



الرنين المغناطيسي

MRI OF THE TEMPORAL LOBES

Sawa University

College of health and medical techniques

Department of Radiology Tech.

Fourth. Stage

جامعة ساوة الاهلية

كلية التقنيات الصحية والطبية

قسم تقنيات الاشعة والسونار

.....المرحلة الرابعة

الجانب النظري محاضرة رقم 8

Lecture No 8 . Theoretical

Sawa University

تدريسي المادة : م.م. فاضل عوفي عواد

(introduction)

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MRI of the Temporal Lobes: An Academic Lecture1. IntroductionThe temporal lobes are critical regions of the brain involved in memory, auditory processing, language, and emotion. MRI is the modality of choice for imaging the temporal lobes due to its superior soft-tissue contrast and ability to delineate fine anatomical structures.

2. Patient Positioning

Standard Positioning:

- The patient is positioned supine (lying on their back) on the MRI table. The head is placed in a neutral position to avoid rotation or tilting.
- The head is secured using a head coil to minimize motion artifacts. Comfort Considerations:
 - Padding and ear protection are provided to ensure comfort during the scan due to the long duration of imaging.
 - Communication devices (e.g., squeeze bulb) are given for patient reassurance.
- Immobilization:
 - Foam pads, straps, or cushions are used to reduce head movement.

3. Coil SelectionCoil Used

- :A dedicated head coil (8-channel or 32-channel phased array) is used for high spatial resolution and signal-to-noise ratio.
- Use of high-resolution coils is critical for small structures like the hippocampus, amygdala, and other temporal lobe areas.
- Advanced Coils:Multi-channel phased-array coils are preferred for parallel imaging and faster acquisition.

4. Indications for Temporal Lobe .

MRINeurological Disorders:Epilepsy (especially temporal lobe epilepsy)

Degenerative diseases (e.g., Alzheimer's disease, frontotemporal dementia)

Space-Occupying Lesions:Neoplasms (e.g., gliomas, metastases)

Vascular lesions (e.g., cavernomas, arteriovenous malformations)

- Infectious and Inflammatory Conditions:Encephalitis (e.g., herpes simplex encephalitis)

Autoimmune diseases (e.g., multiple sclerosis)

Trauma:Post-traumatic sequelae

Congenital Anomalies:Developmental malformations (e.g., cortical dysplasia)

Hearing and Balance Issues:Suspected vestibular schwannomas or other auditory pathway lesions.

5. Series of Sequences

Basic MRI Sequences for Temporal Lobes:

- T1-Weighted (T1W): Pre-contrast images to assess anatomy and post-contrast for enhancement of lesions.
- High-resolution 3D T1W (e.g., MPRAGE or SPGR) is useful for evaluating structures like the hippocampus.
- T2-Weighted (T2W): High-resolution axial and coronal images to assess edema, gliosis, and fluid-filled spaces.
- Fluid-Attenuated Inversion Recovery (FLAIR): Suppresses CSF signal, making pathologies like gliosis and encephalitis more conspicuous.
- Susceptibility-Weighted Imaging (SWI): Detects microhemorrhages, calcifications, and vascular malformations.

- Diffusion-Weighted Imaging (DWI): Identifies acute ischemia, abscesses, and highly cellular tumors.
- Magnetic Resonance Angiography (MRA): Evaluates vascular abnormalities like aneurysms or stenosis.
- T2-Weighted Gradient Echo (GRE): *Detects blood products or iron deposition.
- Proton Spectroscopy (MRS): Assesses metabolic changes in lesions, such as tumor or infection differentiation.
- Advanced and Optional Sequences:
 - 3D FLAIR: For isotropic imaging and multiplanar reconstruction.
 - Functional MRI (fMRI): For pre-surgical planning in epilepsy or tumor cases.
 - Diffusion Tensor Imaging (DTI): For mapping white matter tracts like the uncinate fasciculus.

6. Planning for Temporal Lobe MRI Anatomical Orientation:

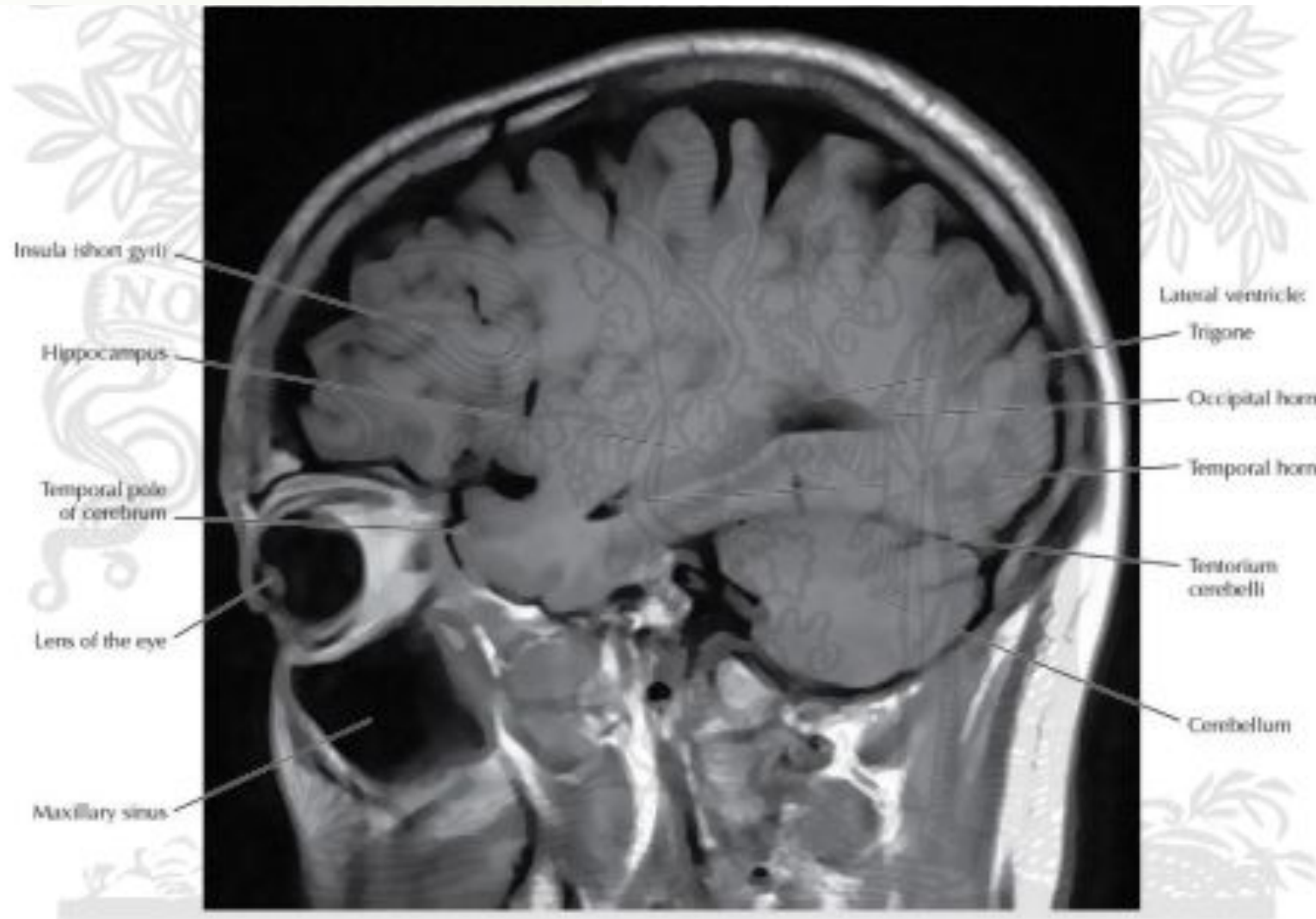
- Ensure imaging planes are aligned parallel to the temporal lobe axis. Use sagittal localizers to select precise axial and coronal slices.
- Axial Plane: Slices should cover from the inferior temporal lobe to the superior border of the Sylvian fissure. Include the hippocampus, amygdala, and surrounding temporal lobe structures.
- Coronal Plane: Align perpendicular to the long axis of the hippocampus. Covers the entire temporal lobe, including the temporal pole and medial temporal structures.
- Sagittal Plane: Optional for evaluating midline structures and asymmetry.
- Field of View (FOV): Small FOV (e.g., 180–220 mm) to focus on the temporal lobes while maintaining high resolution.
- Slice thickness: 3 mm or less (preferably 1–2 mm for high-resolution 3D imaging).

Contrast Administration:

Gadobutrol or other gadolinium-based contrast agents may be used to enhance lesions, especially for infections, tumors, or vascular abnormalities.

7. Artifacts and Challenges

- **Motion Artifacts:** Strategies include patient immobilization and fast imaging sequences.
- **Susceptibility Artifacts:** Common near air-filled sinuses; minimized using proper angulation and high field strength systems.
- **Flow Artifacts:** Arising from CSF or blood flow; reduced using flow compensation techniques.



Conclusion

- Temporal lobe MRI plays a key role in diagnosing neurological and psychiatric conditions.
- Proper planning and optimized protocols are essential for high-quality imaging.

Any questions?

*Thank
You*