الجامعة التقنية الوسطى

كلية التقنيات الصحية والطبية/ بغداد

قسم: تقنيات الاشعة المادة: التصوير بالرنين المغناطيسي

المرحلة: الرابعة

العنوان: Title: MRI of the abdomen (renal + liver + spleen + bowel).

اسم المحاضر: Name of the instructor:

م. حيدر عبد القادر طاهر

lecturer. Haydar Abdul Kader Taher

الفئة المستهدفة: Target population:

طلبه المرحلة الرابعة في قسم تقنيات الاشعة

المقدمة: Introduction:

learning about abdomen MRI is essential for MRI technologist to perform MRI exams effectively, interpret MRI results accurately, ensure patient safety, understand anatomy and pathology, and collaborate with other healthcare professionals. MRI technologist can acquire this knowledge through specialized training programs, continuing education courses, and on-the-job experience.

Scientific Content: المحتوى العلمي:

Liver and biliary system

Common indications

•• Focal lesions and staging of neoplasms
•• Benign hepatic disease, especially haemangioma and focal nodular hyperplasia
•• Haemochromatosis
•• Gallbladder disease
•• Biliary duct obstruction
•• Evaluation of liver infiltrants such as iron or fat

Equipment

•• Body coil/volume torso array or multi-coil
•• RC bellows
•• Earplugs/headphones
•• Pe gating leads if required

Patient positioning

The patient lies supine on the examination couch with the RC bellows (if required) securely attached. The patient is positioned so that the longitudinal alignment light lies in the midline, and the horizontal alignment light passes
through the level of the third lumbar vertebra, or the lower costal margin.

Kidneys and adrenal glands

Common indications

•• Adrenal masses and haemorrhage
•• Renal masses and haemorrhage
•• Renal cell carcinoma
•• Renal transplant rejection
•• Ureteric obstruction

Equipment

•• Body coil/multi-phased array or multi-coil array

•• RC bellows
•• Earplugs/headphones

Patient positioning

The patient lies supine on the examination couch with the RC bellows securely attached (if required). The patient is positioned so that the longitudinal alignment light lies in the midline, and the horizontal alignment light passes through the level of the third lumbar vertebra, or the lower costal margin. The kidneys are generally located about four fingers inferior to the xiphoid.

Placement of the respiratory compensation (RC) bellows

Patient Position- Torso array coil

Coronal localizer for axial slices

Sagittal localizer to obtain coronal slices

Main Abdominal MRI Sequences:

1. <u>T1-Weighted Imaging</u>:
    - Parameters:

- Slice thickness: 5-8 mm

- Use: Provides detailed anatomical information of abdominal structures, including the liver, spleen, kidneys, and blood vessels. T1-weighted images are helpful for detecting anatomy and lesions.

2. T2-Weighted Imaging:
    - Parameters:
        - Slice thickness: 5-8 mm
    - Use: Highlights differences in tissue water content, aiding in the identification of lesions, inflammation, and structural abnormalities within the abdomen.

3. Fat Suppression Sequences:
    - Parameters:
        - Utilizes fat saturation techniques
    - Use: Helps differentiate between fat-containing and non-fat tissues, which can be useful for characterizing lesions and assessing fatty infiltration of organs.

4. Diffusion-Weighted Imaging (DWI):
    - Parameters:
        - Slice thickness: 5-8 mm
        - b-values: Typically 0 and 800-1000 sec/mm²
    - Use: Measures the diffusion of water molecules in tissues and can assist in the evaluation of tissue cellularity and identifying certain abdominal lesions, including tumors.

5. Dynamic Contrast-Enhanced Imaging:
    - Parameters:
        - Slice thickness: 5-8 mm
        - Contrast agent: Gadolinium-based contrast agent
    - Use: Evaluates tissue perfusion and vascularity, aiding in the characterization of lesions, particularly for detecting and characterizing liver lesions.

6. Gradient Echo (GRE) Sequences:
    - Parameters:
        - Slice thickness: 5-8 mm
    - Use: Sensitive to blood products and hemorrhage, making it useful for detecting vascular abnormalities, such as hemangiomas or vascular malformations.

Main Renal MRI Sequences:

1. **T1-Weighted Imaging**:
    - Parameters:
        - Slice thickness: 3-5 mm
    - Use: Provides detailed anatomical information of the kidneys and surrounding structures. T1-weighted images help detect renal anatomy and lesions.
2. **T2-Weighted Imaging**:
    - Parameters:
        - Slice thickness: 3-5 mm

- Use: Highlights differences in tissue water content, aiding in the identification of renal lesions, inflammation, and structural abnormalities.

3. **Fat Suppression Sequences**:
    - Parameters:
        - Utilizes fat saturation techniques
    - Use: Helps differentiate between fat-containing and non-fat tissues in and around the kidneys, aiding in characterizing lesions and assessing fatty infiltration of renal structures.

4. **Diffusion-Weighted Imaging (DWI)**:
    - Parameters:
        - Slice thickness: 3-5 mm
        - b-values: Typically 0 and 800-1000 sec/mm²
    - Use: Measures the diffusion of water molecules in renal tissues and can assist in the evaluation of tissue cellularity and identifying renal lesions, including tumors and abscesses.

5. **Dynamic Contrast-Enhanced Imaging**:
    - Parameters:
        - Slice thickness: 3-5 mm
        - Contrast agent: Gadolinium-based contrast agent
    - Use: Evaluates renal perfusion, vascularity, and enhancement patterns, which can be valuable for detecting and characterizing renal lesions, including renal cell carcinoma.

6. **<u>Magnetic Resonance Angiography (MRA)</u>**:
    - Parameters:
        - Slice thickness: 1-2 mm
    - Use: Visualizes renal arteries and veins, making it useful for assessing renal vascular conditions, such as renal artery stenosis or aneurysms.

References: المصادر:

Handbook of MRI Technique Catherine Senior 5TH EDITION 2022
Step by step MRI Jaganmohan Reddy v parsed

Mriquestions.com

Essential of body MRI 2018