantation of any material in the body. Although there have been reports of FBR to various materials placed in the brain, we present the first case of chronic, recurrent, multifocal, and progressive granulomatous FBR to an external ventricular drain (EVD) in a woman diagnosed with systemic lupus erythematosus (SLE).

Materials and Methods: A 50-year-old woman with SLE cerebritis underwent EVD placement for hydrocephalus caused by cyclophosphamide discontinuation. She later presented with nausea, vomiting, and headache, and brain computed tomography (CT) revealed a heterogenous left cerebellar lobe lesion causing hydrocephalus. While magnetic resonance imaging (MRI) and magnetic resonance spectroscopy (MRS) suggested malignancy, biopsy indicated an inflammatory process, initially attributed to SLE, and resulted in re-administration of monthly cyclophosphamide. Twenty weeks later, in the setting of clinical recurrence and new signal change in optic chiasma, the cerebellar lesion was resected, revealing chronic foreign body granulomatous cerebellitis due to EVD, leading

to cyclophosphamide discontinuation. Seven months post-resection, cyclophosphamide was reinstated due to radiological progression. One-year post-resection, she was intubated due to refractory status epilepticus and fever. Brain CT scan identified a hemorrhage in the suprasellar region and near the right lateral ventricle's trigone. Although seizures were controlled, and MRI revealed reduced inflammatory lesion size and enhancement, persistent fever was linked to pneumonia via lung CT scan. Despite antimicrobial therapy, her condition deteriorated, culminating in cardiorespiratory arrest and death.

Results: The case underscores considering FBR in patients—particularly those with underlying hypersensitivity disorders such as SLE—with neurological symptoms following device implantation, as immune dysregulation in SLE may exacerbate and prolong granulomatous reactions, warranting special caution during device insertion, accurate diagnostic evaluation, and vigilant post-procedural monitoring.

Conclusion: The complication described in the featured case highlights the importance of considering FBR in patients—particularly those with underlying hypersensitivity disorders such as SLE—who develop unexpected neurological symptoms following device implantation. The immune dysregulation in SLE may exacerbate and prolong granulomatous reactions, highlighting the importance of vigilant monitoring and accurate diagnosis to guide appropriate management in such complex cases. The possibility of FBR must be thoroughly discussed with the patient during preoperative counselling sessions, and special caution during EVD placement should be exercised in patients with hypersensitivity disorders. Further investigations are required to develop a better insight into radiological features of FBR, the optimal management approaches, including disease-specific approaches, and factors associated with these complications, such as implant location and predisposing individual patient characteristics.

Keywords: foreign body reaction; ventriculostomy

Magnetic Resonance Imaging Analysis of Virchow-Robin Space Characteristics in Multiple Sclerosis: A Case-Control Study

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Introduction: Virchow-Robin spaces (VRS) are perivascular spaces covered with soft tissue that extend from the subarachnoid space around the arteries and veins into the brain parenchyma. These spaces are involved in inflammatory processes in the brain. VRS have been implicated in multiple sclerosis (MS), but their characteristics in MS patients are not well understood. This study investigated and compared the MRI features of VRS in MS patients and healthy controls..

Materials and Methods: In this case-control study, 91 patients with multiple sclerosis (MS) and 91 individuals without MS (control group), all referred for brain MRI, were selected using available and consecutive sampling. The groups were compared based on the number, shape, and size of Virchow-Robin spaces (VRS).

Standard MRI was performed using a SIEMENS MAGNETOM Avanto 1.5-Tesla scanner. Data were analyzed using SPSS version 20. Statistical tests included the chi-square test, Student's t-test, and Mann-Whitney U test. Logistic regression was used to adjust for age and gender, and the area under the curve (AUC) was calculated to evaluate model discrimination. A p-value of less than 0.05 was considered statistically significant.

Results: The mean number of VRS was 2.82 ± 3.22 in the case group and 0.67 ± 1.97 in the control group ($p < 0.001$, Cohen's $d = 0.82$, 95% CI: 0.55 to 1.09). The ROC curve analysis showed an AUC of 0.7614 (95% CI: 0.697 to 0.82), indicating good diagnostic performance. Logistic regression revealed that the number of VRS (OR = 1.50, 95% CI: 1.25-1.80, p = 0.001) and round-shaped VRS (OR = 2.12, 95% CI: 1.54-2.94, p = 0.001) were significant predictors of MS

Conclusion: The number and shape of VRS) on brain MRI were statistically associated with M. These findings suggest potential diagnostic value. However, further prospective studies and high-resolution imaging are needed to confirm their clinical utility. VRS may complement conventional biomarkers, such as white matter lesions, in the evaluation of MS.

Keywords: Virchow-Robin space Multiple sclerosis

Radiomic biomarkers from 3D brain MRI to discrimination multiple sclerosis phenotypes: An in-depth machine analysis

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Introduction: The diagnostic differentiation of MS phenotypes is still challenging. We aimed to evaluate the value of radiomic signatures as quantitative imaging biomarkers for differential

diagnosis of relapsing-remitting (RRMS) and secondary progressive multiple sclerosis (SPMS).

Materials and Methods: One hundred MS patients including 56 RRMS and 44 SPMS were enrolled in this study, and a total of 2553 radiomic features were extracted from the 3D brain MR images including T2, FLAIR, and T1-MPRAGE. After multi-level feature selection, seven radiomic models were constructed by multivariate LASSO (least absolute shrinkage and selection operator) logistic regression analysis. The performance of models was evaluated using the area under the ROC curve (AUC), sensitivity, specificity, accuracy, precision, and F1 score.

Results: We found the multi-parametric LASSO logistic regression model developed from all MRI sequences with AUC 0.8758, sensitivity 0.7727, specificity 0.9286, accuracy 0.8578, precision 0.8947, and F1 score 0.8293 as the best model.

Conclusion: Our work concludes that the multi-parametric MRI radiomic features can potentially discriminate similar lesions in MS phenotypes and provide a useful supplementary tool for the differential diagnosis of RRMS from SPMS.

Keywords: MS MRI Radiomics Neuroimaging

Desmoplastic Fibroma of the Distal Femur: A Rare Bone Tumor Mimicking Common Lytic Lesions

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Introduction: Desmoplastic fibroma of bone is an exceptionally rare benign tumor, accounting for less than 0.1% of primary bone neoplasms. It is characterized histologically by spindle cell proliferation within a collagen-rich stroma. Although the mandible is the most frequent site, long bones like the femur can also be affected. On imaging, desmoplastic fibroma typically appears as a well-defined lytic lesion with variable cortical involvement, often resembling more aggressive conditions such as giant cell tumor (GCT), chondrosarcoma, or metastatic disease. Magnetic resonance imaging (MRI) is essential for evaluating the lesion's extent and matrix, but histopathology remains the gold standard for diagnosis. This case report details the radiological findings of a desmoplastic fibroma in the distal femur, highlighting its diagnostic challenges and imaging characteristics.

Materials and Methods: A 50-year-old man presented with left knee pain, without systemic symptoms or additional complaints. Physical examination revealed mild tenderness over the distal femur. Laboratory tests were unremarkable. Plain radiographs of the left knee were obtained (Figure 1). The radiographs showed a subtle lytic lesion in the distal femoral metaphysis, extending into the epiphysis, with well-defined margins and no evidence of cortical destruction or soft tissue mass. Subsequent MRI of the left knee was performed to further characterize the lesion (Figure 2). The MRI revealed a well-defined, lobulated lesion in the distal femoral metaphysis, extending into the epiphysis. On T1-weighted images, the lesion appeared hypointense. T2-weighted images demonstrated

heterogeneous hyperintensity, suggesting varied tissue components, including a cystic area likely due to degeneration or necrosis. Proton density fat-saturated sequences highlighted the lesion's heterogeneous hyperintensity, posterior cortical breach, and absence of soft tissue invasion or perilesional edema. Based on these imaging findings, the differential diagnosis included low-grade chondrosarcoma, giant cell tumor, lymphoma and metastasis. A core needle biopsy (CNB) was performed under imaging guidance.

Microscopically, it showed a neoplasm composed of fascicles of spindle cells with uniform, vesicular, large nuclei and rare mitotic figures, accompanied by a bone component consistent with its intraosseous origin. The final diagnosis, confirmed one month prior to this report, was a low-grade spindle cell tumor, favoring desmoplastic fibroma. Given the patient's mild symptoms and the benign nature of the lesion, surgical intervention was not pursued. The patient is scheduled for periodic MRI follow-up to monitor for lesion progression or recurrence, with the next evaluation pending.

Results: This case shares similarities with prior reports, such as Crim et.al, who described desmoplastic fibroma as a lytic lesion. However, the cystic component and epiphyseal extension in our case are less frequently reported. Vanhoenacker et.al. underscored the role of MRI in detecting cortical involvement and guiding biopsy, as demonstrated here where CNB provided a definitive diagnosis with high accuracy. The decision to manage this patient with MRI follow-up rather than surgery aligns with strategies for minimally symptomatic lesions, as described by Tunn et.al.

The non-surgical management in this case, one month post-diagnosis, reflects the patient's minimal symptoms and the lesion's benign nature. Radiologists play a pivotal role in characterizing the lesion, biopsy, and monitoring progression, ensuring optimal outcomes in such rare cases

Conclusion: Desmoplastic fibroma is a rare benign bone tumor that can mimic more aggressive lytic lesions on imaging. This case illustrates its presentation in the distal femur with atypical features, including a cystic component and cortical breach without soft tissue invasion. Radiologists should consider desmoplastic fibroma in the differential diagnosis of well-defined lytic lesions in long bones, particularly when imaging findings are nonspecific. Core needle biopsy is essential for confirmation, and MRI plays a critical role in characterizing the lesion and guiding management. Non-surgical management with MRI follow-up may be appropriate for minimally symptomatic cases, but long-term monitoring is warranted to detect potential progression.

Keywords: bone tumor, lytic lesion

A Review on MRI-Based Machine Learning Approaches for Autism Spectrum Disorder Diagnosis

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Introduction: Autism spectrum disorder(ASD) is a heterogeneous neurodevelopmental condition that emerges in infancy or early childhood. According to 2025 data from Centers

for Disease Control and Prevention(CDC), 3.2% of 8-year-old children are diagnosed with ASD, with boys affected three times more than girls. Therefore, developing neuroimaging-based methods for early diagnosis is essential to improve patients' life skills and social functioning. Magnetic resonance imaging(MRI) plays a crucial role in the early detection of abnormal brain changes associated with ASD, including increased brain volume, impaired integrity of white matter fiber tracts, and abnormalities in the connectivity of structural and functional brain networks, as well as altered tissue perfusion and neuronal metabolism. To improve diagnostic accuracy, artificial intelligence techniques including machine learning and deep learning are applied to MRI data, capable of identifying complex, multivariate features and image patterns.

Materials and Methods: Common MRI techniques used in ASD diagnosis include structural MRI (sMRI), diffusion tensor imaging (DTI), and functional MRI (fMRI). sMRI provides detailed anatomical information with high spatial resolution, enabling the identification of abnormal brain structures. DTI allows examination of white matter fiber tract abnormalities, which are critical for brain connectivity. fMRI detects dynamic physiological changes by measuring blood oxygen level-dependent signals, revealing disruptions in functional brain connectivity. Multimodal MRI, integrating these methods, is expected to enhance early and accurate clinical diagnosis of ASD, especially when combined with deep learning, genomics, and artificial intelligence. Such integration can provide visual, rapid, measurable, and objective imaging biomarkers for clinical use. Classifiers such as support vector machine (SVM), decision tree (DT), random forest (RF), and deep neural networks (DNN) have demonstrated strong performance in ASD diagnosis due to their ability to handle high-dimensional and complex data. To prevent overfitting or underfitting, feature reduction methods—both supervised (e.g., filter and wrapper techniques) and unsupervised (e.g., principal component analysis, PCA)—are employed to select the most relevant features and improve model generalization.

Results: Numerous studies have been conducted to investigate various imaging and machine learning approaches for improving the diagnosis of ASD. In one study, a deep convolutional neural network (DCNN) model was used to classify ASD using sMRI, achieving remarkable results including 84% accuracy, an area under the curve (AUC) of 0.90, 77% sensitivity, and 85% specificity. Another study reported a DCNN model (ResNet18) with sMRI data achieving 91.57% accuracy. The integration of sMRI, dMRI, and fMRI data is increasingly enhancing our understanding of ASD. Studies combining sMRI and fMRI reported accuracies ranging from 66% to 87.09%, with CNN performing best. In studies combining sMRI and DTI, accuracies ranged from 91.9% to 94.82%, with SVM showing the best performance.

Conclusion: Challenges such as limited data on infants under two years old, gender differences in ASD prevalence, and the lack of diverse MRI datasets representing different ASD subtypes continue to hinder research progress. These gaps should be addressed in future studies. Machine learning algorithms have proven highly effective for both basic ASD diagnosis and classification of varying severity levels. Future research should prioritize identifying imaging biomarkers using multimodal MRI and integrating them with deep learning and genomic data to support early detection and the development of personalized intervention strategies.

Keywords: Autismspectrumdisorder
Magneticresonanceimaging
Artificialintelligence

Poster Accepted Abstract of ICR2025

The Effect of Chat GPT on Dental Radiology

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Introduction: Artificial intelligence is a branch of computer science whose main goal is to produce intelligent machines that are capable to perform tasks that usually require human intelligence. Chat GPT is one of the most significant models of artificial intelligence that has flourished in dentistry, especially the field of dental radiology. Therefore, the present study has been conducted to make a comprehensive review of the various applications of Chat GPT in the field of dental radiology along with its advantages and disadvantages.

Materials and Methods: A complete quarry was conducted in PubMed, Google Scholar, Embase, and Scopus databases, and studies published during the years 2020 to 2024 using the keywords "Artificial Intelligence," "Dentistry," "Chat GPT," "Dental Radiology," and "Differential Diagnosis" was scrutinized. According to the inclusion and exclusion criteria of the study, ultimately 14 related articles focusing on the effects of Chat GPT in dental radiology were selected and evaluated.

Results: Multiple studies have discussed Chat GPT's positive impact on dental radiology. It has been mentioned that Chat GPT can aid in preparing a differential diagnosis list for a dental lesion based on radiographs, write an appropriate maxillofacial radiograph report and generate task-specific responses including the lesion's location, extent, size, shape, radiographic appearance, effect on surrounding structures, clinical implication, appropriate differential diagnosis, and recommendation. The accuracy rate of Chat GPT's answers to radiologic-based questions was estimated to be between 70-81% which proposes Chat GPT's potential capability to be used as an aiding tool in this field.

Conclusion: Based on the obtained results, the application of Chat GPT in clinical practice is still not reliable. It is perceived that Chat GPT version 3.5 and 4 can merely answer students' questions and help them with their learning process. It also should be noted that this novel technology faces multiple challenges including the difficulty of use, ethical problems, and high expenses, which require more research in the future.

Keywords: ArtificialIntelligence, Dentistry, ChatGPT, DentalRadiology, DifferentialDiagnosis

Application of Artificial Intelligence in Dental Radiology

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Introduction: Artificial Intelligence (AI) is a branch of computer sciences with the primary objective of producing intelligent machines capable of performing tasks that usually require human intelligence. In recent years, the use of AI has become increasingly popular in various branches of dentistry including dental radiology. Therefore, the present study aims to determine how the future of dental radiology will be transformed by artificial intelligence along with its advantages and disadvantages.

Materials and Methods: A complete query was carried out on PubMed and Google Scholar databases and the studies published during 2015-2024 were collected using the keywords "Artificial Intelligence," "Dentistry," "Dental Radiology", "Machine learning," and "Deep learning,". Ultimately, 26 relevant articles focused on artificial intelligence in dental radiology were selected and evaluated.

Results: AI has noticeably influenced dental radiology. For Instance, in new research AI models can be used for classification, detection, and segmentation in maxillofacial radiology, diagnose dental caries, periodontal disease, osteosclerosis, odontogenic cysts and tumors, and diseases of the maxillary sinus or temporomandibular joints on a radiology image, suggest a list of differential diagnoses by providing the patient's clinical and radiological records and reduce the noise in the radiographic film and artifacts caused by metal restorations, including crowns and implants on CT and CBCT images. Moreover, In the field of forensic dentistry, AI can analyze dental images to identify and match individuals based on their teeth and jaws estimate age and sex based on dental radiographs. Nowadays, intelligent chatbots that can answer questions and educate people about dental radiology have been introduced to the world.

Conclusion: As evidenced by the obtained results, AI systems can be practical in radiology with a high accuracy rate of 80-87%. However, the immense application of AI requires adequate regulations and frequent precise research.

Keywords: ArtificialIntelligence, Dentistry, DentalRadiology, Machinelearning, Deeplearning

Fetal renal artery and middle cerebral artery indices in pregnant mothers with pre-eclampsia

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Introduction: When this hypertension is accompanied by proteinuria, thrombocytopenia, renal failure, liver failure, pulmonary edema, and cerebral/visual symptoms, it is called preeclampsia (2), which occurs in 46% of pregnant women with gestational hypertension. (3) In general, 5-7% of all pregnant women suffer from preeclampsia, causing more than 500,000 fetal deaths and 70,000 maternal deaths worldwide each year (4).

Pre-eclampsia affects the kidneys of the fetus and the number of nephrons decreases following blood pressure imbalance. The values of resistance index (RI) and pulsatility index (PI), which means high values measured by Doppler test, indicate an increase in resistance in the vascular bed, is the best indicator of resistance in the vascular bed. (24)

So far, limited Doppler studies of fetal kidney and middle cerebral artery in pre-eclamptic mothers have been investigated

Materials and Methods: This study was conducted from July 2022 to July 2023 on patients referred for pre-eclampsia pregnancy ultrasound and healthy pregnant women to Besat Army Hospital.

Inclusion criteria were: 1- New/known case of pre-eclampsia 2- Absence of fetal growth restriction (IUGR) 3- Absence of previously known diseases in the fetus including cardiac, renal and fetal anomalies 4- Consent to participate in the study and exclusion criteria were: 1- The patient's lack of consent to continue the study 2- The unavailability of information during childbirth. At first, the type of study, its importance and steps, and the confidentiality of the information were explained to the patient, and if the patient consents to participate in the study, a written consent form was given. All the patient's information was coded without mentioning the name and surname in a checklist including: demographic variables (age of mother and fetus and sex of the fetus). Patients were divided into two groups with pre-eclampsia and healthy. All patients were underwent ultrasound examination by an expert radiologist with more than one thousand anomaly scan experience. Ultrasound examination was done using a curve probe with 3-5 MHz and RI, PI, and S/D indexes were measured and recorded in the middle cerebral arteries and fetal kidneys.

Results: In this study, 24 healthy mothers and 26 preeclampsia mothers were studied. Also, the mean MCA.PI in healthy mothers was 1.9 and the S/D ratio was 6.9. The meanrenal RI in healthy people was 0.84 and the mean Renal PI was 1.98 and the S/D ratio was 7.2.Mean MCA. RI in pregnant mothers with preeclampsia was 0.83.

Also, the mean MCA.PI in healthy mothers was 1.9 and the S/D ratio was 7.07. The mean renal RI in mothers with preeclampsia was 0.83 and the mean Renal PI was 2.13, S/D ratio was 6.99.

RI had a correlation coefficient of 0.127, which seems with increasing the age of the mother, the amount of MCA. RI increases, but this relationship was not statistically significant (p=0.37).

The correlation coefficient of two variables, gestational age and renal PI was -0.294, which was statistically significant, that is, with increasing gestational age, the renal artery PI variable decreases with a negative slope. (P=0.03)

Conclusion: In this study, we tried to investigate and compare the Doppler sonographic differences of renal arteries and MCA of preeclamptic and healthy fetuses. In this study, it was shown that with the increase in gestational age, renal PI and S/D variables decreased significantly in two groups, but due to the lack of a similar study, it was not possible to compare similar cases. Also, in patients with preeclampsia, the Doppler criteria of renal arteries and MCA There was no significant difference with the control group. Taking into account that previous studies had significant differences from each other in terms of results, there were limitations in examining the results with similar studies.

Keywords: renal artery, Doppler, cerebral artery

Seldinger or trochar for pleural effusion drainage; a case control study

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Introduction: In the normal pleural space, there is a steady state in which the amount of fluid formation (inflow) and absorption (outflow) is approximately equal. To cause pleural effusion, this balance must be disturbed (1). It is important to understand which tube to use in different situations and how to correctly insert the tube or catheter. This article that one type or one size of tube or catheter is suitable for everyone is outdated.

Placement of thoracostomy tube (Fr ≥ 16 diameter) or thoracostomy catheter (Fr ≤ 14 diameter) may be indicated in different conditions. Different types of tubes (diameter, shape) are selected based on the type of indication (2-7).

Materials and Methods: The current study is cross-sectional-analytical. The studied population in this study were patients suffering from pleural effusion with any type of etiology who were candidates for drainage with confirmation of the diagnosis. Each patient was evaluated for the occurrence of complications, including early pneumothorax, delayed pneumothorax, infection, leakage, and intrapleural bleeding. Also, blockage or displacement of catheter, volume of pleural effusion and size of catheter used in both methods were recorded separately in each patient

Results: In the present study, 90 patients were included in the study. The median age and interquartile range (IQR) of the patients in this

study were 57.5 and 20.5 years respectively (age range 34 to 81 years). Also, 61.1% of the patient population in this study were men. There was no statistically significant difference in the incidence of early pneumothorax, delayed pneumothorax, infection, leakage, and intrapleural bleeding between the two study groups. The incidence of intrapleural bleeding and delayed pneumothorax was higher in the one-step group than in the two-step group (respectively, 13.3% vs. 4.4% and 11.1% vs. 4.4%), but this difference was not statistically significant.

Conclusion: One-step and two-step catheterization techniques are both safe methods in medium-sized pleural effusions without serious complications

Keywords: Pleural effusion, catheter, complications

ChatGPT in Diagnostic Radiology: A Systematic Review

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Introduction: Radiology plays an important role in diagnosis and treatment of many medical diseases. Although imaging technologies have evolved over the past century, radiology reports have remained largely unchanged in both content and structure. Discussing algorithms such as ChatGPT can help improve patient outcomes, increase the efficiency of radiology interpretation, and contribute to the overall workflow of radiologists. Therefore, this study will be designed and implemented with the aim of evaluating the advantages and limitations of ChatGPT in diagnostic imaging as a systematic review.

Materials and Methods: This study is a systematic review of original studies. A comprehensive search was conducted in major databases, including PubMed, Scopus, and Web of Science, to identify relevant articles on using ChatGPT in radiology for medical imaging diagnosis.

Results: The search yielded a total of 870 results. Following the removal of 198 duplicates, 672 studies were screened, of which 214 were selected for full-text review. From these 214 full texts, a total of 30 studies met the inclusion criteria and were included in our analysis. Systematic searches were carried out for all publications according to inclusion and exclusion criteria between 2010 and 2024. Among these, 24 (24/30; 80%) demonstrated high performance. Two studies compared two recent ChatGPT versions, and in both of them, ChatGPTv4 outperformed v3.5. Challenge and limitations included inconsistent accuracy, hallucinations, and the potential for inaccurate information leading to misinformation.

Conclusion: ChatGPT demonstrates substantial potential in reforming radiology by enhancing workflow efficiency, improving diagnostic accuracy and aiding in research but there are still multiple pitfalls and limitations to address. Further research

are essential to harness the full capabilities of ChatGPT and address the challenges associated with its implementation.

Keywords: Artificial intelligence, ChatGPT, Diagnosis Imaging

Grading of Gliomas by Using Radiomic Features on Contras-Enhanced Computed Tomography

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Introduction: Glioma is the most common primary central nervous system malignancy. Grading of glioma is critical for treatment decisions and determining the next step of the treatment procedures. Radiomics is a non-invasive method to reach clinical information by extracting minable data from clinical images. The study aims to determine the glioma grading by using contrast-enhanced CT scan images radiomics analysis.

Materials and Methods: Sixty-two pathologically proven glioma patients with contrast-enhanced brain CT images were included. A total of 93 radiomic features were extracted by using Slicer Software from the segmented regions. Feature selection was done by L1-norm regularization (LASSO) and was applied to three classifier algorithms including support vector machine (SVM), Linear Discriminant, and k-nearest neighbors (KNN) to build predictive models. The predictive power of models was assessed by accuracy, sensitivity, specificity, and the area under the curve (AUC).

Results: Thirteen significant features were selected. Our models obtained accuracy and AUC of 0.935, 0.98 for Linear Discriminant, 0.903, 0.94 for SVM and 0.87, 0.871 for KNN respectively.

Conclusion: Glioma grading could be accurately determined using contrast-enhanced brain CT scan images radiomics. The result of our study shows that radiomics on CT scan images is a suitable method for non-invasively assessing the grading of glioma.

Keywords: Glioma, Radiomics, Machine Learning

Imaging Modalities for Evaluation of Treatment Response in Bone Metastasis of Breast Cancer: A Narrative Review of the Literature and Update of the Current Guidelines

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Introduction: Bone metastasis is relatively common in patients with breast cancer, occurring in up to 70% of cases. It is crucial to have reliable, repeatable, and consistent techniques for evaluating treatment responses to manage metastatic bone lesions in breast cancer.

Materials and Methods: In this article, we review the clinical application of the four most commonly used imaging modalities for detecting bone metastasis in breast cancer and discuss their limitations as well as their potential benefits. Several guidelines including 2024 American College of Radiology and National Comprehensive Cancer Network, as well as response systems such as MET-RADS and MD Anderson are discussed.

Results: Based on current data, advanced imaging methods such as whole-body diffusion-weighted magnetic resonance imaging, positron emission tomography, and hybrid imaging are preferred over conventional computed tomography or bone scan, which lack sufficient sensitivity and specificity when evaluating metastatic bone lesions.

Conclusion: Evaluating treatment responses is recommended with a combination of serological and imaging analysis. Conventional imaging modalities including bone scans and CT scans- although inexpensive and accessible, lack sufficient sensitivity. This limitation is far more important when it comes to monitoring small alterations. Recent advances have provided imaging techniques with adequate sensitivity and specificity and also inform clinicians about precise metabolic and anatomical alterations within bone. These advanced modalities include WB-MRI, PET/CT, and PET/MRI. Current data suggest the superiority of PET/CT (especially FDG-

PET/CT) and DW-WB-MRI over other methods for monitoring the response to systemic therapy of osseous metastatic breast cancer.

Keywords: breast cancer Bone metastasis responses

Simple MR Guided Breast Biopsy Strategy: Technique and Radiological-pathological Associations

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Introduction: MRI is pivotal in breast imaging, encompassing staging, treatment monitoring, and lesion differentiation. While MRI boasts high sensitivity, specificity, and utility in detecting otherwise unseen lesions, challenges persist in accurately distinguishing benign from malignant findings. The study delves into MRI-guided breast biopsy outcomes and highlights the importance of radiologic-pathologic results.

Materials and Methods: This retrospective study analyzed 109 MRI-guided breast biopsies conducted on lesions identified between 2017 and 2023. the patients underwent biopsies for screening and diagnostic purposes. Biopsy procedures involved meticulous MRI guidance using a 1.5 Tesla system. Lesions were categorized based on location and BIRADS lexicon, with biopsy results spanning benign, suspicious, and malignant pathologies. Data collection encompassed a wide array of patient factors and pathology reports, meticulously reviewed by experienced radiologists, shedding light on the efficacy and outcomes of MRI-guided breast biopsies.

Results: The participants had a mean age of 45 ± 11 years. A significant association was found between the history of pregnancy and breast lesion enhancement. Patients with mass enhancement had a higher BIRADS B4b, B4c, and B5 classification rate, while those with non-mass

enhancement were more commonly classified as BIRADS B3 and B4a. Histopathology diagnoses were significant in determining the presence of mass or non-mass lesions. The sensitivity and specificity of MRI for detecting malignancy were high for BIRADS categories 4c and 5 but may result in a higher number of false positives.

Conclusion: Our research highlighted the significance of MRI in the diagnosis of breast cancer, particularly when used in conjunction with high-risk lesions as well as showed the need of sub-classifying BI-RADS-4 lesions to minimize the number of unnecessary biopsies. The results affirm the ongoing use of MRI-guided biopsy for the detection of breast cancer.

Keywords: MRI-guided breast biopsies, BIRADS

The Correlation between Metabolic Dysfunction – Associated Steatotic Liver Disease (MASLD) Grades and Hemodynamic Alterations of the Portal, Hepatic, and Splenic Vein and Spleen Size

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Introduction: Metabolic dysfunction-associated steatotic liver disease (MASLD), formerly known as non-alcoholic fatty liver disease (NAFLD), is the most prevalent chronic liver condition worldwide, affecting over 25% of the population. Fatty infiltration in MASLD leads to hemodynamic changes in hepatic circulation, which can be quantitatively assessed using Color Doppler Ultrasonography (US). In this study, we aimed to investigate the correlation of Color Doppler US findings of the portal, hepatic, and splenic venous system within various degrees of MASLD.

Materials and Methods: Between 2021 and 2024 , 104 patients referred to Mousavi Hospital at Zanjan University of Medical Sciences were enrolled. Participants were divided into four groups based on the degree of hepatic fatty infiltration on biopsy results: normal, grade 1, grade 2, and grade 3, with 26 subjects in each group (13 men and 13 women). All patients were biopsy proved. Gray-scale and Color Doppler US were used to assess portal and splenic vein peak systolic velocity (PSV), portal and splenic vein diameter, hepatic vein waveform, and spleen size. The Spearman rank correlation was employed to evaluate the relationship between these variables under non-parametric conditions.

Results: A significant negative correlation was found between portal vein PSV and MASLD grade(r=−0.499,p=0.000). A significant difference was also observed in hepatic venous waveform abnormality between different grades of MASLD (p = 0.043). Accordingly, portal vein

PSV and splenic vein PSV had a significantly positive correlation (r = 0.209, p = 0.033). We also observed a positive correlation between the portal vein and splenic diameter (r = 0.210, p = 0.032).

Conclusion: Colour Doppler US is a non-invasive method for evaluating hemodynamic changes in the portal vein. Our study demonstrated an inverse correlation between the grade of MASLD and portal vein PSV, likely due to decreased vascular com- pliance from increased fat infiltration. However, we did not find a significant association between MASLD grade and portal vein diameter, splenic vein diameter, splenic vein PSV, or spleen size. Additionally, our results indicated that the hepatic vein is more affected by fatty infiltration and inflammatory processes in MASLD. Therefore, assessing hepatic and portal vein hemodynamics can be considered reliable for routine examination of MASLD patients.

Keywords: MASLD, NAFLD, color doppler

Evaluation of Barium sulfate-copper breast radiation shield for use in thoracic Computed Tomography Examinations

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Introduction: In thoracic computed tomography (CT) examinations, patients' breasts are exposed to high radiation doses, necessitating the need to reduce the received dose. The aim of this study was to evaluate the efficiency of a new composition of a shielding material with minimal impact on image quality.

Materials and Methods: Different breast shields were manufactured with varying weight percentages of copper and BaSO4. Thermoluminescent dosimeters (TLD) and thorax phantoms were used to assess the radiation shielding effectiveness. Image quality, in terms of noise and CT number accuracy, was quantitatively evaluated on a CTDI phantom. Additionally, a controlled trial with 30 female participants was conducted to further assess image quality and select the best breast radiation shield.

Results: The results indicated that the different shield compositions reduced the surface dose by 14.17-51.69%. The shield with a composition of 90% Cu-10% BaSO4 and 50% Cu-50% BaSO4 had the lowest noise, while the 100% bismuth shield had the highest noise. Importantly, the 50% Cu-50% BaSO4 shield did not cause artifacts in the thoracic CT images.

Conclusion: By using the 50% Cu-50% BaSO4 shield, a significant dose reduction was achieved while maintaining appropriate image quality, making it suitable for clinical applications.

Keywords: Dose reduction- radiation breast shield

Increased Contralateral Uterine Artery Pulsatility Index with Lateral Placental Position

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Introduction: The uterine artery pulsatility index (Uta-PI) is a Doppler-derived measure of uteroplacental blood flow, used to predict pregnancy complications and adverse perinatal outcomes. This study aimed to evaluate the effect of placental position on Uta-PI.

Materials and Methods: From December 2020 to June 2022, a total of 155 uncomplicated singleton pregnancies (18-28 weeks) were studied. The right and left Uta-PI were measured, and the placental position was determined as posterior, anterior, lateral (right or left), fundal, or previa.

Results: The placental position was posterior (43 cases), anterior (39 cases), right-sided (29 cases), fundal (27 cases), left-sided (12 cases), or previa (5 cases). Overall, a significant difference in the mean right Uta-PI was observed across the six placental positions ($P< 0.01$), with similar results for the left Uta-PI ($P< 0.01$). When comparing right and left Uta-PI values, no significant difference was detected in posterior, anterior, and fundal placentas. However, there were significant differences between the right and left Uta-PI in lateral placentas. For right-sided placentas, the left Uta-PI was significantly higher than the right Uta-PI (1.20 ± 0.45 vs 0.78 ± 0.28, $P< 0.01$). For left-sided placentas, the right Uta-PI was significantly higher compared to the left Uta-PI (1.22 ± 0.54 vs 0.85 ± 0.42, $P= 0.04$). These findings remained consistent after adjusting for gestational age using Uta-PI percentiles.

Conclusion: Our findings indicate that in cases of placental laterality, the contralateral Uta-PI is higher than the ipsilateral Uta-PI. This suggests increased contralateral uterine artery resistance when the placenta is positioned laterally.

Keywords: placenta, pulsatility index, uterine artery

Deep learning Methods for Dipole Inversion in Quantitative susceptibility mapping (QSM)

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Introduction: Quantitative susceptibility mapping (QSM) is a magnetic resonance imaging (MRI) based-technique aiming to quantitatively measure the spatial distribution of magnetic susceptibility within tissues. In the brain, QSM has been shown to provide information about myelin and iron concentration. QSM requires multiple processing steps such as phase unwrapping, background field removal and field-to-source inversion. Current state of-the-art techniques utilize iterative optimization procedures to solve the inversion and background field correction, which are computationally expensive and require a careful choice of regularization parameters. Recently deep learning has shown great potential for solving dipole inversion of quantitative susceptibility mapping (QSM) with improved results.

Materials and Methods: In this review we have found 1127 articles in PubMed and ScienceDirect database by using "deep learning for dipole inversion" as a keyword. So, we have decided to choose the relevant methods and explained them to give an adequate background and then analyzed the most practical ones. Therefore, five regions of interest (ROIs), including putamen (PUT), globus pallidus (GP), caudate nucleus (CN), red nucleus (RN), and substantia nigra (SN) in brain were selected in all the deep learning methods. The first method is

xQSM which introduced modified octave convolutional layers into a U-net backbone and used both synthetic and simulated datasets for training.

QSMnet used a modified U-net structure and the combined loss, including model loss, gradient loss, and the normal L1 loss, to generate high-quality COSMOS-like maps from the single-orientation tissue phase.

AutoQSM directly estimated the susceptibility map from the unwrapped phase without brain extraction and background removal based on a modified U-net structure.

LPCNN incorporated a learned iterative proximal gradient descent solver into CNN to solve the ill-posed QSM dipole inversion problem.

DeepQSM trained a U-net using purely synthetic data to make the network learn the dipole deconvolution process.

MoDIP comprises a small, untrained network and a Data Fidelity Optimization (DFO) module. The network converges to an interim state, acting as an implicit prior for image regularization, while the optimization process enforces the physical model of QSM dipole inversion.

Results: The results of evaluating the accuracy of deep neural networks in Quantitative Susceptibility Mapping (QSM) reconstruction are promising for the better future. Performance intuition has shown that the xQSM simulated shows weak susceptibility reconstruction on data but indicating that the trained models are limited by the training data distribution. Also, DeepQSM has strong predictive performance when applied to synthetic data. However, DeepQSM errors analysis shows that the error distribution is centered around 0 and indicating no systematic quantification bias while MEDI has the low error measures for high-frequency error scale, DeepQSM maintain similar

accuracy in this dataset. QSMnet demonstrates a significant advantage in reconstruction speed, with an average time of just 6.3 seconds on GPU compared to MEDI's slower average of 258.1 seconds on CPU.

Conclusion: Deep learning-based QSM reconstruction, trained solely with synthetic data, is well-suited to rapidly reconstructing high-quality susceptibility maps in the presence of fat without needing masking for background field removal. Deep neural networks have demonstrated great potential in solving dipole inversion for Quantitative Susceptibility Mapping (QSM). Deep learning offers a new angle to QSM reconstruction and has already shown promising results to overcome a few important problems in conventional methods. However, new challenges that are not yet resolved have arisen, offering novel opportunities not only for QSM reconstruction but also for deep learning in general. We believe a substantial amount of work awaits to bring the techniques towards robust clinical applications.

Keywords: Deep learning Dipole inversion QSM

Venous Pseudoaneurysm of the Cervix Causing Hematometra Mimicking Endometrial Cancer: A Case Report

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Introduction: Pseudoaneurysms affect both the arteries and veins. Venous pseudoaneurysms are less common than arterial ones. Venous pseudoaneurysms, whether deep or superficial, form in both large and small vessels. One of the very rare types of venous pseudoaneurysm is the pseudoaneurysm of the cervical veins. In this study, we introduce a woman with a cervical vein pseudoaneurysm.

Materials and Methods: A 64-year-old woman presented complaining of post-menopausal uterine bleeding for about 3 months. The transvaginal ultrasound exam revealed increased endometrial thickness. Therefore, she underwent hysteroscopy and endometrial curettage. The histopathologic results reported focal hyperplasia raised on an endometrial polyp. Given the ongoing vaginal bleeding after the curettage, a transvaginal ultrasound re-scan was performed, followed by Magnetic Resonance Imaging; which revealed a heterogeneously thickened endometrium containing clot and different stages of hematoma with no evidence of abnormal enhancement or myometrial

invasion along with a pseudoaneurysm located at the cervix. Ultimately

Results: considering the persistent vaginal bleeding and suspicion of concurrent endometrial cancer, the patient underwent total abdominal hysterectomy and bilateral salpingo-oophorectomy. Histopathologic findings revealed no malignant cells and it was assumed that the thickened endometrium, intracavitary blood, and symptoms of the patient were due to leakage of blood from the cervical venous pseudoaneurysm

Conclusion: To our knowledge, this is the first report of a venous pseudoaneurysm located at cervix. Pseudoaneurysms of the cervical veins are rare cause of uterine bleeding that should always be considered in women complaining of persistent abnormal uterine bleeding and a recent or remote uterine surgery or transvaginal interventions

Keywords: pseudoaneurysm vein cervix

Colpocephaly and corpus callosum dysgenesis in an adult: A rare case report

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Introduction: Colpocephaly, a midline anomaly, may be associated with agenesis of the corpus callosum. While prenatal diagnosis is possible, this malformation is rarely detected in adults and may be asymptomatic.

Materials and Methods: Case presentation: We present a case of a 54-year-old male with Colpocephaly and dysgenesis of the corpus callosum, incidentally diagnosed during an emergency department visit. Computed tomography imaging revealed bilateral dilation of the posterior horns of the lateral ventricles and the absence of the corpus callosum.

Results: Although some adults with Colpocephaly may show clinical symptoms, this anomaly can often be an incidental finding in asymptomatic individuals. Medical imaging plays a crucial role in the early diagnosis of this anomaly. Prenatal ultrasound can also detect midline anomalies, including Colpocephaly.

Conclusion: Awareness of this anomaly can prevent unnecessary diagnostic and therapeutic interventions.

Keywords: Colpocephaly; Corpus callosum dysgenesis

Lithopedion - A Rare Complication of Ectopic Pregnancy: A case report

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Introduction: The term "lithopedion" is derived from 2 Greek words, "lithos" (stone) and "payion" (child), which was first described in the 10th century by Albucasis, a pioneer of modern surgery. It is a rare phenomenon in 1.5%-2% of ectopic pregnancies and accounts for 0.0054%

Materials and Methods: We present a 52-year-old woman admitted to the emergency department after an accident, and a lithopedion was observed in imaging examinations. Immediately, surgery was performed, and the calcified mass was removed. (Our case was reported as the first case of lithopedion from Iran)

Results: After taking a pelvic X-ray, we noticed an area with a large mass-like ossification in the pelvic region. Next, a computed tomography (CT) scan was requested from the abdominal and pelvic area, in which a calcified mass was identified in the shape of a fetus with flexion; in addition, the ribs, vertebral column, arm, and skull were recognizable to some extent

Conclusion: Knowing the types of abdominal masses, etiopathogenesis, and their differentiation from each other is important in preventing and reducing their complications. Ectopic pregnancy is one of the causes of abdominal mass. Proper and timely diagnosis can prevent complications caused by ectopic pregnancies. Improving the health level of society is an important step that can have a significant impact on preventing such pathologies.

Keywords: Lithopedion - Ectopic pregnancy

Cervicothoracic (C6, C7 & T1) Spina Bifida Occulta – A case report

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Introduction: Spina bifida (SB), as one of the spine abnormalities, is caused by incomplete closure of the neural tube and generally includes two types: open and closed. This study aims to

introduce one of the rare cases of closed SB.

Materials and Methods: A 34-year-old male patient was admitted to the hospital with neck pain. Radiographic and computed tomography (CT) imaging revealed bifid spinous processes from C6 to T1 vertebrae, indicative of a rare case of closed SB in the cervicothoracic region.

Results: CT-scan of the neck and thorax clearly shows closed SB in the C6 to T1 vertebrae, limited to the bony structure (Fig. 2). In the physical examination, no evidence of a hair cyst or the connection of the spinal cord or meninges with the skin's surface was observed.

Conclusion: Diagnosing this abnormality is crucial for addressing potential complications that may arise from it.

Keywords: Spina bifida-Neural tube

Assessment of the relationship between the placenta location and ovulation from right or left ovaries with fetal gender in pregnant woman referring to shahid beheshti hospital at Isfahan from 2023 to 2024

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Introduction: relationship between placental location and ovulation side on fetal gender has been explored in some studies but findings remain inconclusive

Materials and Methods: prospective cross sectional design was carried out at beheshti hospital on600 pregnant woman whether is any link between site of placenta and ovary that ovulates and fetal gender

Results: a total 600 pregnant woman with mean age 31/8+/-5/5 years were entered to our study and be evaluated

Conclusion: noteworthy association between the position of placenta and relationship between the ovary that ovulate and fetal gender

Keywords: fetus gender placenta ovulation

RI-RADS Quality Framework: Analysis of 1,021 Radiological Referrals Across Multiple Centers

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Introduction: Introduction: Effective communication through complete radiological request forms is essential for accurate diagnosis and patient safety. However, inadequate request forms remain a significant challenge in healthcare settings. The Reason for Exam Imaging Reporting and Data System (RI-RADS) was developed to standardize clinical information in radiology requests by evaluating the adequacy of provided details using a five-point scale. While the high rate of inadequate radiology request forms has been documented, the effectiveness of RI-RADS in assessing request quality across different healthcare settings requires further investigation. Objective: To evaluate the implementation of the Reason for Exam Imaging Reporting and Data System (RI-RADS) in assessing radiological referral quality across multiple centers and investigate interrater agreement

Materials and Methods: Methods: This multi-center study analyzed 1,021 consecutive inpatient imaging requests from three major medical centers in ZZZ between April 2024 and October 2024. Three radiologists independently evaluated referrals using the RI-RADS scoring system. The study included computed tomography (CT), magnetic resonance imaging (MRI), and conventional radiography (CR) requests. Interobserver agreement was assessed using weighted Kappa statistics and intraclass correlation coefficient (ICC). Associations between RI-RADS grades and clinical parameters were analyzed using multivariate ordinal regression.

Results: Results: Of the 1,021 requests analyzed, 520 (50.9%) were CR, 271 (26.5%) CT, and 230 (22.5%) MRI examinations. The majority of requests (65.52%) received a RI-RADS grade of D, indicating significant deficiencies in provided information. Conventional radiography showed the highest rate of D grades (89.23%), while CT and MRI demonstrated more balanced distributions. Interobserver agreement was substantial ($\kappa = 0.7$), with ICC of 0.72 indicating good reliability. Missing diagnostic questions (64.74%) and incomplete clinical information (55%) were the most common deficiencies. Orthopedics and trauma constituted the majority of referrals (59.0%).

Conclusion: Conclusion: The study reveals substantial deficiencies in radiological referral

quality, particularly in conventional radiography requests. The RI-RADS system demonstrated good reliability across multiple raters, suggesting its potential utility as a standardized tool for assessing imaging request quality. These findings highlight the need for improved communication between referring physicians and radiologists to enhance the quality of imaging requests.

Keywords: Radiology, RI-RADS

The diagnostic value of anogenital distance and fetal heart rate in predicting the fetal sex in the ultrasound of the first fourteen weeks of pregnancy

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Introduction: Determining the fetal gender during early stages can help identify potential x-linked disorders and predict pregnancy complications and outcomes that are related to the fetal gender. Minimal studies evaluated using anogenital distance (AGD) and fetal heart rate (FHR) as sonographic markers for predicting fetal gender in the first trimester. Therefore, this study aimed to predict fetal gender by measuring AGD and FHR via ultrasound in the first trimester.

Materials and Methods: This is a cross-sectional study conducted at Shahid Beheshti Hospital, Isfahan City, in 2022-2023. The ultrasound scans of 143 singleton pregnancies between 11–13 plus 6 gestational weeks and their fetal gender at birth were collected. Then, the diagnostic value of AGD and FHR in predicting the fetal sex was evaluated using receiver operating characteristic curves (ROC) analysis, and indicators such as sensitivity, specificity, positive and negative predictive value, and the area under the curve (AUC) were reported

Results: A total of 143 pregnant women with the mean age of 31.08±5.26 years were entered to our study. The mean of CRL and FHR in male and female fetuses demonstrated no significant association to differentiate fetal gender (P >0.001). However, AGD in the male fetus was significantly higher than the females (P <0.001). Also, we found that the AGD at the cut-off point of 4.2 mm had a significant diagnostic value in predicting male gender (AUC=0.792; P value<0.001).

Conclusion: Our study demonstrated that AGD measurement, unlike FHR and CRL, could be a valuable procedure for predicting fetal gender.

Keywords: Anogenital distance, Fetal heart rate

Investigating the Diagnostic Value of MRI in the Diagnosis of Rotator Cuff Tears Compared with Findings from Arthroscopy or Open Surgery

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Introduction: Rotator cuff tear is amongst the most common shoulder diseases and a principal reason for orthopaedic consultations. Currently, magnetic resonance imaging (MRI) is one of the most common diagnostic methods for rotator cuff tears and has been compared with direct observation methods, such as arthroscopy and open surgery, in this study.

Materials and Methods: The present study is a cross-sectional analytical type conducted retrospectively from the beginning of 2018 to the end of 2020 in Al-Zahra and Kashani Hospitals in Isfahan, Iraq, covering 86 patients including 54 men and 32 women with criteria for rotator cuff tear who underwent MRI and subsequently arthroscopy or open surgery. MRI images were interpreted by a radiology specialist, and physical examinations, arthroscopy and surgery were performed by two orthopaedic specialists, calculating sensitivity, specificity, accuracy, positive predictive value and negative predictive value for rotator cuff tears.

Results: A total of 29 cases of partial tear and 37 cases of complete tear were observed, with sensitivity, specificity, positive predictive value, negative predictive value and accuracy obtained as 93.9%, 60%, 88.6, 75% and 86%, respectively

Conclusion: MRI is a highly reliable diagnostic tool for diagnosing rotator cuff tears, although correlation with clinical symptoms and physical examinations is essential for this diagnosis.

Keywords: rotator cuff MRI arthroscopy

Approach to The Evaluation and Management of Ovarian Masses

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Introduction: Ultrasonography is the primary imaging modality for evaluating ovarian mass. it provides detailed information about the morphology,size and internal characteristics of the mass,which is critical for determining wheter it is benign or malignant.

Materials and Methods: both IOTA & ORADS are valuable tools in evaluating ovarian mass this study is a prospective analysis conducted at beheshti hospital Isfahan university from 1402-1403.the primary aim was to evaluated the diagnostic and management approaches to ovarian masses in a cohort of 70 patients

Results: This study evaluated 70 patients with ovarian masses at Beheshti Hospital. The mean age was 45 years (range: 18–75 years). The

most common presenting symptoms were pelvic pain (60%) and abdominal distension (25%), while 15% were asymptomatic. Ultrasound findings showed simple cysts in 40%, complex cysts in 25%, and solid masses in 35%. Elevated CA-125 levels were observed in 30% of patients, with a significant correlation to malignancy ($p < 0.05$). Based on O-RADS classification, 50% were low risk, 30% intermediate, and 20% high risk. Surgical intervention was performed in 50% of cases, revealing benign masses in 80% and malignant masses in 20%. Histopathology identified functional cysts (40%), endometriomas (20%), and serous carcinoma (15%). O-RADS 4–5 showed 85% sensitivity and 90% specificity for malignancy prediction. Postoperative complications were minimal, with 90% achieving full recovery.

Conclusion: This study highlights the importance of a structured approach in the evaluation and management of ovarian masses. Among the 70 patients analyzed, imaging techniques such as ultrasound and O-RADS classification, combined with tumor marker evaluations like CA-125, played a pivotal role in risk stratification and guiding clinical decisions. Surgical interventions confirmed a high proportion of benign masses (80%) while accurately identifying malignant cases (20%), underscoring the utility of these diagnostic tools. The findings emphasize the need for comprehensive evaluation protocols to improve early detection of malignancy, optimize patient outcomes, and minimize unnecessary interventions ORADS has slightly lower accuracy than IOTA but sufficient for routin use

Keywords: ORADS IOTA ovarian mass

SMART BIOPSA: Enhancing accuracy in CT-guided lung nodule biopsies using deep learning

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Introduction: CT-guided biopsy is essential for diagnosing histological lesions, particularly small lung nodules. Accurate biopsies help reduce complications such as pneumonia and pneumothorax. Traditional manual methods are often slow and prone to errors, leading to increased patient radiation exposure. New techniques utilizing advanced deep learning and CAD systems are being developed to enhance lung cancer detection and improve nodule identification. This research introduces SMART BIOPSA, a method that maximizes accuracy and minimizes complications through machine learning.

Materials and Methods: This study involved a 128-detector CT scanner and coaxial biopsy needle applied to 42 patients with lung nodules. The sensitivity and specificity of different machine learning algorithms were compared.

Results: The CNN method demonstrated the lowest complication rate, with an average sensitivity, specificity and AUC values of 86%, 88% and 82% respectively. Deep learning achieved the highest specificity among all methods. Transfer learning methods, particularly those like VGG16 and ResNet, have demonstrated exceptional capabilities in effectively representing small nodules. Among these methods, VGG16 has notably outperformed the others, achieving the highest level of performance in this specific task. This highlights the efficacy of transfer learning approaches in improving the representation and analysis of small nodules within various applications.

Conclusion: In conclusion, transfer learning models like VGG and ResNet effectively aid in lung nodule biopsies. Our results show that deep learning enhances early diagnosis with high sensitivity and specificity, serving as valuable non-invasive diagnostic tools.

Keywords: BIOPSA, Deep Learning, Lung, CT

Duplicated Umbilical Vein with an Abnormal Intrathoracic Right Umbilical Vein in the Context of Taussig-Bing Anomaly and Atrioventricular Septal Defect

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Introduction: The prevalence of persistent right umbilical vein (PRUV) is estimated at approximately 2 per 1,000 pregnancies. Nevertheless, instances of PRUV that bypass the intrahepatic route, opting instead for extrahepatic and intrathoracic pathways to establish a connection with the superior vena cava, are considerably rarer. Additionally, the case presented demonstrates notable concurrent cardiac anomalies, specifically D-Transposition of the Great Arteries (TGA) associated with a type of Double Outlet Right Ventricle (DORV) known as the Taussig-Bing anomaly, alongside an Atrioventricular Septal Defect (AVSD), thereby underscoring the distinctiveness of this clinical scenario.

Materials and Methods:

Study Design

This case report describes the clinical findings and imaging characteristics of a fetus diagnosed with persistent right umbilical vein (PRUV) and associated cardiac anomalies. A detailed review of the second trimester ultrasound and echocardiographic assessments was conducted, adhering to ethical standards for fetal research.

Patient Selection

The subject of this report is an 18-week gestational age fetus presented at our tertiary care center for routine second-trimester anomaly screening. The mother had no significant medical history, and there was no known family history of congenital anomalies. Informed consent was obtained from the parents for the use of clinical data for research purposes.

Imaging Techniques

Ultrasound Examination:

A comprehensive ultrasound was performed using a high-resolution ultrasound machine (model specifications if applicable) with 2D and 3D imaging capabilities.

Standardized protocols for second-trimester anomaly scans were followed, including assessments of fetal anatomy, placental location, and amniotic fluid volume.

Special attention was directed towards the location of the fetal stomach, abdominal organs, and umbilical cord arrangement.

Echocardiography:

Fetal echocardiography was conducted using Doppler ultrasound techniques to assess cardiac structure and function.

Axial and coronal views of the fetal heart were obtained, including the 4-chamber view, outflow tracts, three vessel and trachea view and color Doppler imaging to evaluate for any vascular anomalies and shunting.

Results: The imaging studies and clinical evaluations of the 18-week gestation fetus revealed multiple congenital anomalies, including the Taussig-Bing anomaly characterized by transposition of the great vessels from the right ventricle and a subpulmonary ventricular septal defect, along with severe pulmonary stenosis. Sonographic assessments showed an atypical right-sided stomach, raising initial concerns for cardiosplenic syndromes, but imaging of the inferior vena cava confirmed normal anatomy. Notably, PRUV was detected with an aberrant pathway leading to the superior vena cava, diverging from typical anatomy.

Among 99 documented cases of double outlet right ventricle (DORV), 35.3% were identified as heterotaxy type, suggesting a possible link to right atrial isomerism in this case. The findings underscore the complexity of congenital heart defects and highlight the necessity for careful prenatal evaluation and monitoring to inform postnatal management.

Conclusion: The imaging assessment of this distinctive case revealed several cardiac anomalies, including the Taussig-Bing anomaly, AVSD, and pulmonary stenosis (PS). Additionally, the atypical right-sided placement of the stomach and the presence of two vessels located posterior to the heart in the 4-chamber view raised concerns regarding potential cardiosplenic and polysplenia syndromes. However, a thorough examination of the inferior vena cava (IVC) pathway alleviated these concerns. Ultimately, the additional vessel seen behind the heart was confirmed to be the PRUV, which displayed an unusually rare course.

Keywords: PRUV , echocardiography , AVSD

Comparison of Artificial Intelligence using in the FFF-Machine on improving the dose distribution accuracy and normal tissue sparing: state of the art and future perspectives

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Introduction: In radiotherapy, one of the main challenges is delivering the prescribed dose to the tumor volume while ensuring the safety of organs at risk (OAR). The delivered dose to the tumor is significantly influenced by specific parameters such as the accuracy and precision of the commissioning process, the radiation delivery platform, and dosimetric methods. With the increasing volume of available data and model complexity, this study presents significant advancements in radiotherapy measurements aimed at improving accuracy and workflow efficiency. The goal is to enhance planning quality, efficiency, and consistency by reducing trial-and-error processes and integrating prior clinical knowledge.

Materials and Methods: This study focuses on comparing artificial intelligence (AI) models in machines using flattening-filter-free (FFF) beams. It includes an analysis of dosimetric data from 270 patients with head and neck cancer, trained using a residual neural network model. Additionally, the dosimetric characteristics of various machines, including the TrueBeam linear accelerator that delivers both filtered and FFF beams, were examined.

The materials used in this study include dosimetric data from patients, information regarding treatment protocols, and measurement results obtained with microdiamond detectors for model AI validation. Key parameters such as high dose rate, dose per pulse, and lateral variations in beam hardness were also investigated

Results: The results of this study indicate that FFF beams possess unique dosimetric advantages that can be effective in stereotactic radiotherapy and high-dose-rate treatments. The AI model successfully validated results with a 90% accuracy based on the gamma criterion (0.5 mm/2%). These findings highlight the high potential of using FFF beams and artificial intelligence models to improve dose distribution accuracy in radiotherapy treatments.

Conclusion: Therefore this study aims to compare AI model using in the FFF-Machine on improving the dose distribution accuracy.

Keywords: Dose measurement, AI,Cancer,FFF machine

Sonographic-pathologic correlation of complex breast cysts

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Introduction: To determine appropriate management recommendations for sonographically diagnosed complex breast cysts in symptomatic women.

Materials and Methods: Complex breast cysts were diagnosed in sonographic breast evaluation of symptomatic patients.75 complex breast cysts were included in the study. Lesions were categorized as

1) 52 complex cysts with thick wall and or thick septation or indistinct wall,

2) 23 complex breast cysts with solid components or complex masses with at least 50% cystic component. Sonographically guided core needle biopsy was performed for all lesions.

Results: 23% of first group and 43% of second group had malignant pathologies which is a significant number.

Conclusion: core needle biopsy of all complex breast cysts appears necessary.

Keywords: complex cyst-breast- malignancy

Evaluation The Diagnostic Value of Multiparmetric MRI Based on Radiomics in Differentiating of Metastatic and Non-Metastatic Head and Neck Lymphnodes

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Introduction: Lymph node metastasis is closely related to a significant reduction in the postoperative survival of patients with head and neck malignancies. Identification of lymph node metastasis(LNM) is one of the main factors that improves the prognosis.

Magnetic resonance imaging(MRI) has long been the imaging modality for preoperative local staging and detection of LNM of head and neck cancer in clinical practice. Radiomics, which involves the extraction of mineable high dimensional imaging features from digital medical images, is gaining importance in personalized cancer therapy. The purpose of this study is to show the great potential for Radiomics analysis of LNM in head and neck cancers.

Materials and Methods: 20 patients with proven cancers of head and neck underwent 3 Tesla MRI Siemens machine. Multiparametric MRI(mp-MRI) included T2w and dynamic contrast enhanced imaging were acquired. Suspicious lymphnodes were detected and region of interest were drawn.

Quantitative evaluation of mp-MRI images was done by generating of the semiquantitative and pharmacokinetics maps of DCE images.

4 groups of radiomics:

1- GLCM,

2- GLRLM,

3- Histogram and

4- Wavelet features were extracted from mp-MRI.

For evaluating the radiomics features we run two different methods for classifications. 1- Proposed method and 2- linear discriminant analysis (LDA) was run.

Results: After running 1- the proposed and 2- LDA classifications, the best group based on accuracy was T2w and all DCE maps with 91% and 91.8% respectively for differentiating metastatic and non-metastatic lymphnodes. The sensitivity and specificity of T2w and all DCE maps group were 98% and 75% respectively in proposed classification and area under curve (AUC) 0.979 for LDA classification.

Conclusion: With these promising results, we can avoid unnecessary biopsies and perform preoperative local staging and detection of LNM and help to surgeons to planning the surgery.

Keywords: Lymphnode, Malignant, Benign, Radiomics, Classification

Challenging Case of Brain Mass as Atypical Teratoid/ Rhabdoid Tumor (AT/RT), A Case Report

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Introduction: Medulloblastoma is a common malignant brain tumor in children, accounting for 15-20% of pediatric CNS tumors, usually found in the cerebellum and associated with increased intracranial pressure and neurological deficits. On MRI, it appears as hyperintense lesions on T2-weighted images, often causing mass effect and obstructive hydrocephalus. In contrast, atypical teratoid/rhabdoid tumors (AT/RT) are rarer, primarily affecting younger children, and have an aggressive nature with distinct histological characteristics. Differentiating between these two tumors is essential due to differing treatment and prognoses.

Materials and Methods: A case is presented of a 4-year-old initially diagnosed with medulloblastoma based on MRI but later identified as AT/RT after pathological analysis.

Results: Although medulloblastoma is more common in pediatric tumors of the posterior fossa, it is important not to overlook its significant differential diagnoses. Performing immunohistochemistry (IHC) in the evaluation of pediatric brain tumors holds special importance.

Conclusion: In summary, ependymomas are well-differentiated and slow-growing tumors that arise from the ependymal cells, medulloblastomas are fast-growing and infiltrative tumors that originate in the cerebellum, and AT/RTs are rare, aggressive tumors with a mixed cellular composition that can occur anywhere in the central nervous system. The radiological appearance of these tumors can be variable, but each has characteristic features that can help in diagnosis.

Keywords: Brain Mass, Atypical Teratoid/ Rhabdoid

Revolutionizing Cancer Diagnosis and Monitoring : The Impact of AI on Functional Imaging Analysis

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Introduction: Functional imaging, especially in cancer diagnosis, plays a crucial role in early detection and monitoring disease progression. However, the analysis of imaging data has traditionally been time-consuming and prone to human errors. In this context, AI has emerged as an innovative tool to enhance the accuracy and efficiency of this process.

The primary objective of this article is to examine how AI algorithms can be utilized in the analysis of functional imaging data and to evaluate their effects on cancer diagnosis and monitoring.

Materials and Methods: In this study, machine learning and deep learning techniques were employed to analyze functional imaging data. Additionally, case studies and clinical outcomes related to the application of AI in cancer imaging were reviewed.

Results: The findings indicate that the use of AI can increase diagnostic accuracy by up to 30% and significantly reduce data analysis time. Moreover, AI is capable of identifying complex patterns that aid in earlier detection and more effective disease monitoring.

Conclusion: The integration of AI into functional imaging could revolutionize cancer detection and monitoring methods. Despite challenges such as the need for high-quality data and privacy concerns, there are tremendous opportunities for improving patient care. This article emphasizes that to fully leverage the potential of AI, further research and collaboration between medical professionals and data engineers are essential.

Keywords: Imaging AI Cancer Diagnose

Contrast Enhancement Mammography, Technical issues

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Introduction: Tumors require a supply of nutrients for their growth, and through a process known as angiogenesis, small blood vessels are created both within and around the tumor to facilitate this nourishment. These tumor-associated microvessels are typically formed rapidly, leading to their "leaky" nature. This characteristic allows contrast agents introduced into the bloodstream to seep through these microvessels and into the tumor, enhancing its visibility. While this effect is predominantly utilized in breast MRI with gadolinium-based contrast agents to assess tumors and their spread within the breast, the high cost of MRI, the challenges faced by claustrophobic patients, and lengthy waiting times for pre-surgical evaluations make contrast-enhanced mammography a viable alternative.

The purpose of our review article is to outline the techniques, physics, indications,

and contraindications of contrast-enhanced mammography for radiologic technologists.

Materials and Methods: Case presentation:

In all contrast-enhanced mammography procedures, an iodine-based contrast agent is administered intravenously. Typically, a dosage of around 1.5 ml/kg of body weight is delivered using an automated injector to maintain a consistent flow rate of the contrast medium. Two minutes following the intravenous injection, Contrast-Enhanced Spectral Mammography (CESM) captures a series of low and high-energy images in rapid succession while the breast is compressed for only a few seconds per breast and view (either craniocaudal or mediolateral oblique). All imaging is conducted with the aid of an anti-scatter grid. Low-energy images are produced using molybdenum (Mo) and rhodium (Rh) targets, along with Mo and Rh filters, at peak kilovoltage (kVp) values between 26 and 31 kVp.

Results:

Conclusion: In summary, contrast-enhanced mammography shows promising initial results and might be a good addition to other breast imaging tools. For this goal, a technologist must know the technique, physics, indications, and contraindications of this method.

Keywords: Mammography, Contrast, Breast

Recent Advances in Molecular Imaging in Relation to Early Cancer Diagnosis

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Introduction: Early cancer detection is critical for improving patient outcomes, yet remains challenging. Molecular imaging, integrating biomarker-specific probes and theranostic strategies, offers transformative potential in oncology. This abstract synthesizes key advances, focusing on neuroendocrine neoplasms (NENs), radiotherapy, and broader oncological applications

Materials and Methods: A comprehensive literature search was conducted using PubMed, Scopus, and Google Scholar. Keywords included molecular imaging, early cancer diagnosis, theranostics, biomarker imaging, PET/CT, neuroendocrine neoplasms, and radiotherapy imaging probes. Articles were selected based on relevance to early cancer detection, applications of hybrid imaging technologies in oncology and their contribution to advancements in diagnostic accuracy and therapeutic integration

Results: Molecular imaging has advanced early cancer diagnosis through improved tracers and theranostic strategies. ^68Ga-labeled PET/CT enhances neuroendocrine tumor detection and guides targeted therapies, while biomarker-specific probes optimize radiotherapy monitoring and adaptive treatment planning. Novel tracers, such as PSMA and FAPI, significantly improve sensitivity and specificity across various cancers. Additionally, hybrid imaging technologies and

the integration of artificial intelligence are further enhancing diagnostic precision and prognostic accuracy, making molecular imaging a cornerstone of personalized cancer diagnosis and management.

Conclusion: Molecular imaging is redefining early cancer diagnosis, offering superior sensitivity, specificity, and therapeutic integration. Advances in imaging tracers and hybrid technologies are particularly impactful in NENs and radiotherapy. With ongoing innovations in biomarkers and AI, molecular imaging is poised to transform oncology, paving the way for more personalized and effective cancer management.

Keywords: Early Diagnosis, Cancer, Theranostics, Neoplasms,

MRI and Thermography integration current status and future progress

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Introduction: In recent years, imaging has become crucial in medical sciences for accurate disease diagnosis and monitoring. Among various techniques, Magnetic Resonance Imaging (MRI) and Infrared Thermography (IRT) are notable for their contributions. MRI uses proton frequency shifts to produce high-resolution images of internal tissues, essential for identifying pathologies. In contrast, IRT is a non-invasive method that measures temperature variations from emitted infrared radiation, helping to detect subtle physiological changes linked to neurological, vascular, and metabolic disorders. While standalone imaging technologies have advanced significantly, integrating MRI and IRT offers a promising approach to enhance diagnostic accuracy for superficial diseases like abscesses, cancer, vascular issues, inflammation, and infections. This paper examines the combined use of these modalities and their potential to improve patient outcomes.

Materials and Methods: The keywords of "magnetic Resonance Imaging", "Thermography", "superficial diseases", "diagnostic Tools" , "Infrared Imaging", " merging mri and thermo graphy", "non-invasive imaging", "early detection" were into

scientific databases of Pubmed ,Google scholar, Research gate, BMC oral health, Nature ,MDPI, Wiley, SID, Science direct, and National institute of health. A bout 84 papers were extracted and 51 fully relevant of them reviewed from years of 2001 to 2023.

Results: Studies show that combining infrared thermography (IRT) with MRI significantly enhances disease diagnosis and management, yielding more accurate and comprehensive results. This integration facilitates early detection of conditions such as breast cancer, where timely diagnosis is linked to a 95% treatment success rate, underscoring its clinical importance. It minimizes the need for invasive procedures, allows continuous non-invasive monitoring, and provides extensive information.Despite these advantages, this method has not been extensively tested for deep-seated organs, like the brain. Technological advancements, including improved thermography camera quality, faster MRI imaging, and AI integration, further enhance efficacy. Additionally, incorporating techniques like Near-Infrared Spectroscopy (NIRS). However, environmental factors, such as ambient temperature, may impact thermography's sensitivity, highlighting a need for controlled conditions during imaging.

Conclusion: Considering the adverse effects of radiation, particularly in children, it is important to explore alternative diagnostic methods. The combination of MRI and thermography presents an innovative and promising approach in medicine, offering more accurate and comprehensive imaging that enhances the quality of medical care and increases precision in diagnosis and treatment. Continued research and technological advancements are expected to further solidify the importance of this combination in the future of medicine.

Keywords: Merging, IRT, MRI, Noninvasive, Early detection

Assessing the effective connectivity of olfactory-related brain regions in Mild Cognitive Impairment: DCM-PEB approach on resting-state functional Magnetic Resonance Imaging

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Introduction: Mild Cognitive Impairment (MCI) is a stage between normal aging and dementia, characterized by memory impairment that exceeds typical age-related changes. The stages of early and late mild cognitive impairment (EMCI and LMCI) mark distinct levels of cognitive deterioration, with LMCI exhibiting a heightened likelihood of advancing to dementia. Individuals with MCI exhibit significant olfactory deficits, particularly in odor identification, which may serve as an early sign of the disease. Effective connectivity analysis examines causal interactions among brain regions, providing insights into functional integration and neuropsychiatric conditions. Through the utilization of effective connectivity (EC) analysis, this approach aimed to identify causal

relationships within olfactory-related brain regions, to investigate connectivity changes of MCI and age-matched cognitively normal individuals (CN).

Materials and Methods: Our research involved 131 participants with LMCI, 137 with EMCI, and 150 cognitively normal individuals. We analyzed resting-state functional Magnetic Resonance Imaging (rs-fMRI) data from the Alzheimer's Disease Neuroimaging Initiative (ADNI). Initially, we performed preprocessing on the images followed by conducting Spectral dynamic causal modeling (DCM) to examine the direction and strength of effective connectivity among the regions of interest (ROIs) within the olfactory system, including the orbitofrontal cortex (OFC), piriform, amygdala, and uncus. We utilized a parametric empirical Bayes (PEB) framework for second-level analysis to assess specific hypotheses in group-level comparisons and between-subject group effects.

Results: The DCM analyses indicated that the CN group exhibited an inhibitory connection from the OFC to three other regions, emphasizing the regulatory role of the OFC in modulating neural activity, possibly as part of cognitive or emotional control processes. Additionally, increased effective connection from the OFC to three other regions was observed in the MCI groups. Furthermore, in the EMCI group, there was an increase in excitatory effective connectivity from uncus to amygdala and to the OFC compared to the CN group. Also, an increased connection from uncus to amygdala was observed in the LMCI group in comparison to the CN group. These findings suggest a combination of compensatory efforts in the early stages and pathological dysregulation as the disease progresses.

Conclusion: Our research highlights the susceptibility of medial temporal and prefrontal circuits in cognitive impairment, suggesting their potential as biomarkers for monitoring disease advancement. The results align with previous research indicating that hyperactivation leads to degenerative changes, ultimately resulting in reduced thickness and volume of these brain regions over time. The decline in performance on odor identification and memory tasks is indicative of compromised brain integrity, reflecting the progression of the disease. Additionally, insights into DCM connection strength may be valuable for early detection and management of this stage and subsequent cognitive decline. This implies potential implications for utilizing effective connectivity measurements related to olfaction as a reliable biomarker for tracking the progression of MCI.

Keywords: MCI Effective connectivity Olfaction

Fetal intracranial hemorrhage and infarct: Main sonographic and MRI characteristics: A review article

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Introduction: Intracranial hemorrhage (ICH) and fetal ischemic brain injury are rare imaging findings in fetuses. Accurately estimating their true prevalence is challenging due to the limitation of prenatal imaging . Fetal stroke typically develops between the 14th week of pregnancy and delivery [1], while fetal ICH often occurs after 20 weeks of gestational age[2–4], particularly in the late second or early third trimester(between 22 and 34 weeks), when vascular connections between the germinal matrix and subependymal veins are established [5–10].Hemorrhage and ischemia in the fetal brain are major causes of mortality and morbidity during the perinatal period and can result in irreversible brain injury [5, 9, 11]. Fetal ICH and infarct can be accurately diagnosed and classified through prenatal ultrasound and fetal MRI[2].

Materials and Methods: MRI protocol

Fetal MRI primarily relies on T2-weighted contrast, achieved using fast spin-echo (SE) or steady-state free-precession (SSFP) sequences, with long echo times (TE) preferred for brain imaging. T1-weighted contrast is typically obtained using 2D gradient echo (GRE) sequences at 1.5 T, requiring brief maternal breath-holding, while achieving it at 3 T is more challenging. GRE, fast spoiled GRE, SE, radial volumetric interpolated breath-hold examination (VIBE) and Dixon sequences have been used to achieve this. Newer sequences like 2D MP-RAGE allow for T1-weighted fetal brain imaging without maternal breath-holding. T1-weighted contrast helps identify features like subacute hemorrhages, calcifications, glands, and meconium. Single-shot high-resolution (SSH)GRE echoplanar imaging (EPI) is used for visualizing bones, calcifications and breakdown products of blood, such as deoxyhemoglobin, which suggests a recent bleed, or hemosiderin, as a residual of an older hemorrhage. Optional sequences include diffusion-weighted imaging (DWI), diffusion tensor imaging (DTI), dynamic SSFP sequences and SSH magnetic resonance cholangiopancreatography sequences, which offer 3D-like images [12]. Based on ISUOG guideline 2023, we recommend using T1-weighted VIBE, T2-weighted HASTE and TRUFI, and DWI sequences routinely for the evaluation of fetal brain.

Results: In this article we categorized the sonographic and MRI characteristics of fetal intracranial hemorrhage and fetal infarct depending on the time of insult, the appearance and the location as we mentioned in the manuscript.

Conclusion: In this review, we discuss the risk factors and etiology of fetal GMH-IVH and perinatal stroke. With advancements in sonographic technology, targeted and detailed fetal brain ultrasonography can now facilitate the early detection of even lower-grade uterine GMH-IVH and brain ischemic insults. MRI serves as a complementary tool to further clarify mild or uncertain ultrasound findings. While DWI and EPI can offer significant advantages in assessing fetal intracranial abnormalities, the decision to use them routinely should be based on the clinical context, the specific abnormalities detected, and the available resources. We recommend DWI routinely for the evaluation of fetal ICH and infarction. Early prenatal evaluation of these brain abnormalities can help reduce postnatal complications, neonatal disabilities, and ultimately improving patient's outcome and survival rates.

Keywords: hemorrhage fetal infarction sonography MRI

Recent Advances in Molecular Imaging in Relation to Early Cancer Diagnosis

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Introduction: Early cancer detection is critical for improving patient outcomes, yet remains challenging. Molecular imaging, integrating biomarker-specific probes and theranostic strategies, offers transformative potential in oncology. This abstract synthesizes key advances, focusing on neuroendocrine neoplasms (NENs), radiotherapy, and broader oncological applications.

Materials and Methods: A comprehensive literature search was conducted using PubMed, Scopus, and Google Scholar. Keywords included molecular imaging, early cancer diagnosis, theranostics, biomarker imaging, PET/CT, neuroendocrine neoplasms, and radiotherapy imaging probes. Articles were selected based on relevance to early cancer detection, applications of hybrid imaging technologies in oncology and their contribution to advancements in diagnostic accuracy and therapeutic integration.

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Conclusion: Molecular imaging is redefining early cancer diagnosis, offering superior sensitivity, specificity, and therapeutic integration. Advances in imaging tracers and hybrid technologies are particularly impactful in NENs and radiotherapy. With ongoing innovations in biomarkers and AI, molecular imaging is poised to transform oncology, paving the way for more personalized and effective cancer management.

Keywords: Molecular Imaging, Early Diagnosis, Cancer

Radiomics based Machine learning models for predicting treatment response in Vestibular Schwannoma patients undergoing gamma knife radiosurgery

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Introduction: Vestibular schwannoma (VS) disease is one of the benign but common brain cancers. Gamma knife radiosurgery (GKRS) is a treatment option for VS but predicting patient response remains challenging. In this study Radiomics features which extracted from magnetic resonance images(MRI) were used in machine learning techniques to develop predictive models for treatment outcomes in VS patients undergoing GKRS.

Materials and Methods: This study was conducted on pre- and post-contrast MRI-T1 FLASH images of 65 patients with VS cancer who underwent GKRS. Image preprocessing involved intensity normalization and magnetic field inhomogeneity correction using ITK. A total 6955 Radiomics features were extracted. Two feature selection methods were used:1.Analysis of Variance (ANOVA) and Minimum Redundancy - Maximum Relevance (MRMR) 2.F-Regression and Recursive Feature Elimination (RFE). For classification, a Support Vector Machine (SVM) model was applied using the selected features. Model performance was evaluated using 10-fold cross-validation assessing accuracy, sensitivity, specificity, and AUC.

Results: six key features which were texture-based were selected and age and gender were incorporated into the feature set. The data were normalized using an exponential scaling, transforming the values between 0 and 1. SVM based machine learning models were trained using radiomic features extracted from T1-weighted images with and without contrast. The best performance was for the radiomic features which extracted from T1-weighted images with contrast, which was achieved an accuracy of 70%, an AUC of 71%, sensitivity of 72%, and specificity of 61% for the feature selection of F-Regression and RFE and for the features which selected with ANOVA and MRMR, the best results were similarly achieved with an accuracy of 70%, an AUC of 71%, sensitivity of 73%, and specificity of 62%.

Conclusion: This study demonstrated that the use of radiomic features which extracted from T1-weighted images with contrast can lead to the development of an effective machine learning model capable of accurately predicting patient responses to treatment. This SVM model provides a non-invasive prediction of the treatment response.

Keywords: Vestibular Schwannoma treatmentresponse Gammakniferadiosurgery machinelearning radomics

Comparison of the characteristics of Virchow-Robin regions in multiple sclerosis patients with the control group

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Introduction: Virchow-Robin spaces are perivascular spaces covered with soft tissue that extend from the subarachnoid space around the arteries and veins into the brain parenchyma. These spaces are responsible for inflammatory processes in the brain. In this study, the MRI features of multiple sclerosis patients and non-multiple sclerosis patients were investigated and compared in terms of Virchow-Robin regions

Materials and Methods: In this case/control study, 91 patients with multiple sclerosis (case group) and 91 people without multiple sclerosis (control group) who were referred for brain MRI were selected using available and consecutive sampling. The case and control groups were compared in terms of the number of Virchow-Robin spaces, shape and size of Virchow-Robin spaces. Standard MRI was performed with Phillips Gyroscan Intra 1.5-Tesla device and data were analyzed with SPSS software

Results: in the case and control groups, respectively, the mean and standard deviation of the total number of Virchow-Robin areas 2.82±3.22 and 0.67±1.97 ($p<0.001$), the number of round shape spaces 1.47±1.76 and 0.27±0.88 ($p<0.001$), the number of oval shape spaces 0.96±1.66 and 0.31±1.07 ($p<0.001$), the number of curvilinear shape spaces 0.48±0.82 and 0.09±0.38 ($p>0.001$) and size of Virchow-Robin areas was 2.10±0.62 and 1.94±0.24 mm respectively ($p=0.266$).

Conclusion: In MRI of the brain, the number of Virchow-Robin spaces is a useful indicator for diagnose of multiple sclerosis. These spaces may also be used to determine the prognosis of the disease. However, systematic review studies and meta-analysis are suggested to confirm the results.

Keywords: multiple sclerosis Virchow-Robin space

The prevalence of polycystic ovarian morphology in sonographic evaluations of Iranian adolescent girls and its association with clinical and hormonal Hyperandrogenism

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Introduction: The significance of polycystic ovarian morphology (PCOM) in adolescence remains uncertain. This study aimed to determine the prevalence of PCOM in adolescent girls and to explore the relationship between PCOM and Hyperandrogenism, using clinical diagnostic criteria and testosterone levels as laboratory diagnostic markers in this population.

Materials and Methods: Fifty adolescents, aged 9 to 19 years, were referred for ultrasonography in this study. Transabdominal ultrasound and blood samples were collected during the follicular phase.

Results: PCOM was observed in 86% of the subjects. Subjects with PCOM showed a higher prevalence of hirsutism with 62.8% versus 14.3% (P-Value=0.01). Girls with PCOM had a higher prevalence of abnormal total testosterone levels than girls without PCOM (55.8% versus 14.3%; P = 0.04). Subjects with PCOM also revealed higher ovarian volume (Right ovary: 14.43±5.8 versus 8.57± 1.98 P-Value=0.01 Left Ovary: 14.66±5.8 versus 8.14±2.26 P-Value=0.006) and follicle numbers per ovary (Right ovary: 15.6±4.2 versus 9.14 ±2.85 P-Value=0.001 Left Ovary: 16.02±4.27 versus 10.86±3.97 P-Value=0.004) as expected.

Conclusion: In summary, our findings indicate that an increased ovarian volume (≥10 cm^2) and a higher number of follicles (≥12) are observed in Iranian adolescents with PCOM; however, these expected impacts were not observed in non-PCOM Iranian individuals. Regarding Hyperandrogenism criteria, our data showed that participants with PCOM had higher hirsutism scores and abnormal total testosterone levels compared to non-PCOM subjects.

Keywords: Polycystic_ovarian_morphology Adolescent_girls Hyperandrogenism Ovarian_Volume Follicle_number

Evaluation of the Correlation of Pulmonary Arterial Hypertension (PAH) with the Pulmonary Artery Trunk Diameter and Serum Level of N-Terminal Pro B-Type Natriuretic Peptide (NT-proBNP) in Patients with PAH

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Introduction: Due to its non-specific symptoms, pulmonary arterial hypertension (PAH) is difficult to diagnose via non-invasive methods. Various diagnostic tests are required to evaluate PAH patients. The increased diameter of the main pulmonary artery in computed tomography (CT) imaging represents a high probability of PAH. Moreover, N-terminal pro B-type natriuretic peptide (NT-proBNP) and pro B-type natriuretic peptide (proBNP) can be considered as prognostic predictors in patients with PAH.

Objectives: This study aimed to evaluate the correlation of CT-based main pulmonary artery diameter (MPAD) and the serum level of NT-proBNP (as a strong pro-inflammatory factor) with the severity of PAH in echocardiography among patients with PAH.

Materials and Methods: Patients and Methods: In this cross-sectional study, a total of 63 hospitalized patients with PAH due to chronic obstructive pulmonary disease were recruited from 2019 to 2020 after initial evaluations and collection of serum NT-proBNP measurements and echocardiographic findings. On the chest CT scans, the largest diameter of the pulmonary artery trunk was determined, and then,. correlation of CT-based MPAD with both PAH severity on echocardiography and NT-proBNP level in patients with PAH were evaluated.

Results: The results of the present study on 63 patients (70% male; mean age, 67.02 years) showed a significant positive correlation between the MPAD and NT-proBNP level ($r=0.444$, $P<0.001$). Moreover, a significant positive relationship was observed between the pulmonary artery pressure (PAP) and NT-proBNP ($r=0.353$, $P=0.005$) and also between MPAD and PAP ($r=0.306$, $P=0.015$). In PAH patients, the mean values of MPAD, PAP, and NT-proBNP were 32.58 mm, 47.9 mmHg, and 6563 pg/mL, respectively.

Conclusion: Considering the significant positive correlation between PAP, MPAD, and NT-proBNP level in subgroup comparisons based on MPAD and PAP, if the MPAD is abnormal on CT scan, additional echocardiographic assessments and serum NT-proBNP measurements can be helpful.

Keywords: PAH, MPAD, NT-proBNP, PAP

Evaluation of Imaging Features in Patients with Non-Invasive Lobular Carcinoma: a systematic review

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Introduction: Lobular neoplasia encompasses a spectrum of non-invasive proliferative lobular lesions, including lobular carcinoma in situ (LCIS). Per the 5th edition Classification of Tumors of the Breast by the World Health Organization (WHO), this category includes classic LCIS, atypical lobular hyperplasia (ALH), and two variants: pleomorphic LCIS (P-LCIS) and florid LCIS (F-LCIS). These atypical epithelial proliferations are characterized by noncohesive cells resulting from altered E-cadherin-mediated adhesion. While microinvasive carcinomas can occur with classic LCIS, they are relatively rare. Notably, non-classic LCIS is more frequently associated with adjacent invasive carcinomas, particularly invasive lobular carcinoma. This study focuses on a cohort of 335 patients with Non-Invasive Lobular Carcinoma (NLC), aiming to analyze the distribution of various characteristics while correlating demographic data, clinical presentations, and imaging findings.

Materials and Methods: This systematic review and meta-analysis involved a thorough examination of databases such as PubMed and Scopus, spanning the years 2000 to 2023. The search utilized specific keywords related to lobular carcinoma and mammographic findings. Eligible studies included those that reported mammographic characteristics of pure NLN lesions, subsequently validated through histopathological examination and surgical outcomes. Studies that lacked surgical data or definitive imaging results were excluded. Two reviewers independently evaluated the titles and abstracts, addressing any discrepancies. A standardized form facilitated systematic data extraction, with the selection process illustrated using a PRISMA flow diagram.

Results: Our study findings show that most patients with Non-Invasive Lobular Carcinoma (NLC) were diagnosed with pure Lobular Carcinoma In Situ (LCIS) via core needle and excisional biopsies. A significant number reported positive familial and personal histories of breast cancer, indicating a notable risk factor profile. Imaging assessments revealed that masses were mainly identified through ultrasound and mammography, while MRI predominantly showed non-mass lesions, highlighting the different diagnostic capabilities of these modalities.

Of the 335 patients, 6 (1.8%) had a personal history of NLC, and 8 (2.4%) with invasive characteristics also reported a personal history. Analysis indicated that among 15 patients with a breast cancer history, 6 had NLC, 8 had invasive NLC, and 1 had non-invasive NLC. Chi-square tests demonstrated a significant association between personal history and CNB pathology ($p = 0.001$), emphasizing the importance of thorough patient assessment.

Conclusion: Following an advanced search and elimination of irrelevant articles, a systematic review was conducted, resulting in the selection of 27 relevant articles from which data was extracted. The patients were categorized into three groups based on pathological and imaging findings, namely NLC, NLC with invasive components, and NLC with non-invasive components. The selected

articles investigated the morphological features of masses, calcifications, and the distribution of calcifications, as well as tissue distortion, using breast sonography and mammography. The assessment of the kinetic curve in MRI was also highlighted, as it provides insights into the enhancement pattern and characteristics of breast tumors. Notably, more invasive cases were associated with speculated masses showing a kinetic curve type 3 in MRI, suspicious calcifications with linear and segmental distribution, and architectural distortion in mammography, as well as masses with unclear boundaries in ultrasound

Keywords: non invasive lobular carcinoma, breast

Automated 3D segmentation of moderate-to-severe traumatic brain injury in T1-weighted MRI employing a nnUNet with a residual encoder

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Introduction: Moderate to Severe Traumatic Brain Injury (msTBI) is caused by external forces and leads to heterogeneous brain lesions, a hallmark of msTBI. These lesions can be focal or diffuse, vary in size, number, and laterality, and affect multiple tissue types (GM, WM, CSF) in both hemispheres. Their complexity complicates neuroimaging processes such as registration, normalization, and brain parcellation, introducing local and global errors. Existing tools for lesion compensation often require manual lesion mask creation, quality assessment, or specialized imaging modalities, making them time-consuming and less effective for TBI lesions. This challenge focuses on segmenting lesions in T1-weighted MRI, aiming to improve lesion segmentation accuracy and facilitate downstream analyses (e.g., parcellation, connectivity, and volumetric assessments), ultimately enhancing prognostication and patient outcomes.

Materials and Methods: The dataset for this study was sourced from the "AIMS-TBI" Grand Challenge, focusing on moderate to severe traumatic brain injury (msTBI) across diverse clinical groups, including Pediatric and Adult msTBI, Military Brain Injury, Sports-Related Head Injury, Intimate Partner Violence, and Acute Mild TBI.The MRI volumes were acquired from 1.5T and 3T scanners (GE, Siemens, Philips). In total, 505 subjects (313 male, 192 female) with binary segmentation masks were included, with 275 subjects reserved for testing.Initially, the images underwent skull-stripping using deepbet, which utilizes Link Net, a contemporary UNet architecture. During the second phase, a bilateral filter was applied to 3D images using with the SimpleITK Python library. We employed nnUNetv2 for our deep learning segmentation task In the training process, residual encoder blocks (ResEnc) were utilized.

Results: The evaluation of our model's performance involved the utilization of various metrics, including the Dice coefficient, lesion-

wise F1 score, Absolute Lesion Difference, and Absolute Volume Difference. When applied to the test dataset of the challenge, the network achieved performance scores of 0.4607 for Mean Dice coefficient, 3.7273 for Mean Absolute Lesion Difference, 2222.3636 for Mean Absolute Volume Difference, and 0.4358 for Mean Lesion-wise F1 Score. In general, satisfactory performance was observed in most test cases for the automated segmentation task of brain lesions in TBI patients.

Conclusion: By leveraging nnUNetv2 with advanced preprocessing techniques and medium residual encoder blocks, our approach demonstrated robust and accurate segmentation of msTBI lesions. This work highlights the potential of automated deep learning frameworks to address the complexities of diverse TBI presentations, enabling improved integration of lesion segmentation into downstream neuroimaging analyses. These advancements could lead to more precise prognostication, better treatment planning, and enhanced outcomes for TBI patients.

Keywords: segmentation Deep learning TBI lesion

Using AI to Detect Both Obvious and Subtle Patterns, Difficult to Identify Visually

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Introduction: Recent advancements in AI have revolutionized data processing and pattern identification, impacting fields like medical imaging, fraud detection, and scientific research. AI's ability to discern both obvious and subtle patterns enhances diagnostic precision and operational efficiency, reducing human error. Despite extensive AI research, a comprehensive review on AI's capacity to identify clear and nuanced patterns is sparse. This systematic review consolidates findings from 30 studies on AI's application in detecting prominent and subtle patterns, focusing on methodologies, outcomes, and AI's potential. The primary objective is to evaluate AI's effectiveness in identifying patterns in radiology. Secondary objectives include analyzing methodologies for detecting clear and subtle patterns in radiology, assessing AI's accuracy and efficiency, and highlighting potential applications. The review aims to provide a holistic understanding and foster future research in this evolving field.

Materials and Methods: By searching for articles using the keywords "Artificial Intelligence, AI, Pattern Recognition, Subtle Patterns, Radiology, Medical Imaging, Diagnosis, Detection, Human Limitation, Beyond Human Vision" in the PubMed, Web of Science, Scopus, and Google Scholar databases within the timeframe of 2020 to 2024, a total of 161 articles were collected. In the initial stage, articles were reviewed to eliminate less relevant, unrelated, and duplicate articles, resulting in 151 remaining articles. In subsequent steps, according to the PRISMA guidelines, article selection was carried out in several stages, and finally, 30 articles were chosen as sources for this research.

Also, EndNote software was used for

managing and organizing the selected articles. The extracted data were analyzed using statistical methods and content analysis.

Results: Analysing 30 studies revealed that AI effectively identifies complex and subtle patterns more accurately than traditional methods. Also, AI significantly reduces diagnosis time, leading to improved therapeutic outcomes. Potential applications of AI include early detection of cancer, cardiovascular diseases, and neurological disorders. Overall, AI enhances diagnostic accuracy, reduces the workload on radiologists, and improves diagnostic process efficiency.

Conclusion: The review concludes that AI significantly enhances diagnostic processes in radiology by accurately identifying both obvious and subtle patterns. This improvement increases diagnostic precision and reduces disease detection time. AI serves as a powerful complementary tool, reducing radiologists' workload. Future research should focus on optimizing AI algorithms to leverage this technology's potential completely.

Keywords: ArtificialIntelligence PatternRecognition MedicalImaging Radiology DiagnosticAccuracy

Automated Machine Learning for Breast Cancer Detection Using Breast Ultrasonography Data

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Introduction: Breast cancer remains a leading cause of cancer-related deaths worldwide, emphasizing the need for accurate and efficient diagnostic tools. Early detection through imaging techniques has shown promise, but challenges such as inter-observer variability and high false-positive rates persist. Artificial intelligence, particularly automated machine learning (AutoML), has emerged as a transformative solution, offering the potential to streamline the diagnostic process and improve accuracy. AutoML frameworks, including AutoKeras, TPOT, and H2O.ai, have demonstrated success in various medical applications by automating tasks such as feature selection, hyperparameter optimization, and model evaluation. This study introduces a novel AutoML framework leveraging advanced preprocessing, feature selection, and ensemble learning techniques. We aim to develop a robust, interpretable, and efficient tool that can assist radiologists in making accurate and timely diagnoses.

Materials and Methods: The dataset comprises demographic, clinical, and imaging features from breast cancer patients, including gray-scale sonography and shear wave

elastography data. Preprocessing steps included encoding categorical variables and normalizing numerical features to ensure compatibility with machine learning algorithms. Feature selection was performed using mutual information to identify the most relevant features for distinguishing between benign and malignant cases. The AutoML framework was designed to automate the end-to-end process of model development. It evaluated a diverse set of classifiers, including Random Forest, Logistic Regression, Artificial Neural Networks (ANN), K-Nearest Neighbors (KNN), CatBoost, LightGBM, Gradient Boosting, XGBClassifier, AdaBoost, and DecisionTreeClassifier. Bayesian optimization was employed to fine-tune hyperparameters for each model, ensuring optimal performance. A 5-fold cross-validation scheme was implemented, with a 0.2 test-size split before cross-validation. Performance metrics such as Accuracy, Precision, Recall, F1 Score, Specificity, and ROC AUC were calculated for the train, validation, and test sets. The top 10 models, ranked by F1 Score, were ensembled to create the final predictor. The framework addressed common pitfalls in machine learning-based breast cancer detection, including overfitting through cross-validation and regularization techniques, data imbalance using stratified sampling during cross-validation, interpretability by retaining feature importance scores for the final model, and computational efficiency by limiting the search space and using parallel processing.

Results: Our AutoML framework demonstrated superior performance compared to existing AutoML solutions in breast cancer detection tasks. The framework consistently achieved higher F1 Scores and ROC AUC values across all datasets, indicating improved sensitivity and specificity. The ensemble approach further enhanced robustness, ensuring reliable predictions even in challenging cases. Comparative analysis with state-of-the-art AutoML tools, such as AutoKeras, TPOT, and H2O.ai, revealed that our framework outperformed these solutions in terms of accuracy. The automated feature selection and hyperparameter optimization played a crucial role in achieving these results, highlighting the framework's ability to adapt to tabular data.

Conclusion: This study presents a novel AutoML framework for breast cancer detection, leveraging gray-scale sonography and shear wave elastography data. By integrating advanced preprocessing, feature selection, and ensemble learning, the framework achieved superior performance compared to existing AutoML solutions. The automated nature of the framework reduces the need for manual intervention, making it a promising tool for radiologists in clinical settings. Future work will focus on expanding the dataset, incorporating additional imaging modalities, and validating the framework in real-world clinical trials to further establish its efficacy and reliability.

Keywords: Machine Learning Breast Cancer Sonography

Intranodal CT Lymphangiography

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Introduction: Intranodal CT lymphangiography is a minimally invasive imaging technique used to visualize the lymphatic system. It involves injecting a contrast agent directly into inguinal lymph nodes to trace lymphatic pathways and identify abnormalities such as leaks or obstructions. This method is particularly valuable in diagnosing and managing conditions like chylous ascites, chylothorax, and lymphatic malformations, offering a precise alternative to conventional lymphangiography.

Materials and Methods:

1. Indications

Chylous disorders: Identifying lymphatic leaks in conditions like chylous ascites, chylothorax, or chyluria.

Lymphatic anatomy assessment: For pre-surgical planning or therapeutic interventions such as thoracic duct embolization.

Evaluation of thoracic duct anatomy: Detecting obstructions or anatomical variations.

2. Procedure Overview

Preparation

- The patient lies supine, and the inguinal region is sterilized. High-resolution ultrasound is used to localize inguinal lymph nodes, typically 1–3 on each side.
- Nodes ≥5 mm are preferred to ensure accurate needle placement.

Injection Process

- Using a 25G–27G needle, the lymph node is punctured under ultrasound guidance at a shallow angle (15°–30°).
- A small test injection of saline (~0.1–0.2 mL) confirms correct needle placement.

Iodinated contrast (150–300 mg/mL) is injected slowly, with 1–2 mL per lymph node, and a total volume of ~3–6 mL.

Imaging Protocol

- Dynamic scans: CT imaging starts immediately after injection and is repeated every 5–10 minutes to monitor lymphatic flow.
- Delayed scans: Final imaging is performed 30–60 minutes post-injection to visualize the thoracic duct, cisterna chyli, and potential leaks.

3. Advantages and Limitations

Advantages:

- High-resolution visualization of lymphatic pathways.
- Direct detection of lymphatic leaks and obstructions.
- Less invasive compared to traditional methods.

Limitations:

- Requires operator expertise for accurate lymph node puncture.
- Limited efficacy in patients with small or inaccessible lymph nodes.

Results: Intranodal CT lymphangiography involves direct injection of iodinated contrast into inguinal lymph nodes under ultrasound guidance, followed by CT imaging. This technique is highly effective in diagnosing lymphatic abnormalities, including leaks and obstructions, and offers a safer and more precise alternative to traditional lymphangiography.

Conclusion: Intranodal CT lymphangiography is a valuable diagnostic tool for evaluating the lymphatic system, offering precise imaging with minimal invasiveness. It is particularly useful in detecting lymphatic leaks, assessing the thoracic duct, and planning therapeutic interventions. While operator expertise is essential, the benefits of this method make it a preferred choice in many clinical scenarios.

Keywords: Intranodal lymphangiography ct scan

Evaluation of diagnostic value of ultrasound findings in predicting pregnancy in mothers referred for scan anomaly (weeks 17 to 20 of pregnancy)

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Introduction: The prediction of gestational diabetes at younger ages during pregnancy may help in controlling its associated complications. The aim of this study was to investigate the diagnostic value of ultrasound findings in predicting gestational diabetes in mothers referred for anomaly scan (week 17 to 20 of pregnancy) by measuring fetal abdominal circumference and subcutaneous abdominal fat thickness.

Materials and Methods: In this study prospedtive study , after obtaining approval from the respected ethics committee, all pregnant mothers who presented to the study investigator for anomaly scan ultrasound during weeks 17-20 of pregnancy were included. Data related to demographic characteristics, obstetric history, and clinical examinations were collected using a pre-prepared checklist. Subsequently, ultrasound measurements of fetal abdominal circumference and subcutaneous abdominal fat thickness were performed by a radiology specialist. Then, during weeks 24 to 28 of pregnancy, an oral glucose tolerance test (OGTT) was conducted to diagnose mothers with GDM, and the demographic and ultrasound data were analyzed based on the OGTT results.

Results: A total of 109 pregnant mothers participated in this study, with a mean age of 28.1 years. 94 individuals (86.2%) had a negative OGTT test result, while 15 individuals (13.8%) had a positive test result for gestational diabetes. There was no significant difference in the measurements of fetal abdominal circumference and subcutaneous abdominal fat thickness between mothers with gestational diabetes and those without gestational diabetes. The mean age and mean number of previous pregnancies were significantly higher in mothers with gestational diabetes compared to the control group. Additionally, there was a significant association between a history of gestational diabetes and diabetes in the current pregnancy. No significant associations were found in other demographic variables.

Conclusion: The study showed that the use of fetal abdominal circumference and subcutaneous abdominal fat thickness at weeks 17-20 of pregnancy cannot be a reliable marker for predicting gestational diabetes in mothers.

Keywords: Gestational Diabetes Mellitus, Abdominal circumference

Remote MRI

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Introduction: Inflexible working hours and a limited number of qualified MRI technologists complicate shift planning. This is especially challenging during extended hours, off-hours, and peak hours and jeopardizes the achievement of the desired level of care and throughput for MRI procedures. Recent advances in technology have seen the introduction of remote scanning capabilities become a reality for departments, allowing staff to remotely access, observe and scan without being by the scanner side. The remote scanning workflow is currently used in several countries worldwide, with the USA, Australia, Germany, Denmark, Belgium and China being some of the most prominent examples. The Institute for Diagnostic and Interventional Radiology and Neuroradiology at the University Hospital Essen in Germany are pioneers in this field and have been successfully using it since 2017. The COVID-19 pandemic has accelerated use of remote working which also aligns with the direction of travel for healthcare widely.

Materials and Methods: To identify relevant articles published to December 2024, an electronic search of Medline, Scopus, and the Web of Science and companies catalogs was undertaken. Reference lists of published articles were also assessed to identify further articles. Methodology was employed to evaluate articles for relevance. Related articles were included using MRI, Remote, Radiographer, Telemedicine keywords.

Results: A clear vision of remote MRI use and robust governance is needed to effectively support its implementation and acceptance by radiographers, medical centers and legal organizations. Introducing remote scanning technology has potential to support training and share skills of experienced radiographers across multiple locations. Contrast agent application is an important part of the MR examination process. The patient manager is authorized to apply contrast agent according to the instructions of the radiologist. While your staff focuses on the patient onsite, you can request MRI scan support from a qualified remote MRI technologist who logs onto your scanner via Smart remote Services and virtual software for remote scanning. Contrast agent application is an important part of the MR examination process. The patient manager is authorized to apply contrast agent according to the instructions of the radiologist. Also, a radiologist is always present at every MR scanner at all shifts.

Conclusion: However, regulations, guidelines, and international expert commissions are needed to ensure patient safety and image quality, while evidence-based research is necessary to determine the advantages and disadvantages of remote scanning and drive its implementation. Overall, remote scanning has great potential to overcome the current challenges in radiography, but careful consideration and action are required to ensure its safe and effective integration into the field.

Keywords: MRI, Remote, Radiographer, Telemedicine

The role of artificial intelligence (AI) in CT radiation dose optimization

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Introduction: Artificial intelligence (AI) holds the promise of enabling further reductions in patient radiation dose through automation and optimisation of data acquisition processes, including patient positioning and acquisition parameter settings. Subsequent to data collection, optimisation of image reconstruction parameters, advanced reconstruction algorithms, and image denoising methods improve several aspects of image quality, especially in reducing image noise and enabling the use of lower radiation doses for data acquisition. AI can be defined as technology that uses learning computer algorithms to solve problems. AI, particularly deep learning techniques, improves the quality of low-dose computed tomography (CT) scans by reducing image noise, restoring image quality, and preserving structural details. This optimization allows radiation doses to be reduced significantly while maintaining diagnostic accuracy.

Materials and Methods: Literature searches of PubMed, ScienceDirect, WOS out to find articles. In addition, mostly a combination of keywords Low-dose CT; Artificial Intelligence; dose optimization and deep learning was used. Related articles were included.

Results: AI uses 3D cameras and trained algorithms to automate and improve patient positioning, reducing positioning errors, define the optimal scan range, reduce artifacts, and improve edge clarity, reduce image noise while preserving spatial resolution, optimize contrast media injection. Deep learning models like convolutional neural networks (CNNs), generative adversarial networks (GANs), and recurrent neural networks (RNNs) are used to denoise CT images. However, careful implementation and rigorous validation are essential to ensure consistent and reliable performance. It relies on datasets from a single device or protocol, reducing generalizability. Limited and homogeneous data can lead to models that perform poorly on diverse datasets. Also, models trained on specific datasets may not perform well across different CT systems or parameters.

Conclusion: AI techniques, particularly deep learning, offer promising solutions for optimisation radiation doses in low-dose CT while maintaining diagnostic image quality. Radiologists and radiographers need training in AI technologies to fully leverage their potential while addressing ethical and safety considerations. Greater data diversity, improved generalizability, and ethical safeguards are required for widespread adoption of AI in dose optimization.

Keywords: Low-dose CT; AI; dose; optimization

Evaluation of Sensitivity and Specificity of Ultrasound-Guided FNA of Suspicious Axillary Lymph Nodes in Patients with Breast Cancer

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Introduction: The axillary lymph node status in breast cancer is a major prognostic factor in survival and establishing a personalized treatment scheme. The ultrasound-guided fine needle aspiration (US-FNA) is a method for taking a lymph node sample. It allows physicians to decide how to manage the axilla.

Materials and Methods: In a cross-sectional study, all the patients were subjected to preoperative ultrasound evaluation of the axilla to determine the presence of lymph nodes suspicious of malignancy. In cases where the suspicious lymph node cortex size was between 3 and 6 mm, US-FNA was performed. After surgery, the frozen section of the biopsy sample was examined histologically and compared with fine needle aspiration (FNA) cytology results.

Results: A total of 102 patients were examined in the study. FNA test results indicated that 46 subjects had axillary malignant tissue, and benign cases summed 56. Also, the final results of frozen section surgical histopathology identified 46.1% of patients with involved lymph nodes. The sensitivity and specificity of FNA were 93.62% and 96.36%, respectively. Also, the overall diagnostic accuracy was 95.1%.

Conclusion: This study showed that the sensitivity, specificity, and accuracy were more than 90% for the ultrasound-guided FNA test in identifying involved lymph nodes in patients with breast cancer. Therefore, the results of this test can be considered clinically reliable. However, there is still a need to examine the sensitivity and specificity of this method in identifying lymph node involvement.

Keywords: Breast Cancer FNA Ultrasound-Guided FNA

Investigating the causes and pattern of peritoneal involvement in CT scan and comparison with ultrasound findings in peritoneal conditions: A two-center, cross-sectional study

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Introduction: Ultrasound and computed tomography (CT) scans can be used as methods to help make a more accurate diagnosis in diseases involving the omentum and peritoneum. The present study was conducted to determine etiology and CT scan pattern of peritoneal involvement and compare it with ultrasound findings.

Materials and Methods: Patients referred

to Ghaem and Imam Reza hospitals who had undergone CT scans and had involvement of peritoneum in abdominal CT scans were included in the study. The findings identified in the CT scan were recorded. According to the underlying cause determined by laparotomy or laparoscopy sample, each disease's most common pattern of involvement and types of patterns were examined. An ultrasound was conducted for every patient and the obtained information was analyzed.

Results: A total of 101 patients were included in the study, of which 61 patients (59.8%) were female and the rest were male. The most common involvement patterns in CT scans included nodular (37.6%), mixed (21.8%), and omental cake (17.8%), respectively. In 80 patients (79.2%), CT scan findings were consistent with ultrasound, but in 21 patients (20.8%), CT scan findings were not visible in ultrasound. The most common diagnoses of the patients were colorectal adenocarcinoma and gastric adenocarcinoma (20 cases, 19.8% each), followed by ovarian and uterine adenocarcinoma (19 cases, 18.8%).

Conclusion: The most common patterns of involvement of peritoneum in CT scans include nodular pattern, mix, and omental cake. The most common diseases that lead to the involvement of peritoneum are gastrointestinal cancers, uterine and ovarian cancers, and peritonitis.

Keywords: peritoneum, ct scan, pattern, involvement

Diagnostic Value of Ultrasound Fetal Parameters as Markers of Prematurity

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Introduction: The level of lung maturity in the fetus plays a significant role in neonatal outcomes, especially in preterm babies.With the advent of ultrasound imaging during pregnancy, doctors have been able to evaluate numerous fetal parameters without the need to perform any invasive procedures.

Traditionally, FLM has been assessed by procedures such as amniocentesis, which measures ratios of lecithin and sphingomyelin (L/S) and phosphatidylglycerol in the amniotic fluid .these traditional methods have risks of complications such as fetal sequela, infection, or fetal distress

Materials and Methods: The present cross-sectional study was conducted on pregnant women between 30 and 37 weeks' gestation who were at risk of preterm delivery and gave birth within the next 72 hours. In ultrasonography, distal femoral epiphysis, placental grading, and free-floating particles in amniotic fluid were investigated. After birth, newborns were followed up at birth and 72 hours after that, and those with respiratory distress syndrome (RDS) were identified

Results: The diameter of distal femoral epiphysis in patients without RDS was significantly higher than in patients with RDS ($p<0.001$). Moreover, there was a significant difference in placenta grading in patients with and without RDS ($p=0.046$). However, the frequency of free-floating particles in the amniotic fluid of the two

groups was not significantly different (p=0.106). The cutting point of the diameter of the distal femoral epiphysis was 2.20 mm

Conclusion: Based on the results obtained in the present study, measuring the diameter of the distal femoral epiphysis can be used with relatively good accuracy to predict fetal lung maturity

Keywords: ultrasound, newborns, lung prematurity

Application and mechanism of SPIONS and IONPs traced with MR imaging in diagnosis of nervous system disease AD and PD

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Introduction: Nanoparticles have been closely followed in science for quite some time,superparamagnetic iron oxide nanoparticles are suitable candidates. Superparamagnetic iron oxide particles have been widely used as cell labeling agents for MRI tracking.Alzheimer's disease is the first common neurodegenerative disease of the central nervous system.(AD) is a chronic and progressive form of neurodegeneration.Parkinson's disease is the second most common neurodegenerative disease characterized by a progressive loss of neurons.treatment strategy consists of replacing damaged neurons via transplantation of dopamine neurons with cellular sources. In this review we describe Unveiling the potential of SPIONs in nervous system disease management and detecting brain activity-proof And the Magnetic resonance imaging tracing of superparamagnetic iron oxide nanoparticle–labeled cells for repairing nervous system injury.

Materials and Methods: Detecting SPIONs in Amyloid Plaques by MRI for diagnosis of AD:

The deposition of Ab is one of the primary histopathological characteristics of AD. With the relatively large size and being located intercellularly, Ab can be regarded as an ideal imaging biomarker. The Ab deposition is earlier than clinical manifestations and increases gradually with the progress of the disease magnetic nanoparticles (MNPs) labeled with antibodies against Ab-40 and Ab-42 is applicable to detect Ab in the blood. Conjugated with the Ab oligomer aptamer and the complementary oligonucleotide of the Ab oligomer aptamer, IONPs can be developed as a method to measure the Ab oligomer in the artificial cerebrospinal fluid (CSF). DDNP-superparamagnetic iron oxide nanoparticles (SPIONs) with high affinities to Ab.1–40/ aggregates can be detected by fluorophotometry.

Application of supra magnetic Iron Oxide Nanoparticles in the Diagnosis of PD:

ADSCs are Adipose-Derived Stem Cells were obtained from perinephric regions of male adult rats and cultured in a DMEM medium. ADSC markers were assessed by immunostaining with CD90, CD105, CD49d, and CD45. The SPION was coated using poly-L-lysine hydrobromide and transfection was determined in rat ADSC using the GFP reporter gene.

Another study was about A PD-L1-binding peptide (WL-12) was conjugated with superparamagnetic iron oxide nanoparticles

(SPIONs) to create the nanoprobe WL-12@Fe_3O_4. ΔT2 values and PD-L1 expression were measured in H226 and MSTO-211H tumor tissues over 4 weeks to analyze correlations.

Statistical analysis and graphical plotting were performed via SPSS software version 26.00 and R language. For normally distributed data, an independent sample t-test was used to compare two groups, whereas one-way analysis of variance (ANOVA) was applied for comparisons among multiple groups.

Results: AD:Yang et al and Skaat et al reported that the fixation of the aAbmAb clone BAM10 to near-infrared fluorescent maghemite nanoparticles enables to detect Ab40 fibrils specifically ex vivo by MRI.

1,1-Dicyano2-[6-(dimethylamino) naphthalene-2-yl]propene (DDNP) carboxyl derivative-modified SPIONs (DDNP SPIONs), synthetized by Zhou et al have shown high binding affinities.

PD:The highest number of GFP-positive cells was in the ADSC/SPION/EM group (54.5±1.3), which was significantly different from that in ADSC/SPION group (30.83±3 and P<0.01).

In another study The WL-12@Fe_3O_4 ,PDL1-expressing H460 cells (930.22 ± 11.75 ng/mL) compared to low PD-L1-expressing A549 cells (254.89 ± 17.33 ng/mL, P < 0.05). Tumor iron levels inthe WL-12@Fe_3O_4 group were significantly elevated (141.02 ± 17.33 μg/g) compared to controls (36.43 ± 3.56 μg/g, P < 0.05), with no significantdifferences in other organs (P > 0.05).

Conclusion: In conclusion specific cells labeled with SPIONs demonstrated excellent stability, targeting ability and biosafety, showing significant potential in tumor visualization and dynamic monitoring of PD-L1 expression.

One of the main advantages of ADSC transfection by SPION/PLL is the potential use of these cells in neurodegenerative cell therapy, as well as cell therapy of PD and AD.External magnets can be used for the delivery and homing of stem cells in the target tissue.In order to improve the symptoms by drug therapy based on the diagnosis at the early stage of the disease, MRI CAs, especially SPIONs and USPIO, have already been developed in.

Keywords: SPIONs AD PD MRI

Evaluation of Relationship between brain MRI findings and clinical findings in pregnant and postpartum women admitted to Bent Al-Hoda Hospital inn Bojnourd between years 2016-2022

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Introduction: The health of any society is largely based on the health of women. Considering that pregnancy and childbirth have a significant effect on women's health and health and are considered important indicators of national health, therefore, the purpose of this study is to investigate the relationship between brain MRI findings and clinical findings

in pregnant and postpartum women admitted to Bent Al-Hodi Hospital in the Bojnourd.

Materials and Methods: In this retrospective cross-sectional study, MRI of pregnant mothers or postpartum mothers hospitalized in Bent Al-Hadi Hospital, Bojnord city, which was conducted in Imam Ali (AS) hospital between 1395-1400, was extracted from the HIS and PACS system and then performed by the conducting radiologist. The plan was examined and the pathological findings were recorded in the designed checklists. On the other hand, the demographic information of the patients, including sex, age, gestational age, and history of previous diseases such as hypertension, diabetes, seizures, as well as the final diagnosis of the disease, were collected, and then provided that the patient did not have a history of known brain disease before pregnancy, it was included in the preparation checklists. was collected. First, univariate logistic regression analysis was performed to check the relationship between independent variables and dependent variable, and the variables that had P-value less than 0.2 were entered into multiple logistic regression and multiple logistic regression test was performed in a backward manner.

Results: In this study, the highest age frequency was related to the age group of 20 to 40 years with 79.5% and the lowest age frequency was related to the group over 40 years old with 4.7%. 3.1% of the participants had pre-pregnancy diabetes, 3.1% post-pregnancy diabetes, 10.2% pre-pregnancy blood pressure and 9.4% post-pregnancy blood pressure. 65.4% had headache, 18.1% dizziness, 18.1% seizures, 9.4% decreased level of consciousness and 30.7% peripheral symptoms. Also, the results showed that MRI findings were 7.9% infectious, 2.4% vascular, 0.8% neoplasm and 10.2% other cases.

Conclusion: The results of the present study indicate that seizures and pregnancy blood pressure have a significant relationship with MRI findings. It was also observed that in many patients with headache, no specific clinical findings were seen in their MRI, which was significant.

Keywords: MRI, Brain, Pregnant, Postpartum

Optimizing Abdominopelvic CT Scan Protocols Based on Prior Ultrasound Findings Using the md.ai chatbot

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Introduction: Abdominopelvic CT scans play a pivotal role in diagnosing various abdominal and pelvic disorders. Typically, clinicians request CT scans with or without contrast, and radiology technologists often use a uniform protocol for all patients. This study aimed to evaluate the feasibility of leveraging the chat bot feature on the md.ai website—a cloud-based platform equipped with HIPAA-compliant large language models trained on radiology data—to personalize abdominopelvic CT protocols according to patients' prior ultrasound findings.

Materials and Methods: Three de-identified ultrasound reports from patients with liver, kidney, and intestinal pathologies were selected. These reports were submitted to the md.ai chat bot, requesting appropriate CT scan protocols for each patient's condition. The proposed protocols

were then compared to those recommended in existing scientific journal articles.

Results: When comparing the chat bot's recommendations with protocols reported in the literature, there was no statistically significant difference in oral contrast specifications or injection protocols ($P < 0.05$). The md.ai chat bot's suggested CT scan protocols were deemed appropriate and tailored to the specific pathological conditions of each patient.

Conclusion: Advances in medical technology, particularly in artificial intelligence, are progressing rapidly, and radiology stands at the forefront of this innovation. Employing AI-driven platforms such as the md.ai chat bot, which are optimized for radiology, enables radiology technologists to implement personalized abdominopelvic CT scan protocols. This personalized approach can be viewed as a significant step forward in precision medicine. Moreover, the use of such novel tools is critical, as it enhances diagnostic accuracy while preventing redundant examinations, ultimately reducing patient radiation exposure.

Keywords: Artificialintelligence CTScan Personalizedmedicine

Creating a deep learning model to evaluate bone age in pediatric hand X-rays, focusing on its effect on the accuracy and time efficiency for radiologists.

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Introduction: The assessment of bone age is important for medical and legal purposes. Methods include Greulich-Pyle and Tanner-Whitehouse systems, with Greulich-Pyle being more common. Recently, machine learning has been used to automate this process, showing mean errors between 4. 2 to 9. 96 months, with CNNs often performing best. Clinical software like BoneXpert, Gleamer, and Vuno assist radiologists but do not replace them. Few studies evaluate AI's impact on radiologists' performance. This study trained a CNN and assessed its accuracy and influence on radiologists, including graduates and residents, as an Associated .

Materials and Methods: This study utilized the RSNA Pediatric Bone Age Machine Learning Challenge dataset from 2017, comprising 12,611 training images and 1,425 validation images of hand radiographs. The images were annotated by two pediatric radiologists based on the Greulich and Pyle method.

We trained a convolutional neural network

(CNN) using 80% of the training dataset and tested it on 200 randomly selected images from the validation set.

- Patient Characteristics: The distribution of bone ages for the 200 test images was analyzed to compare radiologist assessments with and without AI assistance.
- Image Processing: A CNN based on the Xception architecture was trained, incorporating Z-score preprocessing to enhance model performance and reduce image variability unrelated to age.
- Image Interpretation: Two experienced radiologists and two residents evaluated the images using a detailed reference atlas for bone age assessment.
- Statistical Analysis: The significance of bone age differences was analyzed using the Pearson correlation coefficient and the Wilcoxon Signed Ranks Test.

Results:

1. AI Model Performance

Mean Estimation Error: 11.03 years

Standard Deviation: 3.69 years

Statistical Significance: The discrepancy between the AI model's estimates and the reference standard was statistically insignificant.

2. Evaluation of Radiologists

Radiologist 2:

Showed negligible discrepancy from the reference standard.

Radiologist 1 & Two Radiology Residents:

Did not align with the predetermined reference standard.

3. Impact of AI Recognition

Radiologist 2:

After recognizing AI assessment results, his estimations were significantly different from the reference standard, whereas prior estimates were not.

Other Participants:

Three participants (Radiologist 1, Radiology Resident 1, and Radiology Resident showed decreased estimation errors after AI evaluation.

Improvement was statistically significant only for Radiology Resident 2.

4. Timing of Bone Age Assessment

Time taken to determine bone age decreased by 32.6% after implementing AI evaluation.

Conclusion: The AI model demonstrated effective performance with insignificant discrepancies compared to established standards, while the recognition of AI assessments influenced radiologists' performance variably and make more positive effect on performance of radiology residents. The overall assessment time was significantly reduced, indicating the potential efficiency gains from AI integration in clinical practice.

Keywords: bone age, machine learning, radiologist

Advances in Radiology: Innovative Technologies Transforming Medical Imaging

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Introduction: Radiology, the cornerstone of modern medical diagnostics, has witnessed rapid technological evolution. Traditional imaging modalities such as X-ray, CT, MRI, and ultrasound have been augmented by emerging technologies, enabling clinicians to

extract deeper insights from imaging data. This review explores recent breakthroughs and their implications for the future of radiology.

Materials and Methods: This review article was conducted through a comprehensive literature search to identify recent advancements in radiology technologies. Primary sources included peer-reviewed journals, conference proceedings, and books published between 2010 and 2025. Databases such as PubMed, Scopus, and Google Scholar were used with keywords including "artificial intelligence in radiology," "hybrid imaging modalities," "3D and 4D imaging," "molecular imaging," and "theranostic agents."

Inclusion criteria were studies that focused on innovative radiology techniques, clinical applications, and integration with other technologies. Exclusion criteria included articles with limited relevance, non-peer-reviewed publications, or outdated methods.

Data extraction involved a systematic approach:

1. Screening of abstracts to determine relevance.
2. Reviewing full texts for detailed information on methodologies, clinical implications, and future directions.
3. Categorization of findings into key themes, including AI, hybrid imaging, and advanced imaging techniques.

Quantitative data, such as diagnostic accuracy and clinical outcomes, were summarized from original research studies, while qualitative insights were derived from reviews and expert opinions.

To ensure accuracy, information from multiple sources was cross-verified. Emerging trends, challenges, and ethical considerations were critically analyzed to provide a balanced perspective.

This methodology ensures that the review reflects the current state of the art in radiology, offering insights applicable to both clinical practice and future research.

Results: The review identified several transformative innovations in radiology:

1. Artificial Intelligence (AI): AI algorithms demonstrated high diagnostic accuracy in detecting cancers, fractures, and vascular abnormalities. AI-based workflow optimization reduced reporting times by up to 30% in high-volume settings.
2. Hybrid Imaging Modalities: PET/CT remains the gold standard in oncology, while PET/MRI is emerging for superior soft-tissue imaging in neurology and cardiology. Spectral CT showed promise in differentiating tissue types and enhancing material characterization.
3. 3D and 4D Imaging: 3D imaging enhanced surgical planning through precise anatomical reconstructions. 4D imaging improved functional assessments in cardiology and respiratory imaging.
4. Novel Contrast Agents: Molecular and theranostic agents improved early disease detection and enabled targeted therapies, particularly in oncology.

Conclusion: Innovative technologies are propelling radiology into a new era of precision medicine. While challenges remain, the integration of AI, hybrid imaging, and advanced visualization techniques promises to revolutionize patient care. Continued interdisciplinary collaboration and ethical vigilance are essential to harness the full potential of these innovations.

Keywords: AI Machine Learning Deep Learning

Educational Overview of Micro-CT and CT Scans: Principles, Applications, and Distinctions

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Introduction: Computed tomography (CT) has revolutionized medical imaging by enabling detailed cross-sectional visualization of the human body. Its advanced capability to differentiate tissues makes it indispensable in diagnostics. Micro-CT, a derivative of CT, focuses on higher-resolution imaging at the microscopic scale, serving preclinical and material science applications. While CT is widely used in clinical settings, micro-CT's application extends to small specimens and in vitro studies. This paper aims to educate readers on the principles, methods, and applications of both technologies.

Materials and Methods: 2. Materials and Methods

2.1 CT Imaging

- Principle: CT uses X-ray beams and detectors to capture multiple angular projections around a subject, reconstructing them into 2D or 3D images.
- Patient Preparation: Patients are positioned on a motorized table that moves through a gantry containing the X-ray source and detectors. Contrast agents may be administered to enhance visualization of vascular or soft-tissue structures.
- Scan Procedure: Axial, helical, or multi-slice acquisitions are utilized depending on the clinical application.
- Resolution and Applications: CT resolution typically ranges from 0.5 to 1 mm, sufficient for imaging internal organs, fractures, tumors, and vascular diseases.

2.2 Micro-CT Imaging

- Principle: Micro-CT uses a micro-focus X-ray source and high-resolution detectors, capable of achieving voxel sizes in the micrometer range.
- Specimen Preparation: Samples are fixed and often stained to enhance contrast. Specimens are placed on a rotating stage for imaging.
- Scan Procedure: The sample rotates incrementally, capturing thousands of projections that are reconstructed into 3D volumetric data.
- Resolution and Applications: Micro-CT provides resolutions as fine as 1-5 µm, ideal for analyzing bone microarchitecture, small animal models, and material properties.

Results: CT and micro-CT differ significantly in resolution, applications, and imaging capacity:

- CT: Rapidly acquires images for large-scale anatomical analysis, with broad applicability in clinical diagnostics. Typical uses include brain, chest, and abdominal imaging, trauma assessments, and oncology.
- Micro-CT: Excels in microscopic analysis, enabling detailed evaluation of bone, soft tissues, and material properties. While unsuitable for live human imaging, it is pivotal in preclinical and in vitro studies.

Key Findings:

- CT's spatial resolution (~0.5 mm) suits clinical needs but lacks the microscopic detail provided by micro-CT.
- Micro-CT achieves unparalleled resolution

(~1-5 µm) but is limited to small specimens and research settings due to higher radiation doses and longer acquisition times.

Conclusion: CT and micro-CT are complementary imaging technologies, each tailored to specific needs. CT remains the gold standard for rapid, comprehensive clinical imaging, while micro-CT provides high-resolution analysis for research and material sciences. An understanding of their principles and limitations ensures optimized application in their respective fields. Future advancements may bridge the gap between these modalities, broadening their potential uses.

Keywords: Micro CT application medical imaging

Dosimetry and QA Methodology Using Artificial Intelligence (AI)-Based Solutions in Radiation Therapy

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Introduction: The integration of artificial intelligence (AI) into radiation therapy has revolutionized various aspects of treatment planning and quality assurance (QA). AI-based solutions offer the potential to enhance dosimetry accuracy, This study explores the current applications, methodologies, and future directions of AI in dosimetry and QA .

Materials and Methods: AI in Dosimetry

AI models have been applied to improve the accuracy of dosimetry. These methods could, optimize dose distributions, and predict QA outcomes. . Figure 1 indicates AI approaches workflow implies to improve dose distribution accuracy during various procedures and reduce the difference between actual dose distribution and delivered dose.

AI-Based QA Methodologies

Regarding QA Process the AI solutions can predict machine beam data, gamma passing rates, and other QA metrics for IMRT, and VMAT. AI can analyze multiple elements of a delivery system, including the MLC, to ensure optimal performance.

Results: The implementation of AI-based solutions in dosimetry and QA has yielded positive results across various institutions: Accuracy and Efficiency, Time Savings, Reduced Errors.

Conclusion: AI-based solutions have the potential to significantly improve dosimetry and QA accuracy. By automating complex processes, enhancing accuracy, and streamlining workflows, AI can contribute to better patient outcomes and more efficient treatment delivery. Continued research and development in this field is required to fully demonstrated the effectiveness of AI in this field.

Keywords: Dose measurement, AI, Cancer, FFFmachine

Advanced MRI Applications in Addiction: Insights from Hypoxic Brain Injury in Methadone Misuse and Emerging Neuroimaging Paradigms

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Introduction: Addiction is a chronic relapsing disorder with profound neurobiological consequences. Magnetic resonance imaging (MRI), particularly advanced modalities such as diffusion-weighted imaging (DWI), magnetic resonance spectroscopy (MRS), perfusion imaging, and functional MRI (fMRI), enables non-invasive detection of early neural damage and functional disruption in substance use disorders. Our study investigates methadone-related hypoxia using MRI, alongside a synthesis of current evidence on the role of advanced neuroimaging in addiction. Findings support MRI's potential not only for diagnosis but also for monitoring and predicting treatment outcomes.

Materials and Methods: We conducted a cross-sectional MRI study on 96 male participants—methadone users (n=24), opium users (n=14), and healthy controls (n=58)—with standardized imaging using a 1.5T scanner. Sequences included DWI, apparent diffusion coefficient (ADC) mapping, fluid-attenuated inversion recovery (FLAIR), and time-of-flight (TOF) MR angiography. Cases of methadone-related hypoxia showed diffusion restriction, elevated FLAIR signals, altered ADC values, and angiogenic patterns, especially in those co-using alcohol. Regression analysis found no correlation between hypoxia and dose/duration, highlighting individual vulnerability and interaction effects.

Building on these results, we integrated findings from the broader neuroimaging literature. Functional and metabolic imaging studies reveal consistent disruptions in mesocorticolimbic circuits, altered cerebral perfusion, and metabolic stress in addiction. Arterial spin labeling (ASL) demonstrates regional hypoperfusion in opioid and alcohol users; MRS shows mitochondrial dysfunction and excitotoxicity. Pharmacological MRI (phMRI) and resting-state fMRI provide emerging biomarkers for relapse risk and treatment responsiveness. Together, these methods underscore the critical role of MRI in advancing clinical neuroscience of addiction

Results: Among methadone users, 16.7% exhibited hypoxic brain injury, with MRI revealing high DWI and FLAIR signals, reduced ADC in acute cases, and angiogenesis or reduced vascular flow on TOF sequences. Co-use of alcohol was present in most hypoxia cases. No hypoxia was observed in opium users or controls. Logistic regression showed no significant relationship between dose/duration and hypoxia, suggesting individualized vulnerability. Review findings

further support advanced MRI's sensitivity to addiction-related changes: ASL identifies cerebral hypoperfusion; MRS detects metabolic stress; resting-state fMRI reveals disrupted connectivity in reward and control networks, highlighting functional compromise beyond structural damage.

Conclusion: Advanced MRI techniques reveal distinct neurovascular and metabolic brain changes associated with methadone misuse, especially when combined with alcohol. Traditional risk metrics like dose or duration fail to predict injury, reinforcing the need for imaging-based biomarkers. Our findings and review confirm that modalities such as DWI, MRS, ASL, and resting-state fMRI offer critical tools for early detection, monitoring, and personalized intervention in addiction. MRI is not only diagnostic—it is a transformative platform in understanding the functional footprint of substance use and guiding future clinical strategies.

Keywords: Methadone Hypoxia MRI Addiction Neuroimaging

A Cross-Sectional Study of Biparietal Diameter in Second-Trimester Fetuses in Isfahan, Iran: Establishing Population-Specific Reference Values

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Introduction: Prenatal care plays a crucial role in preventing the birth of infants with anomalies, low birth weight, and intrauterine death. The primary aim of this study is to determine the reference values for biparietal diameter (BPD) in second-trimester fetuses in Isfahan, Iran, to establish population-specific norms. Previous studies in the Iranian population have shown significant differences in BPD measurements relative to gestational age.

Materials and Methods: This cross-sectional study was conducted from 2022 to 2023 at obstetrics and gynecology clinics affiliated with Isfahan University of Medical Sciences, Iran. It included pregnant women between 16–28 weeks of gestation undergoing routine second-trimester ultrasound. Inclusion criteria were singleton pregnancies, confirmed gestational age by first-trimester CRL measurement, and normal first-trimester ultrasound screenings,

with exclusions for chronic maternal diseases and family history of skeletal anomalies.

A total of 1540 participants, born in Isfahan, were randomly selected. Demographic and obstetric data were collected from medical records, and biometric parameters—BPD, HC, AC, FL—and estimated gestational age (using the Hadlock formula) were obtained via ultrasound performed by an expert radiologist using standardized equipment and ISUOG guidelines. BPD was specifically measured as the outer-to-inner distance across the parietal bones at the level of the thalami and cavum septi pellucidi, averaged over three measurements.

To control for confounding factors affecting head size, children's developmental milestones were assessed via follow-up at one year of age. Data analysis was conducted with SPSS version 24, employing appropriate statistical tests based on data distribution, and a significance level of $p<0.05$. Polynomial regression was used to establish normal BPD reference values for each week of gestation from 16 to 28 weeks. Ethical approval was granted by the Isfahan University of Medical Sciences Ethics Committee, with all data handled anonymously.

Results: A total of 2210 pregnant women participated in the study. The mean maternal age was 30.04 ± 3.16 years, and the proportion of female and male fetuses was 50.7% and 49.3%, respectively. The overall mean BPD was 52.8 ± 12.40 mm. independent t-test and analysis of variance results showed no statistically significant association between demographic characteristics and BPD ($P > 0.05$).

Conclusion: This study demonstrated that the reference values of BPD in second-trimester fetuses in the Iranian population differ from the standard reference values used in ultrasound devices based on Hadlock's fetal growth charts. Establishing population-specific reference charts can improve the accuracy of gestational age determination and reduce diagnostic errors.

Keywords: Biparietal Diameter, Ultrasound, Gestational Age

Association of ultrasound signs of sarcopenia with serum ferritin levels and hepatic indices like NFS and FIB-4 in NAFLD patients

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Introduction: Non-alcoholic fatty liver disease is one of the most common chronic diseases all around the world, which significantly correlates with metabolic disorders and inflammatory cycles. Sarcopenia is a decrease in the mass of skeletal muscles interacting with factors such as inflammatory processes and chronic diseases. It can also lead to the aggravation of chronic diseases.

Materials and Methods: Method The study population was randomly selected and entered into the research based on exclusion and inclusion criteria. Non-alcoholic fatty liver disease was confirmed in all members of the study population by ultrasound. Patients' serum ferritin level was assessed, and their NFS and Fib 4 scores were calculated. Sarcopenia was diagnosed by measuring the thickness of the rectus femoris by ultrasonography. The correlation between these variables was evaluated and analyzed by statistical software.

Results: According to statistical analysis,

there is a significant association between the serum ferritin level and sarcopenia (P-value < 0.001). Besides, there is a significant association between NFS, Fib4, and sarcopenia (P-value = 0.024, 0.000).

Conclusion: This research's results reflect the correlation between serum ferritin and sarcopenia; however, it cannot conclude a cause-and-effect relationship between these variables.

Keywords: NAF liver disease, Sarcopenia, NFS

Evaluation of contrast agents made of gold and iodine nano-particles in Computed Tomography

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Introduction: Computed tomography produces high contrast images yet it cannot discriminate neighboring objects with similar x-ray attenuation coefficient. High image contrast is achieved if the differences between chemical properties of the adjacent tissues is high, such as effective atomic number (Zeff). For this, high Zeff substances such as iodine (Zeff=53) are injected as a contrast agent into the body. However, there are two problems in using iodinated molecular compounds as contrast media: (1) risk of kidney failure in patients susceptible to kidney damage, (2) time limitation to capture the CT images due to fast flush-out from the body. Recently, gold nanoparticles (AuNPs) covered by Poly-Ethylene Glycol (PEG) have been suggested as a suitable substitute for iodinated contrast solution. This is because gold has high Zeff, is chemically inert, and has long retention time in human blood. The aim of our present study is to comparatively evaluate gold and iodine NPs as contrast agent in CT.

Materials and Methods: AuNP suspension was prepared and diluted with water to produce solutions with 4, 3.5, 3, 2.5, and 2 mg/mL of gold. The iodine solutions of the same concentration were made by dilution of 300 mgI/mL of Iohexol contrast agent. A water phantom with 12 test tube holders was used in this study. Five test tubes were first filled with AuNP suspension with 4, 3.5, 3, 2.5, and 2 mg/ml concentrations and were scanned. Subsequently, five more test tubes were filled with iodine solutions of the same concentrations and the CT image was taken. In each experiment, the rest of the test tubes (7 more) were filled with water, in the water-filled phantom. The phantom was scanned at 80, 100, 120, and 135 kVp in both

the cases. HU values of the AuNP suspensions and iodine were measured at all the above kVps. Least square fits of the HU values of both AuNPs suspensions and iodine solutions were used for data analysis.

Results: The result of least square fit showed that the relationship between HU versus concentrations of both AuNP suspensions and iodine are linear. Also, the gradient of the fit between HU versus concentration for iodine is 1.55 times higher than that of AuNP suspension at 80, 100, 120, and 140 kVps.

Conclusion: Most researchers consider gold to be superior to iodine as a contrast agent, because of its higher attenuation coefficient. Our study shows that attenuation property per unit mass is higher for iodine than that for gold. This is because the mass attenuation coefficient of iodine is higher than that of gold. Therefore, for the same concentration the HU value of iodine is about 1.55 times higher than that of AuNP suspensions. In other words, for the equal amount of iodine and AuNP (in mg/mL), the HU enhancement is higher for iodine. We suggest iodine NPs covered by PEG as a viable contrast agent should be explored since it will reduce the risk of kidney toxicity and also increase the retention time of the contrast in blood flow, giving enough time for CT imaging.

Keywords: Computed Tomography contrast agent nano-particles

Radiomic biomarkers from 3D brain MRI to discrimination multiple sclerosis phenotypes: An in-depth machine analysis

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Introduction: The diagnostic differentiation of MS phenotypes is still challenging. We aimed to evaluate the value of radiomic signatures as quantitative imaging biomarkers for differential

diagnosis of relapsing-remitting (RRMS) and secondary progressive multiple sclerosis (SPMS).

Materials and Methods: One hundred MS patients including 56 RRMS and 44 SPMS were enrolled in this study, and a total of 2553 radiomic features were extracted from the 3D brain MR images including T2, FLAIR, and T1-MPRAGE. After multi-level feature selection, seven radiomic models were constructed by multivariate LASSO (least absolute shrinkage and selection operator) logistic regression analysis. The performance of models was evaluated using the area under the ROC curve (AUC), sensitivity, specificity, accuracy, precision, and F1 score.

Results: We found the multi-parametric LASSO logistic regression model developed from all MRI sequences with AUC 0.8758, sensitivity 0.7727, specificity 0.9286, accuracy 0.8578, precision 0.8947, and F1 score 0.8293 as the best model.

Conclusion: Our work concludes that the multi-parametric MRI radiomic features can potentially discriminate similar lesions in MS phenotypes and provide a useful supplementary tool for the differential diagnosis of RRMS from SPMS.

Keywords: MS MRI Radiomics Neuroimaging

Diagnostic Value of Breast MRI vs Mammography and Ultrasound in Assessing Breast Cancer Extent

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Introduction: Breast cancer is the most common malignancy in women worldwide, and accurate assessment of tumor extent is critical for guiding treatment. Prior to surgery, imaging is used to determine the size of the primary tumor, the presence of additional tumor foci in the breast, and any spread to regional lymph nodes. These factors directly impact surgical decisions, such as eligibility for breast-conserving surgery versus mastectomy, and the need for axillary nodal dissection. We aimed to evaluate the added diagnostic value of breast magnetic resonance imaging (MRI) in determining the extent of breast cancer compared to conventional imaging (mammography and ultrasound).

Materials and Methods: We conducted a cross-sectional analysis of 63 women with histologically confirmed breast cancer from 2016–2021. All patients underwent mammography, ultrasound, and breast MRI prior to surgery. Imaging findings for tumor size, multifocality, multicentricity, axillary lymph node involvement, and nipple-areolar complex involvement were recorded. These were compared across modalities and against surgical pathology, using appropriate statistical tests.

Results: MRI overestimate tumor size compared with pathology (P value= 0.027) and to other modalities (P value=0.011 versus ultrasound and P value=0.030 versus

mammography). However, MRI demonstrated a higher detection of disease extent. MRI identified significantly more cases of axillary lymph node involvement than ultrasound or mammography (P value < 0.001). MRI also detected multifocal tumors in 65% of patients, versus 40% by ultrasound and 21% by mammography (P value= 0.004 versus ultrasound; P value < 0.001 versus mammography). Similarly, MRI revealed multicentric disease in 16% of patients compared to 5% by ultrasound and 3% by mammography (P value= 0.040 versus ultrasound; P value < 0.015 versus mammography). MRI uniquely reported nipple-areolar complex involvement in 24% of cases, whereas mammography reported 3% and ultrasound 0% (P value= 0.040 versus ultrasound; P value < 0.015 versus mammography).

Conclusion: Preoperative breast MRI is a more sensitive modality for evaluating the extent of breast cancer than mammography or ultrasound, uncovering additional tumor foci and nodal involvement that might left undetected on conventional imaging. This added sensitivity can influence surgical planning, but some MRI-detected lesions represent overestimation (false positives) and reduce the specificity. Clinicians should balance MRI's higher detection rate with its propensity for false positives when planning optimal surgical management

Keywords: Breast MRI, preoperative staging

Interesting neuroimaging findings in a child with hyperlipidemia: a case report

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Introduction: Neurological manifestations are rare; however, extreme hypertriglyceridemia may cause "milky" blood and cerebrospinal fluid (CSF) and can compromise the central nervous system. We report an infant with familial hyperlipidemia who presented with seizures and unusual neuroimaging findings, including fat deposition in cerebral vasculature and intracranial xanthomas.

Materials and Methods: A 2-month-old boy, previously healthy, presented with fever, followed by a focal seizure in the right leg. He was born to consanguineous parents with an unremarkable perinatal history and normal early development. Physical examination was largely normal for age. Notably, blood drawn for tests had an abnormal "salmon-colored" (lipemic) appearance. Laboratory work-up revealed severe hypertriglyceridemia with normal pancreatic enzymes; other metabolic, hematologic, and infectious evaluations were unremarkable. Brain imaging was performed given the seizure. Non-contrast brain CT and Brain MRI showed fat in the dural venous sinuses and cortical veins, along with two extra-axial, fat-containing intracranial lesions were noted in the left parietal and right frontal regions.

Results: In severe hypertriglyceridemia cause visible lipemia of blood, blood viscosity increases and perfusion in microcirculation can

be impaired. Hyperviscosity and the toxic effect of lipid particles on endothelium may lead to vascular injury in brain. Accumulation of lipid in intracranial blood vessels can extravagate through the injured blood-brain barrier to CSF and brain parenchyma. Intracranial xanthoma, parenchymal hemorrhage and infarction are considered as the complication.

Conclusion: In infants presenting with seizures or stroke-like signs alongside lipemic blood, clinicians should consider hyperlipidemia-induced neurovascular injury. Neuroimaging signs such as fat-density vessels or lesions should prompt an evaluation for dyslipidemia

Keywords: dyslipidemia, neuroimaging, pediatrics, intracranial xanthoma

Redefining Coronary Artery Dimensions: A CCTA-Based Morphometric Study with Ethnic Comparisons in an Iranian Population

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Introduction: Coronary artery dimensions are important for diagnostic imaging, including coronary CT angiography, as well as for risk stratification and interventional planning.

Nevertheless, reference data are predominantly included from western populations with invasive coronary angiography (ICA) techniques which may not to be representative physiology characteristics in different ethnic background. The objective of this cross-sectional study was to define normative coronary artery dimensions in an Iranian population using CCTA while considering the influence of sex, coronary dominance, cardiac structure, and clinical risk variables.

Materials and Methods: This work conducts a cross-sectional study that included 555 Iranian adults with zero coronary calcium scores and no known cardiovascular disease. Agatston scoring was performed using a 256-slice multidetector CT scanner. Coronary artery diameters of the proximal segments of the left main coronary artery (LMCA), left circumflex artery (LCX), and right coronary artery (RCA) were measured. Proximal, mid and distal parts of left anterior descending artery (LAD) diameter are also documented. We also calculated body surface area (BSA)–adjusted values. Subgroup analyses were performed by sex, coronary dominance, and smoking history, family history of coronary artery disease, body mass index (BMI) and cardiac structural variables such as left ventricular chamber size (Cham) and wall thickness (Thick).

Results: Mean coronary artery diameters were significantly smaller in this studied Iranian group compared to previously reported values in Iranian, Caucasian, and Indian populations ($p < 0.001$ for LMCA, LAD, and LCX). BSA-adjusted dimensions remained consistently lower, particularly in females, which reveal challenging issues in

the notion of universally applicable reference standards. LMCA and RCA were significantly larger in right-dominant individuals, while LCX was larger in left-dominant cases ($p < 0.05$). Notably, both smoking and family history of coronary artery disease (CAD) were independently associated with smaller coronary diameters in the absence of calcification or overt disease. Positive correlations were also found between coronary dimensions and left ventricular mass, chamber size, and myocardial thickness ($p < 0.001$).

Conclusion: To the best knowledge of the authors, this is the first CCTA-based study to define coronary artery dimensions in the Iranian population. The results show significant anatomical variability related to ethnicity, sex, dominance, and clinical risk factors. These findings underscore and highlight the importance of population-specific benchmarks in coronary imaging and challenge the generalizability of Western-derived normative values.

Keywords: coronary artery dominance angiography BSA-adjusted

Tumefactive Demyelination Distant from Targeted Field as a Rare Neurological Complication Following Radiotherapy: a case report

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Introduction: Iatrogenic demyelination of the central nervous system (CNS) is a rising concern, commonly associated with various medications and therapies, including radiotherapy (RT). However, RT-induced demyelination remote from the primary treatment field is rare. We present the first case of delayed onset, acute tumefactive demyelination far from the targeted therapeutic field after 3D conformal RT.

Materials and Methods: A 47-year-old man with radiologically isolated syndrome (RIS) and low-grade astrocytoma presented with generalized tonic-clonic seizures following the tumor resection and 3D conformal RT (60 Gy over 30 fractions). Twenty-one weeks post-RT, he developed new-onset progressive dysarthria and left-sided hemiparesis. MRI revealed a new large white matter lesion with features suggestive of tumefactive demyelination, confirmed by a negative 18F-FDG PET/CT scan for malignancy. Intravenous methylprednisolone improved his symptoms. Follow-up imaging showed lesion size reduction and resolution of inflammation. Ocrelizumab was initiated due to the large demyelinating lesion, alongside ongoing Levetiracetam for seizure control

Results: In conclusion, special caution should be exercised among patients with nonspecific white matter lesions in T2 weighted sequence undergoing radiotherapy due to the unidentified risk of developing new demyelinating lesions or enlargement of previous lesions. Initiating early therapy might be an option in these patients. Consequently, demyelinating lesions though remote to the maximally targeted region should be considered as a differential diagnosis in these patients.

Although glioma with concurrent MS is a rare phenomenon, concurrent brain tumors might interfere with the course and diagnosis of MS and vice versa [27]. Considering the increased risk of cancer development associated with some of MS treatments and increased risk of MS development linked to some of cancer treatments[32], a multi-disciplinary approach is essential in treating patients diagnosed with both cancer and demyelinating disease.

Conclusion: The case highlights RT-induced remote demyelination, a previously undocumented phenomenon. Radiotherapy can cause CNS damage via vascular and neuroglial mechanisms, with oligodendrocytes being particularly susceptible. This case underscores the importance of considering demyelination in differential diagnoses for RT patients presenting with new neurological symptoms, even if lesions are remote from the primary treatment field. A multidisciplinary approach is crucial for managing patients with concurrent cancer and demyelinating diseases.

Keywords: Demyelinating Diseases; Cranial Irradiation; Radiotherapy

Diagnostic performance of Ultra-Low Dose Computed Tomography (ULD-CT) in chest, bone, and abdominal imaging

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Introduction: Computed tomography (CT) is an irreplaceable non-invasive diagnostic tool. Radiation dose to the patient is considerably high in conventional CT scans. Therefore, the risk of stochastic effects increases especially on patients who need serial CT series and frequent follow up. Patient radiation dose optimization, radiation dose reduction to As-Low-As Reasonably Achievable with acceptable image quality, has to be implemented in all CT

protocols. The purpose of this research is to evaluate the diagnostic performance of the Ultra-Low Dose CT (ULD-CT) images, when the Iterative Reconstruction (IR) is used, to detect pathologies in protocols such as lung lesions, traumatic (bone fracture) and non-traumatic bone disorders, and acute abdominal pain.

Materials and Methods: Those patients referred to the hospitals affiliated to the university with the request of chest (e.g. liable to Covid-19 and lung cancer in high-risk patients), bone (e.g. traumatic and non-traumatic disorders), and abdominal (e.g. acute abdominal pain) CT were included in this study. Those who agreed to sign the consent form were scanned by standard dose (SD) and ULD-CT protocols. SD and ULD-CT protocols were used 120 kVp, tube current modulation (mAs) and 80-100kVp, fixed mAs (20 mAs) to scan the patients, respectively. Hybrid IR (iDose4) and knowledge-based IR Model (IMR) algorithms were used to reconstruct the SD and ULD-CT images, respectively. Qualitative image analysis was done by 5 points scoring system by two experienced radiologists. Sensitivity and specificity were used to assess the quantitative image quality. Volume CT dose index (CTDIvol in mGy), and Dose Length Product (DLP in mGy.cm) were extracted from the page of dose report available at the university Picture Archiving and Communication System (PACS). The mentioned dose indices and effective dose (ED in mSv, calculated by the product of the conversion factor to DLP), were used to compute and compare the patients' doses in SD and ULD-CT protocols.

Results: The number of patients prone to lung cancer, suspicious of lung cancer, bone fractures or DJD, and abdominal pain included in the present study were 17, 273, 71, and 36 respectively. The two radiologists assigned the ULD-CT images of lung, bone, and abdomen as diagnostically acceptable. The lung nodules in high-risk patients (lung cancer), lung lesions in patients' prone to Covid-19, fractures and Degenerative Joint Disease (DJD) in patients suffering bone pain, and the cases of acute abdominal pain were detected in ULD-CT images. Quantitative image analysis demonstrated that the sensitivity and specificity of ULD-CT images for all above-mentioned cases were close to those of SD-CT. Acceptable image quality was attained with 86% dose reduction in the cases with abdominal pain and with 96%-98% dose reduction for the other cases such as high-risk patients for lung cancer, those suspicious of Covid-19, and patients with bone disorders, with ULD-CT.

Conclusion: The results of this study revealed that the image quality of ULD-CT with 86% (abdomen) to 96%-98% dose reduction was acceptable. This method may be used for lung cancer screening in high-risk patients and also those who need serial CT series, and for patient follow up.

Keywords: Computed Tomography, ULD-CT, image quality

Investigating the Patency of Fallopian Tubes After Clinical and Surgical Treatment of Ectopic Pregnancy

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Introduction: Ectopic pregnancy (EP) is one of the important issues in the field of obstetrics and gynecology. Proper assessment of fallopian tube patency following medical treatment of an EP in women who wish to have future children seems reasonable. Therefore, the purpose of this

study was to investigate the patency of fallopian tubes after clinical and surgical treatment of EP

Materials and Methods: In this quasi-experimental study, our research population was 270 people who were referred to Ali-Ibn-Abitaleb hospital in Zahedan with a definite diagnosis of EP in 2020. Patients were divided into three groups: drug treatment (90 people), surgical treatment (90 people) and expectant treatment (90 people). For each patient, the patency of the left and right fallopian tubes was investigated and the obtained data were statistically analyzed by t-test and chi-square test methods using SPSS software version 22 (IBM, USA).

Results: A total of 270 patients were examined. The mean age of the patients in the drug treatment, surgical therapy and expectant treatment groups were 32.34 ± 6.17, 32.02 ± 6.12 and 32.12 ± 6.40 years, (P=0.389). Moreover, there was no statistically significant difference between the right fallopian tubes (P=1.00), and the left fallopian tubes in the investigated groups (P=0.08)

Conclusion: ased on the results of this study, there was no statistically significant difference between the drug treatment and the surgery treatment groups. The findings of this study revealed that the uterine tube opening was similar on both sides after drug treatment, surgical treatment and expectant treatment.

Keywords: Fallopian Tubes, Treatment, Ectopic Pregnancy

Comparison between Transvaginal Ultrasound and Saline Infusion Sonohystrography in Identifying and Evaluating the Size of Cesarean Scar in Symptomatic Women

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Introduction: The increasing rate of cesarean sections worldwide has led to a rise in associated complications, including cesarean scar niche formation. A cesarean scar niche is a pouch-like defect at the site of a previous cesarean section, identified through imaging as an anechoic space with specific depth criteria. While many affected individuals remain asymptomatic, others experience symptoms such as postmenstrual bleeding, pain, infertility, or cesarean scar

pregnancy. Several imaging techniques, including transvaginal ultrasound (TVS) and saline infusion sonohysterography (SIS), are used to assess cesarean scar integrity. However, no gold standard exists for niche evaluation. This study aims to compare TVS and SIS in identifying and measuring cesarean scar niches in symptomatic patients, determining their diagnostic accuracy and agreement. Understanding their comparative effectiveness can guide clinical decisions and optimize patient care.

Materials and Methods: A prospective cross-sectional study conducted at a referral women's hospital in Tehran between 2022 and 2023. Symptomatic women with at least one prior cesarean section were included, while those with uterine anomalies, endometrial pathologies, or more than two cesarean sections were excluded. TVS and SIS were performed following standardized imaging protocols using a Samsung™ HERA W9 scanner. Niche measurements, including depth, width, length, residual myometrial thickness (RMT), and adjacent myometrial thickness (AMT), were recorded. Statistical analysis employed Cohen's kappa coefficient for agreement assessment and Spearman's correlation for parameter comparison.

Results: Among 155 symptomatic women, 119 had cesarean scar niches detected via imaging. TVS identified fewer cases than SIS, which detected additional niches missed by TVS. Strong correlations ($r = 0.76–0.96$) were observed between TVS and SIS for niche depth, width, length, and RMT measurements. The agreement rate for niche detection was moderate ($\kappa = 0.65$), with TVS missing a significant number of niches identified by SIS. SIS diagnosed 36 additional large niches missed by TVS, confirming its superior sensitivity. However, TVS showed strong measurement reliability, suggesting its utility as an initial diagnostic tool.

Conclusion: While TVS provides reliable niche measurements, it has lower sensitivity for niche detection compared to SIS. This highlights the complementary role of both methods in diagnosing cesarean scar niches. Future research should explore the integration of advanced imaging techniques such as MRI for enhanced diagnostic precision.

Keywords: Cesarean-scar-niche Transvaginal-ultrasound Saline-infusion-sonohysterography

Detection of Neuroinflammation by Quantitative Multi-Parametric MRI in MRI-Negative Refractory Epilepsy

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Introduction: MRI-negative refractory epilepsy (MNRE) presents a significant diagnostic and therapeutic challenge. While conventional MRI often fails to reveal structural abnormalities, mounting evidence suggests that neuroinflammation plays a crucial role in the pathogenesis of MNR. This study aims to explore the efficacy of advanced MRI techniques in identifying the presence of

neuroinflammation in the brains of patients with epilepsy, focusing on the alterations that occur during neuroinflammatory processes.

Materials and Methods: Susceptibility weighted imaging (SWI), magnetic resonance spectroscopy (MRS), and magnetization transfer imaging data were collected from 14 patients with diagnosed as refractory mri-negative as well as from age-matched control subjects. Regions of interest (ROIs) across the three imaging modalities were delineated within the epileptic lobe, as identified through long-term monitoring (LTM), and corresponding regions in the control hemispheres. Statistical significance among groups was assessed using a t-test, with a threshold set at $p<0.05$, and results were presented as mean ± standard deviation (S.D.). Additionally, feature selection analysis was employed to identify more effective parameters for distinguishing between the epileptic and normal lobes.

Results: MTR measurements indicate a notable decrease in the epileptic lobes across all patients. Susceptometry-based oximetry has revealed elevated global venous oxygenation levels in specific veins of patients when compared to control subjects. The ratio of mIs to Cr has been found to be higher in epileptic lobes than in normal lobes. Feature selection analysis has identified MTR and the mIs/Cr ratio as the most effective parameters for distinguishing between epileptic and normal lobes.

Conclusion: We employed multiparametric MRI techniques to identify suitable parameters indicative of neuroinflammation in patients with MRI-negative refractory epilepsy. Our findings suggest that inflammatory interactions can alter the parameters associated with both physiological and metabolic modalities of MRI. Specifically, our measurements revealed a decrease in magnetization transfer ratio (MTR), which correlates with an increase in water content within inflamed regions. Additionally, an elevation in the ratio of myo-inositol to creatine (mI/Cr) may reflect heightened glial cell activity in the epileptic lobes during episodes of neuroinflammation. Furthermore, an increase in the venous oxygen consumption rate indicates significant activation of brain immune cells present in the inflamed brain tissue. Consequently, we propose that a combination of quantitative MRI modalities can effectively detect neuroinflammation in the epileptic lobes of patients with MRI-negative epilepsy.

Keywords: Neuroinflammation, Refractory Epilepsy, Multiparametric MRI

Assessment of Fetal Lung Signal Intensity and Lung-to-Liver Signal Intensity Ratio on MRI images according gestational age

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Introduction: This cross-sectional study was designed to evaluate the signal intensity values of normal lung tissue, liver, and amniotic fluid, as well as the lung-to-liver and lung-to-amniotic fluid signal intensity ratio in fetal MRI images based on gestational age, with the aim

of determining fetal lung maturity.

Materials and Methods: This retrospective study was conducted on 578 fetal MRI images taken for various assessments since 2013 at Imam Reza and Qaem Hospitals, Mashhad University of Medical Sciences. The signal intensities of the lung, liver, and amniotic fluid were extracted and measured in T2-weighted sequences. Gestational age and other demographic data were collected from relevant records, and statistical analysis was performed using correlation tests, ANOVA, and post hoc LSD. Additionally, ROC curve analysis was used to determine the optimal cut-off point for detecting lung immaturity.

Results: The findings showed that the signal intensities of the lung, liver, and amniotic fluid significantly decreased with increasing gestational age. Moreover, it was observed that the lung-to-liver signal intensity ratio increased with gestational age, showing a significant rise in fetuses older than 37 weeks compared to those at younger ages. The ROC curve analysis for the lung-to-liver signal intensity ratio demonstrated a reasonable diagnostic accuracy (AUC=0.66), and the optimal cut-off value for diagnosing lung immaturity was determined to be <2.4, with a sensitivity of 57.25% and a specificity of 69.94%. Additionally, the ROC curve for liver signal intensity also showed a reasonable diagnostic accuracy (AUC=0.698). The Youden index analysis for this curve indicated that a liver signal intensity greater than 248.33, with a sensitivity of 46.14% and specificity of 87.12%, was the optimal threshold for diagnosing fetal lung immaturity.

Conclusion: Increasing gestational age was associated with a decrease in lung, liver, and amniotic fluid signal intensities, as well as an increase in the lung-to-liver signal intensity ratio. Moreover, ROC curve analysis indicated that liver signal intensity and the lung-to-liver signal ratio could serve as non-invasive indicators for assessing fetal lung maturity. The use of this method alongside other diagnostic tools could improve birth timing strategies and reduce respiratory complications in preterm neonates.

Keywords: MRI lung-to-liver signal ratio fetus

Diagnostic value of ADC-MRI in the diagnosis of uterine masses

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Introduction: Uterine myomas (fibroids) are benign tumors of smooth muscle origin, while adenomyomas result from endometrial tissue infiltrating the myometrium. In contrast, leiomyosarcoma is a malignant mesenchymal tumor of the uterus. Differentiating these masses is crucial for appropriate management, particularly when there is suspicion of malignancy. Magnetic Resonance Imaging (MRI) is a noninvasive tool that can provide valuable

information about the size, location, number, and characteristics of uterine masses.

Objective: This study aimed to evaluate the diagnostic utility of various MRI sequences in characterizing different types of uterine masses.

Materials and Methods: This retrospective study included 50 patients who presented to Aliebne Abitaleb Hospital between 2018 and 2020 and met the inclusion criteria. All patients underwent MRI (T1, T2, DWI, and ADC sequences) followed by surgery (myomectomy or hysterectomy). The final diagnosis was confirmed by histopathological examination. Radiological findings were compared with pathological results and statistically analyzed.

Results: In T1-weighted images, leiomyomas showed low signal intensity in 83.3% of cases and heterogeneous signal in 16.2%. Adenomyomas exhibited high signal intensity in 100% of cases, while leiomyosarcomas also appeared hyperintense.

On T2-weighted images, 81.8% of leiomyomas demonstrated low signal, 16.2% were heterogeneous, and 2% showed high signal. All adenomyomas showed low signal intensity, while leiomyosarcomas showed high signal.

On DWI, 66.7% of leiomyomas showed no diffusion restriction, 27.3% had intermediate restriction, and 6.1% were restricted. All adenomyomas showed no restriction. Leiomyosarcomas exhibited significant restriction in 89% of cases.

Mean ADC values were 1.3 for leiomyomas, 0 for adenomyomas, and 0.5 for leiomyosarcomas. A statistically significant correlation was found between ADC values and the type of uterine mass.

Conclusion: MRI, particularly using T1, T2, DWI, and ADC sequences, is a valuable noninvasive tool for differentiating between benign and malignant uterine masses. It can aid in preoperative diagnosis and guide clinical management strategies.

Keywords: Myoma, Adenomyoma, Leiomyosarcoma, Magnetic-Resonance-Imaging (MRI)

Challenging Case Of Brain Mass As Atypical Teratoid/ Rhabdoid Tumor (AT/RT), A Case Report

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Background Medulloblastoma is a common malignant brain tumor in children, accounting for 15-20% of pediatric CNS tumors, usually found in the cerebellum and associated with increased intracranial pressure and neurological deficits. On MRI, it appears as hyperintense lesions on T2-weighted images, often causing mass effect and obstructive hydrocephalus. In contrast, atypical teratoid/rhabdoid tumors (AT/RT) are rarer, primarily affecting younger children, and have an aggressive nature with distinct histological characteristics. Differentiating between these two tumors is essential due to differing treatment and prognoses. Case report A case is presented of a 4-year-old initially diagnosed with medulloblastoma based on MRI but later identified as AT/RT after pathological analysis. Conclusions Although medulloblastoma is more common in pediatric tumors of the posterior fossa, it is important not to overlook

its significant differential diagnoses. Performing immunohistochemistry (IHC) in the evaluation of pediatric brain tumors holds special importance.

Key words: Atypical Teratoid/Rhabdoid Tumor (AT/RT), medulloblastoma, Central nervous system, Histopathology, Immunohistochemistry, Case reports