

# Mesial Temporal Sclerosis: Diagnostic Clues

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## NORMAL ANATOMY

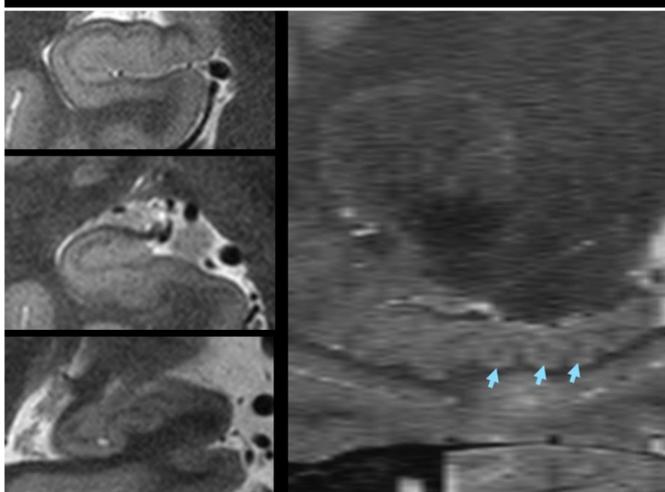


Figure 1. Coronal T2 images (left) of normal right hippocampus at the head (top), body (middle), and tail (bottom), and sagittal T2 image (right) demonstrating digitations of internal layer (blue arrows).

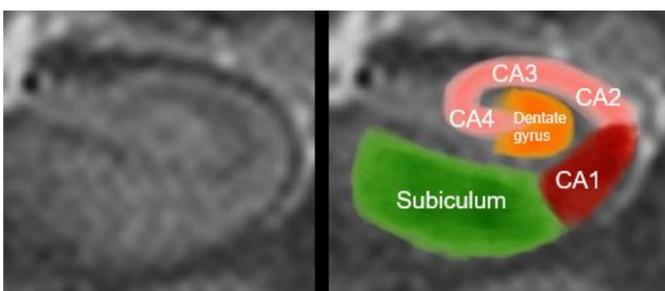


Figure 2. Normal coronal T2 images of hippocampal body with non-annotated (left) and annotated (right) select hippocampal subfields. Note the normal smooth tapering at subiculum and CA1 junction.

## STUDY TECHNIQUE

- Coronal T2 and FLAIR images should be obtained along the plane of the hippocampus.
- On 3 Tesla magnet, ideal slice thickness is 2 – 2.2 mm.
- On 7 Tesla magnet, ideal slice thickness is <1.5 mm.

## VOLUME LOSS

- Volume loss is the most reliable diagnostic clue for mesial temporal sclerosis (MTS) (Figure 3).
- Look for secondary signs of atrophy such as temporal horn enlargement.
- Isolated involvement of CA1 and dentate gyrus subfields are commonly missed. Look for loss of smooth tapering of the subiculum and CA1 junction (Figure 4).



Figure 3. Coronal T2 image demonstrates marked left hippocampal volume loss with secondary enlargement of the temporal horn.

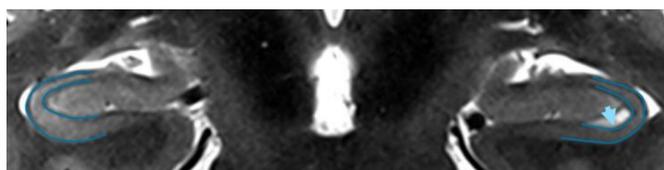


Figure 4. Coronal T2 image demonstrates subtle left CA1 subfield volume loss with loss of smooth tapering at the expected junction of subiculum and CA1, that instead appears flattened (blue arrow).

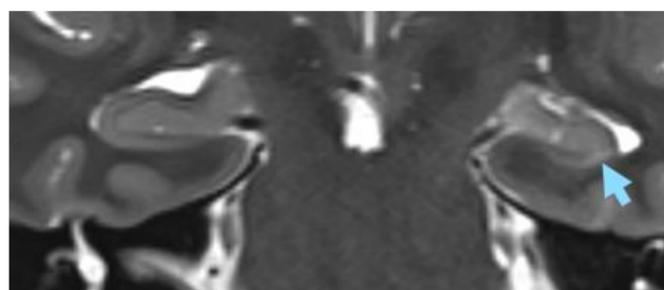


Figure 5. Coronal T2 image demonstrates T2 hyperintensity and loss of internal layer involving CA1 subfield (blue arrow) of left hippocampus.

## T2/FLAIR HYPERINTENSITY

- Hippocampus is a 4-layered structure in contrast to the 6-layered cerebral cortex. There is intrinsically higher T2/FLAIR signal compared to the remaining cortices.
- Signal hyperintensity is not reliable early in the disease.
- If using the contralateral side for signal comparison, be aware that 10% of MTS is bilateral and managed differently.
- Post-ictal edema is also T2/FLAIR hyperintense but tends to affect a larger area.
- Important to note that while mesial temporal sclerosis is a good predictor of site of seizure onset, areas with acute post-ictal change are not.

## LOSS OF INTERNAL LAYER

- Blurring due to averaging from normal hippocampal digitations (Figure 1) will demonstrate interspersed normal-appearing coronal slices. Check sagittal images to confirm hippocampal digitations.
- Can appear abnormal due to partial volume averaging, technique (images not obtained along the plane of hippocampus), motion, incomplete hippocampal rotation.

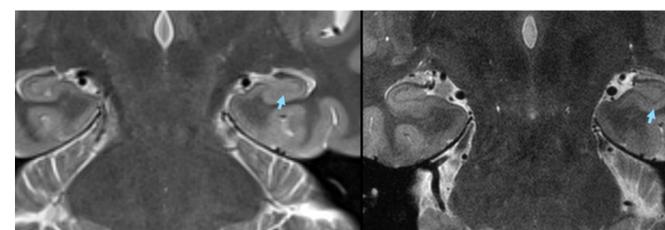


Figure 6. 3T (left) vs 7T (right) coronal T2 images of hippocampal body demonstrate artifactual blurring of internal layer on 3T (blue arrows).

## SUMMARY

- MTS is a good predictor of site of seizure onset.
- MTS is seen in 3.9% of children undergoing MRI for epilepsy.
- Only 11% of patients with isolated MTS achieves seizure freedom with antiepileptic drugs.
- Postoperative seizure freedom rate in patients with MTS is 56-91%.
- Postoperative outcome in patients with normal MRI range from 18-80%, significantly worse than patients with abnormal MRI.
- Early recognition of MTS will guide management and optimize patient outcome.
- Volume loss is the most reliable diagnostic clue for MTS. Isolated involvement of CA1 and dentate gyrus subfields are commonly missed.
- Be aware of the pitfalls of using T2/FLAIR hyperintensity and loss of internal layer to support a diagnosis of MTS.

## REFERENCES

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