Solved DNB Theory Papers
Volume - 2
(2020 - 18)

HOW TO APPROACH THIS BOOK

This book is structured to provide a comprehensive guide to mastering the DNB as well as MD Radiology exam. Here is a suggested approach to make the most of this resource:

1. **Familiarize Yourself with the Exam Format:** Begin by understanding the structure of the DNB as well as MD exams. Knowing the types of questions, the marking scheme, and the areas of focus will help you tailor your study plan effectively.
2. **Systematic Study:** Tackle each section of the book methodically. Start with the topics you find most challenging, as this will give you more time to understand and absorb the material.
3. **Practice Regularly:** Regular practice is key to success. Use the model questions provided to test your knowledge and identify areas that need further review. Time yourself to simulate exam conditions and improve your time management skills.
4. **Review and Reflect:** After attempting the questions, carefully review the answers and explanations. Reflect on any mistakes and ensure you understand the rationale behind the correct answers.
5. **Utilize Additional Resources:** While this book is comprehensive, supplementing your study with additional book on lecture notes as well as the video lectures, textbooks, journals, and online resources can provide a broader understanding of complex topics.
6. **Group Study and Discussion:** Studying in groups can be highly beneficial. Discussing questions and answers with peers can provide new insights and reinforce your understanding.
7. **Seek Guidance:** Do not hesitate to seek guidance from mentors and senior colleagues. Their experience and expertise can provide valuable perspectives and tips.

Team Conceptual Radiology

PREFACE

Preparing for the Diplomate of National Board (DNB) and MD Radiology theory exam can be a daunting and challenging task, requiring not only a thorough understanding of Radiology concepts but also the ability to apply this knowledge in a practical, clinical setting. Recognizing the critical need for a comprehensive and practical resource, we embarked on the journey to create this book, "DNB Radiology Master Solutions"

We have included the actual question papers from the last six years of the DNB Radiology exams. These past papers are invaluable for understanding the trends, frequently tested topics, and the style of questions that have been set by the board. Each of these past papers is followed by comprehensive solutions, providing you with the correct answers as well as detailed explanations.

The solutions provided in this book are designed to be as user-friendly and informative as possible. Each solution is presented in a point-wise, systematic manner to ensure clarity and ease of understanding. We understand that concise and organized answers can greatly enhance learning and retention.

To further aid comprehension, we have included relevant images and diagrams alongside the solutions. These visual aids are intended to illustrate key concepts, anatomical structures, and procedural steps, thereby offering a more comprehensive learning experience. By integrating text with visuals, we aim to cater to different learning styles and make the material more accessible.

By combining detailed, step-by-step solutions with illustrative images, we strive to provide a holistic and effective study tool that supports students in mastering the DNB as well as MD Radiology curriculum.

It is our hope that this book will serve as a reliable companion in your exam preparation journey, providing the guidance and practice needed to excel in the theory exams. We believe that with diligent study and consistent practice using this book, you will be well-equipped to achieve your goals and advance in your career as a Radiologist.

I would like to acknowledge the hard work of the eConceptual team, **Dr. Abhishek Soni, Dr. Sai Krishna, Dr. Deepshika, Dr. Kunal, Dr. Saurabh Sharma** in the preparation of this book.

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DNB Radiology (Dec 2020)

Question 1.

a. Imaging evaluation of a patient with Cushing's syndrome.

b. Role of imaging in differentiating adrenal adenoma from adrenal metastasis.

Answer 1a.

Imaging Evaluation of Cushing Syndrome

1. Initial Clinical and Laboratory Assessment

Before imaging, a thorough clinical evaluation and biochemical testing are conducted to confirm the diagnosis of Cushing's syndrome. This typically includes:

- 24-hour urinary free cortisol test
- Late-night salivary cortisol test
- Low-dose dexamethasone suppression test
- Plasma ACTH measurement to differentiate ACTH-dependent from ACTH-independent Cushing's syndrome

2. Imaging Modalities

A. Pituitary Imaging

For ACTH-dependent Cushing's syndrome, where a pituitary adenoma (Cushing's disease) is suspected:

- **Magnetic Resonance Imaging (MRI)**
  - Preferred modality for pituitary evaluation.
  - High-resolution MRI with gadolinium contrast enhances visualization of microadenomas (lesions < 10 mm).
  - Dynamic contrast-enhanced MRI can improve detection rates.
  - MRI sensitivity is approximately 50-60% for detecting pituitary adenomas in Cushing's disease.
- **Computed Tomography (CT):**
  - Used when MRI is contraindicated.
  - Less sensitive than MRI for small pituitary adenomas.

B. Adrenal Imaging

For ACTH-independent Cushing's syndrome, where an adrenal source is suspected:

- **CT Scan of the Adrenal Glands:**
  - Preferred initial imaging modality.
  - High sensitivity for detecting adrenal adenomas, carcinomas, or hyperplasia
  - Can differentiate between adenomas (usually < 4 cm, homogeneous, and with smooth borders) and carcinomas (larger, irregular borders, heterogeneous).
- **MRI of the Adrenal Glands:**
  - Used for further characterization if CT findings are indeterminate.
  - Provides better soft tissue contrast.
  - Useful in differentiating adrenal adenomas from metastases or pheochromocytomas.

C. Thoracic Imaging

For ectopic ACTH production:

- **CT Scan of the Chest:**
  - First-line imaging for detecting ectopic ACTH-producing tumors (e.g., small cell lung carcinoma, bronchial carcinoid).
  - High-resolution CT can identify small pulmonary nodules.
- **MRI of the Chest:**
  - Used when CT findings are inconclusive or for further characterization of mediastinal masses.
- **Somatostatin Receptor Scintigraphy (SRS) or PET-CT:**
  - Used for identifying ectopic ACTH-secreting tumors, especially when initial CT and MRI are negative.
  - SRS involves the use of radiolabeled octreotide, which binds to somatostatin receptors present in many neuroendocrine tumors.
  - PET-CT with fluorodeoxyglucose (FDG) can also localize occult ectopic ACTH-secreting tumors.

3. Advanced Imaging Techniques

- **Inferior Petrosal Sinus Sampling (IPSS):**
  - Performed when MRI does not show a clear pituitary adenoma.
  - Helps distinguish between pituitary and ectopic sources of ACTH.
  - Involves sampling blood from the inferior petrosal sinuses (draining the pituitary) and comparing ACTH levels to peripheral blood.
  - High sensitivity and specificity for detecting ACTH-secreting pituitary adenomas.

4. Follow-Up Imaging

- Post-treatment imaging is necessary to assess the success of surgery (e.g., resection of a pituitary adenoma or adrenal tumor
- Regular follow-up imaging to monitor for recurrence, especially in cases of adrenal carcinoma or ectopic ACTH-secreting tumors.

Answer 1b.

Role of imaging in differentiating adrenal adenoma from adrenal metastasis

1. Computed Tomography (CT)

- **Hounsfield Units (HU):**
  - Unenhanced CT: Adenomas typically have low attenuation due to their high lipid content. An attenuation value of ≤10 HU on unenhanced CT strongly suggests an adenoma.
  - Contrast-enhanced CT: Adenomas enhance rapidly but wash out quickly. This is assessed using washout calculations.
  - Absolute washout: Calculated using the formula: (Enhanced CT - Delayed CT) / (Enhanced CT - Unenhanced CT) x 100. A value ≥60% suggests an adenoma.
  - Relative washout: Calculated using the formula: (Enhanced CT - Delayed CT) / Enhanced CT} x 100. A value ≥40% suggests an adenoma.
- **Size and Shape:**
  - Adenomas are typically smaller and more homogeneous.
  - Metastases tend to be larger, more heterogeneous, and may have irregular borders or necrosis.

2. Magnetic Resonance Imaging (MRI)

- **Chemical Shift Imaging:**
  - This technique exploits the different resonance frequencies of protons in water and fat.
  - Adenomas, due to their high intracellular lipid content, show a significant signal loss on out-of-phase images compared to in-phase images.
  - Metastases generally lack significant lipid content and do not show this signal loss.
- **T2-Weighted Imaging:**
  - Adenomas typically appear less intense on T2-weighted images.
  - Metastases can vary in appearance but often have higher signal intensity on T2-weighted images due to their higher water content.

3. Positron Emission Tomography (PET) with 18F-FDG

PET/CT using fluorodeoxyglucose (FDG) can be helpful, particularly in oncologic patients.

- Metabolic Activity:
  - Adenomas usually have low FDG uptake due to their benign nature and low metabolic activity.
  - Metastases generally show higher FDG uptake reflecting higher metabolic activity of malignant cells.

4. Other Imaging Modalities

- **Ultrasound:**
  - While not typically used for primary characterization of adrenal masses, it can be useful for initial detection and guidance for biopsy.
  - Adenomas are usually hypoechoic and homogenous, while metastases may be more heterogeneous.
- **Contrast-Enhanced Ultrasound (CEUS):**
- This technique can sometimes help in further characterizing adrenal lesions but is less commonly used than CT or MRI.

Question 2 .

a. Approach for incidental thyroid nodules detected on imaging.

b. TI-RADS and its clinical utility.

Answer 2a.

Approach for incidental thyroid nodules detected on imaging

1. Initial Assessment

- **Review Patient History and Clinical Examination:**
  - **Risk Factors:** Consider factors such as age, gender, family history of thyroid cancer, history of head and neck radiation, and symptoms suggestive of thyroid dysfunction or malignancy (e.g., rapid growth of the nodule, hoarseness, dysphagia).
  - **Physical Examination:** Check for signs of thyroid dysfunction (hypo- or hyperthyroidism) and examine the thyroid gland for nodule size, consistency, and presence of cervical lymphadenopathy.
- **Evaluate Previous Imaging and Reports:**
- Compare with any prior imaging studies to assess for changes in nodule size or characteristics over time.

2. Risk Stratification Using Imaging Characteristics

- **Ultrasound (US) Examination:**
- **Perform Thyroid Ultrasound: This is the primary imaging modality for further evaluation. Key features to assess include:**
  - **Size:** Nodules larger than 1 cm are more likely to be clinically significant.
  - **Composition:** Solid, cystic, or mixed.
  - **Echogenicity:** Hypoechoic nodules have a higher risk of malignancy.
  - **Margins:** Irregular or lobulated margins are concerning.
  - **Calcifications:** Microcalcifications are suggestive of malignancy.
  - **Shape:** Taller-than-wide shape on transverse view is worrisome.
  - **Vascularity:** Increased intranodular vascularity may indicate malignancy.
- **Use Risk Stratification Systems:**
  - American College of Radiology (ACR) TI-RADS: Categorizes nodules into levels of suspicion based on US features, guiding management.
  - American Thyroid Association (ATA) Guidelines: Similar approach, with recommendations on when to perform fine-needle aspiration (FNA) biopsy based on nodule size and risk features.

3. Fine-Needle Aspiration (FNA) Biopsy

- **Indications for FNA:**
  - Nodules ≥1 cm with suspicious US features.
  - Nodules ≥1.5 cm that are intermediate suspicion.
  - Nodules ≥2 cm that are low suspicion.
  - Smaller nodules (<1 cm) if there are risk factors or concerning clinical features.
- **Procedure and Cytology:**

- Perform FNA: Typically guided by ultrasound.
- Cytological Evaluation: Utilize the Bethesda System for Reporting Thyroid Cytopathology to classify results (e.g., benign, atypia of undetermined significance, follicular neoplasm, suspicious for malignancy, malignant).

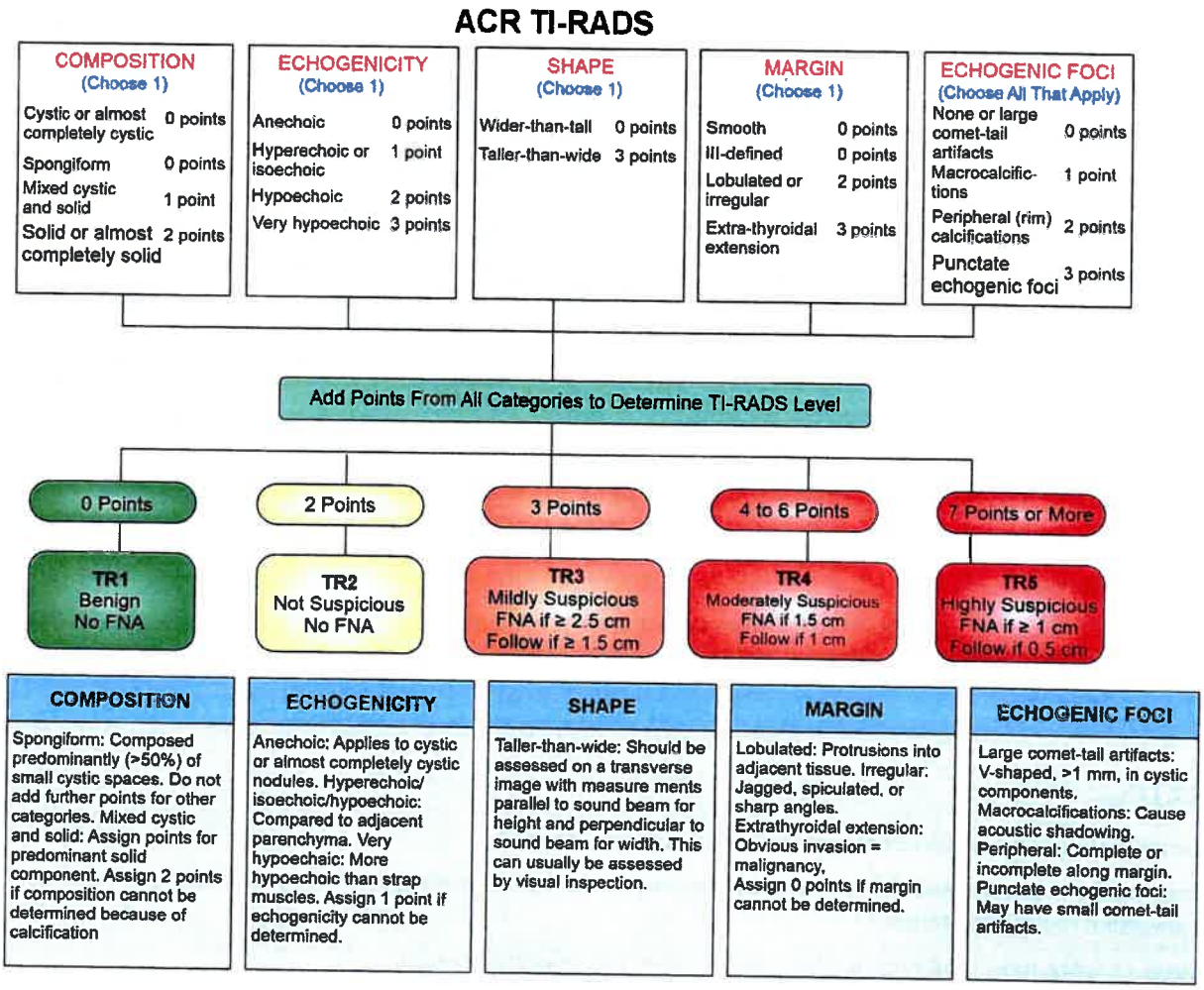
4. Management Based on FNA Results

- **Benign Cytology:**
  - Follow-up with periodic ultrasound (e.g., 6-18 months initially, then less frequently if stable).
- **Atypia of Undetermined Significance/Follicular Lesion of Undetermined Significance (AUS/FLUS):**
  - Repeat FNA in 3-6 months, molecular testing, or consider diagnostic surgery based on risk factors.
- **Follicular Neoplasm/Suspicious for Follicular Neoplasm:**
  - Consider molecular testing or diagnostic lobectomy.
- **Suspicious for Malignancy:**
  - Surgical referral for lobectomy or total thyroidectomy based on nodule size, patient preference, and other risk factors.
- **Malignant:**
  - Referral for surgery (total thyroidectomy or lobectomy depending on the extent and type of malignancy).

Answer 2b.

TI-RADS

1. Composition: Solid, cystic, or mixed solid-cystic components.
2. Echogenicity: How the nodule compares in brightness to the surrounding thyroid tissue (e.g., hypoechoic, isoechoic, hyperechoic, very hypoechoic).
3. Shape: Orientation of the nodule (e.g., taller-than-wide, wider-than-tall).
4. Margin: Edge characteristics of the nodule (e.g., smooth, ill-defined, lobulated, irregular).
5. Echogenic Foci: Presence of microcalcifications, macrocalcifications, or other echogenic features.



Clinical Utility

1. **Standardization:** TI-RADS provides a consistent framework for evaluating thyroid nodules, reducing variability in interpretation among radiologists and clinicians.
2. **Risk Stratification:** By categorizing nodules based on specific features, TI-RADS helps stratify the risk of malignancy, aiding in decision-making regarding the need for biopsy or further imaging.
3. **Guidance on Management:** It offers clear guidelines on when FNA should be performed based on the size and characteristics of the nodule, thus optimizing patient care and resource use.
4. **Reduction of Unnecessary Procedures:** By providing thresholds for FNA, TI-RADS helps avoid unnecessary biopsies of benign nodules, reducing patient anxiety and healthcare costs.
5. **Follow-up Recommendations:** TI-RADS offers guidance on follow-up intervals for nodules that do not initially require biopsy, ensuring appropriate monitoring over time.

Limitations

- **Inter-observer Variability:** Despite standardization, some variability in scoring between different radiologists can still occur.
- **False Positives/Negatives:** As with any diagnostic system, there is a risk of false positives (benign nodules classified as suspicious) and false negatives (malignant nodules classified as benign or less suspicious).

- **Subjectivity:** Certain features, like margins and echogenic foci, can be subject to interpretation, leading to potential inconsistencies.

Question 3.

What is lipoma arborescens? Enumerate imaging findings on US and MRI. Discuss any two differential diagnosis.

Answer 3.

Lipoma arborescens

Lipoma arborescens is a rare, benign intra-articular lesion characterized by villous proliferation of the synovium with replacement by mature adipose tissue. It most commonly affects the knee joint but can occur in other joints as well.

Imaging Findings

Ultrasound (US):

1. Hyperechoic Mass:

- Lipoma arborescens typically appears as a well-defined, hyperechoic mass within the joint space on ultrasound due to its fatty content.
- The mass may exhibit posterior acoustic shadowing.

2. Synovial Hypertrophy:

- There may be synovial hypertrophy with villous proliferation, giving a frond-like appearance.
- The synovium may appear thickened with finger-like projections.

3. Joint Effusion:

- Joint effusion may be present due to chronic synovial inflammation.

Magnetic Resonance Imaging (MRI):

1. Fat Signal Intensity:

- Lipoma arborescens typically demonstrates high signal intensity on both T1-weighted and T2-weighted MRI sequences due to its fatty composition.
- On T1-weighted images, it appears hyperintense similar to subcutaneous fat.
- On T2-weighted images, it may show suppression of signal due to fat saturation techniques.

2. Synovial Proliferation:

- MRI reveals synovial hypertrophy with frond-like projections, characteristic of lipoma arborescens.
- The synovium may appear diffusely thickened with fatty infiltration.

3. Joint Effusion and Synovitis:

- Effusion and synovitis are common findings on MRI due to chronic inflammation associated with the lesion.

Differential Diagnoses:

1. Synovial Lipomatosis:

- Differentiation: Synovial lipomatosis resembles lipoma arborescens but lacks the villous proliferation of the synovium.
- Imaging Features: It presents as diffuse infiltration of fat within the synovium without the characteristic frond-like projections seen in lipoma arborescens.
- MRI: Both lesions demonstrate high signal intensity on T1-weighted sequences due to fat content, but synovial lipomatosis lacks the frond-like appearance.

2. Pigmented Villonodular Synovitis (PVNS):

- Differentiation: PVNS is characterized by hemosiderin deposition within the synovium, leading to pigmented villonodular proliferation.
- Imaging Features: MRI typically shows hemosiderin deposition as low signal intensity on T2-weighted sequences ("blooming artifact" on gradient echo sequences).
- Histopathology: Synovial biopsy may reveal hemosiderin-laden macrophages, confirming the diagnosis.

Question 4.

Indications, technique, advantages and limitations of MRI in imaging of breast cancer.

Answer 4.

MRI IN BREAST IMAGING

Indications:

1. **Screening High-Risk Populations:** MRI is recommended for screening women at high risk of breast cancer, such as those with BRCA mutations or strong family histories of the disease.
2. **Problem Solving:** When conventional imaging (mammography and ultrasound) is inconclusive or ambiguous, MRI can provide additional information.
3. **Preoperative Evaluation:** MRI is valuable for assessing tumor extent, particularly in patients being considered for breast-conserving surgery.
4. **Assessment of Treatment Response:** It can help evaluate the response to neoadjuvant chemotherapy or other treatments.
5. **Detection of Occult Cancer:** MRI can detect additional lesions not visible on mammography or ultrasound, aiding in treatment planning.
6. **Implant Evaluation:** MRI can assess the integrity of breast implants and detect implant rupture.

Technique:

1. **Contrast Enhancement:** Breast MRI is typically performed with intravenous injection of a gadolinium-based contrast agent, which highlights areas of increased vascularity.
2. **Positioning:** The patient lies prone on the MRI table with both breasts positioned in dedicated coils.
3. **Sequences:** Various sequences are used to acquire images, including T1-weighted, T2-weighted, and dynamic contrast-enhanced (DCE) sequences.

4. **Image Interpretation:** Images are interpreted by radiologists, focusing on enhancement patterns, lesion morphology, and kinetic characteristics.

Advantages:

1. **High Sensitivity:** Breast MRI has high sensitivity for detecting breast cancer, particularly invasive cancers and ductal carcinoma in situ (DCIS).
2. **Multi-Parametric Imaging:** It provides multi-parametric information, including morphological, functional, and vascular characteristics of lesions.
3. **Detection of Multifocality/Multicentricity:** MRI can detect additional lesions within the breast, aiding in treatment planning.
4. **No Radiation Exposure:** Unlike mammography, MRI does not use ionizing radiation, making it safe for repeated use.
5. **Improved Surgical Planning:** MRI can accurately delineate tumor extent, helping surgeons plan breast-conserving surgeries.

Limitations:

1. **False Positives:** MRI has a high sensitivity but lower specificity, leading to a higher rate of false positives and unnecessary biopsies.
2. **Cost:** Breast MRI is more expensive than mammography and ultrasound, limiting its widespread use as a screening tool.
3. **Resource Intensive:** MRI requires specialized equipment and expertise, making it less accessible in some healthcare settings.
4. **Claustrophobia:** Some patients may experience claustrophobia during MRI, limiting their ability to undergo the procedure.
5. **Contrast Allergy/Renal Impairment:** Gadolinium-based contrast agents used in MRI can cause allergic reactions or nephrogenic systemic fibrosis in patients with renal impairment.

Question 5.

Discuss the etiology of femoroacetabular impingement and imaging findings on plain radiographs and MRI.

Answer 5.

Femoroacetabular impingement (FAI)

Aetiology:

1. **Morphological Abnormalities:**
   - **Cam Type:** This involves an abnormality of the femoral head-neck junction where there is a lack of concavity or a prominence on the anterosuperior aspect of the femoral head. This can lead to impingement against the acetabular rim during hip motion.
   - **Pincer Type:** In this type, there is excessive acetabular coverage of the femoral head, often due to acetabular over-coverage or retroversion. This can lead to impingement of the femoral neck against the acetabular rim.
2. **Developmental Factors:** Abnormalities in hip development during childhood or adolescence can contribute to the development of FAI.

3. **Functional Factors:** Activities that involve repetitive hip motion, such as certain sports (e.g., soccer, hockey) or occupations (e.g., ballet dancers), can contribute to the development of FAI.

Imaging Findings:

Plain Radiographs:

1. **Alpha Angle (Cam-Type FAI):** On a frog-leg lateral radiograph, an increased alpha angle (>55 degrees) indicates a prominence at the femoral head-neck junction, suggesting cam impingement.
2. **Pistol Grip Deformity (Cam-Type FAI):** This is seen on anteroposterior (AP) radiographs as a concave contour of the femoral head-neck junction.
3. **Crossover Sign (Pincer-Type FAI):** On an AP radiograph, this sign shows the anterior rim of the acetabulum crossing over the posterior rim, indicating acetabular retroversion.
4. **Posterior Wall Sign (Pincer-Type FAI):** This sign shows excessive acetabular coverage of the femoral head, visible as a prominent posterior wall on an AP radiograph.
5. **Joint Space Narrowing:** Progressive joint space narrowing may be seen in advanced cases due to cartilage damage and osteoarthritis.

MRI:

1. Labral Tears: MRI is excellent for detecting labral tears, which commonly occur in FAI due to impingement and repetitive microtrauma.
2. Cartilage Damage: MRI can assess the integrity of articular cartilage and detect early signs of cartilage damage or thinning.
3. Bone Marrow Edema: This is a common finding in FAI and indicates areas of increased stress within the bone due to impingement.
4. Capsular Abnormalities: MRI can reveal capsular thickening or inflammation, which may be associated with FAI.
5. Synovial Changes: Synovial hypertrophy or inflammation may be present, indicating an inflammatory response to impingement.

Question 6.

Enumerate the various posterior fossa tumours in the paediatric age group. Describe in brief the protocol for evaluation of these patients. Discuss the salient imaging features of the three commonest paediatric posterior fossa tumours.

Answer 6.

Posterior Fossa Tumors in Paediatric Age Group

1. **Medulloblastoma:** This is the most common malignant brain tumor in children, originating in the cerebellum. It tends to occur in the midline of the posterior fossa.
2. **Pilocytic Astrocytoma:** A benign tumor that usually arises in the cerebellum, though it can occur elsewhere in the brain. It has a distinctively cystic appearance with a solid mural nodule.
3. **Ependymoma:** Arises from ependymal cells lining the ventricles or central canal of the spinal cord. In children, they frequently occur in the posterior fossa.
4. **Brainstem Glioma:** Tumors located in the brainstem, which can be diffuse intrinsic pontine glioma (DIPG) or focal

gliomas. DIPG is particularly aggressive and is found in the pons region of the brainstem.

5. **Atypical Teratoid/Rhabdoid Tumor (AT/RT):** A rare and highly aggressive tumor that usually occurs in infants and young children. It can arise in various locations within the central nervous system, including the posterior fossa.
6. **Choroid Plexus Papilloma and Carcinoma:** These tumors arise from the choroid plexus, which is located in the ventricles of the brain. They can occur in the posterior fossa, particularly in children.
7. **Hemangioblastoma:** Though more commonly found in adults, hemangioblastomas can occur in children, usually associated with von Hippel-Lindau disease. They are often located in the cerebellum.
8. **Cerebellar Lipoma:** A rare benign tumor composed of mature fat cells, typically located in the cerebellum.
9. **Primitive Neuroectodermal Tumors (PNETs):** These are a group of tumors that arise from primitive (undifferentiated) nerve cells. Medulloblastoma is a type of PNET, but other variants can occur in the posterior fossa as well.
10. **Metastatic Tumors:** Although less common in children, metastatic tumors can spread to the posterior fossa from primary tumors elsewhere in the body.

Evaluation of posterior fossa tumors in the pediatric age group

1. **Medical History:** Obtain a detailed medical history, including symptoms such as headache, vomiting, visual changes, motor or sensory deficits, gait abnormalities, and any changes in behavior or cognition. Also, inquire about any relevant family history or predisposing conditions.
2. **Physical Examination:** Perform a thorough neurological examination to assess cranial nerve function, motor strength, coordination, reflexes, and any signs of increased intracranial pressure (e.g., papilledema).
3. **Neuroimaging:**
   - MRI (Magnetic Resonance Imaging): This is the imaging modality of choice for evaluating posterior fossa tumors due to its superior soft tissue contrast. MRI can help identify the location, size, extent, and characteristics of the tumor. Contrast-enhanced MRI may be used to assess tumor vascularity and involvement of adjacent structures.
   - CT (Computed Tomography) Scan: CT scans may be used initially for rapid assessment in emergency situations or when MRI is contraindicated. CT can provide information about bone involvement, haemorrhage, and calcifications associated with the tumor.
4. **Additional Tests:**
   - Cerebrospinal Fluid (CSF) Examination: Lumbar puncture may be performed to analyse CSF for signs of tumor spread, such as elevated protein levels, presence of tumor cells, or evidence of leptomeningeal metastasis.
   - Genetic Testing: In some cases, genetic testing may be warranted, especially for tumors associated with specific genetic syndromes (e.g., von Hippel-Lindau disease, neurofibromatosis).
   - Neuropsychological Evaluation: Assess cognitive and behavioral functioning, particularly if the tumor or its treatment may impact neurological function.
5. **Biopsy:** In some cases, a biopsy may be necessary to obtain a tissue sample for definitive diagnosis, especially if the tumor characteristics on imaging are inconclusive or if there is concern for a high-grade malignancy.
6. **Multidisciplinary Consultation:** Depending on the specific tumor type and associated symptoms, consultation with various specialists such as neurosurgeons, neuro-oncologists, radiation oncologists, and pediatricians may be necessary to formulate an appropriate treatment plan.

Features of Posterior Fossa Tumors in Paediatric Age Group

1. Medulloblastoma:

- **Location:** Typically arises in the midline of the posterior fossa, often within the vermis of the cerebellum.

- **MRI Features:**
  - T1-weighted Imaging: Usually iso- to hypointense compared to gray matter.
  - T2-weighted Imaging: Typically hyperintense with variable signal intensity due to cystic components or hemorrhage.
  - Enhancement: Homogeneous or heterogeneously enhancing solid components with contrast administration. Enhancement may be nodular or diffuse.
  - Posterior Fossa Involvement: May demonstrate effacement of the fourth ventricle, hydrocephalus, and leptomeningeal enhancement.
  - Dissemination: Occasionally, medulloblastomas may disseminate through CSF pathways, leading to leptomeningeal metastases, which can be detected on MRI.

2. Pilocytic Astrocytoma:

- **Location:** Often arises in the cerebellum, frequently in the hemispheres, but can also occur in the midline structures.
- **MRI Features:**
  - T1-weighted Imaging: Typically iso- to hypointense compared to gray matter.
  - T2-weighted Imaging: Predominantly hyperintense with cystic components, which may demonstrate fluid-fluid levels or mural nodules.
  - Enhancement: Typically demonstrates vivid enhancement of solid components and mural nodules following contrast administration.
  - Posterior Fossa Involvement: May cause mass effect with compression of the fourth ventricle, leading to obstructive hydrocephalus.
  - Peritumoral Edema: Often minimal or absent compared to high-grade tumors.

3. Ependymoma:

- Location: Arises from the ependymal lining of the ventricular system, commonly in the fourth ventricle.
- MRI Features:
  - T1-weighted Imaging: Iso- to hypointense compared to gray matter.
  - T2-weighted Imaging: Typically hyperintense with peritumoral edema.
  - Enhancement: Variable enhancement patterns, ranging from homogenous to heterogenous enhancement of solid components and nodules following contrast administration.
  - Tumor Calcifications: Ependymomas may contain calcifications, which appear as areas of low signal intensity on both T1 and T2-weighted images.
  - Flow Void: Due to its intraventricular location, flow voids from CSF may be seen adjacent to the tumor.
  - Posterior Fossa Involvement: May result in obstructive hydrocephalus and compression of adjacent structures.

Question 7.

Discuss in brief the salient CT and MRI features in an acute ischemic stroke patient arriving to the hospital within 6 hours of onset. Suggest an algorithm based approach for confirmation of diagnosis and guiding the management of such a patient.

Answer 7.

Acute Ischaemic Stroke