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AJNR Am J Neuroradiol 1993, 14 (5) 1237-1240

<http://www.ajnr.org/content/14/5/1237.citation>

This information is current as
of August 6, 2025.

Hippocampal Anatomy and Pathologic Alterations on Conventional MR Images

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Previous anatomic moments have described features of hippocampal anatomy and nomenclature (1, 2). The purpose of this anatomic moment is to highlight the appearance of the hippocampus in sagittal and coronal planes that are used in clinical magnetic resonance (MR) imaging with a conventional head coil, although newer imaging techniques have been developed to provide finer anatomic detail (Tsuruda JS, et al, presented at the 31st Annual Meeting of the American Society of Neuroradiology, Vancouver, BC, 1993; Hyde JS, et al, presented at the Eighth Annual Meeting of the Society of Magnetic Resonance in Medicine, The Netherlands, 1989). Pathologic distortion of the hippocampus also can be identified on conventional images.

In the parasagittal plane, hippocampal anatomy may be difficult to conceptualize because of the concave medial surface and curvilinear configuration of the hippocampus and temporal horn of the lateral ventricle (3) (Figs 1–3). However, in parasagittal conventional MR images, the cigar-shaped gray matter of the hippocampus is easily recognized inferior to the *temporal horn of the lateral ventricle* and/or *choroid fissure*. Sometimes MR images also can show a thin strip of white matter representing the *fimbria* between the temporal horn and the gray matter of the *cornu ammonis* (Figs 1–3). MR images also effectively demonstrate hippocampal masses that dis-

tort and deform hippocampal gray matter and the temporal horn (Fig 4).

The relationship of the hippocampus to its surrounding structures is well demonstrated in the coronal plane (Fig 5). Cerebrospinal fluid spaces above the hippocampus consist of the temporal horn and, more medially, the choroid fissure. The lateral margin of the choroid fissure is the temporal horn tela choroidea formed by ependymal and pial layers and extending from the taenia of the stria terminalis to the taenia of the fimbria (4–6). Figure 6 demonstrates a cyst in the choroidal fissure, which distorts the temporal horn and hippocampus.

Conventional coronal MR images readily demonstrate hippocampal anatomy, though the imaging plane is not completely orthogonal to the curvilinear axis of the hippocampus (7). The almond-shaped gray matter of the hippocampal body is positioned at the medial aspect of the temporal lobe just inferior to the temporal horn (Figs 6 and 7). Alterations of the morphology and signal characteristics of the hippocampal region can be easily recognized by MR imaging. Figure 7 shows a case of mesial temporal sclerosis which can result in hippocampal atrophy and increased signals on T2-weighted images. CA1 and CA4 are typically affected in mesial temporal sclerosis, but neighboring structures are usually also involved.

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Fig. 1. Parasagittal schematic drawing showing the hippocampal formation (*H*) inferior to the temporal horn of the lateral ventricle. The choroid plexus is incompletely demonstrated in this plane because of the concave medial border of the curvilinear temporal horn. The amygdala is located just anterior to the temporal horn. Adapted from Nieuwenhuys et al (8) and Duvernoy (9) with permission.

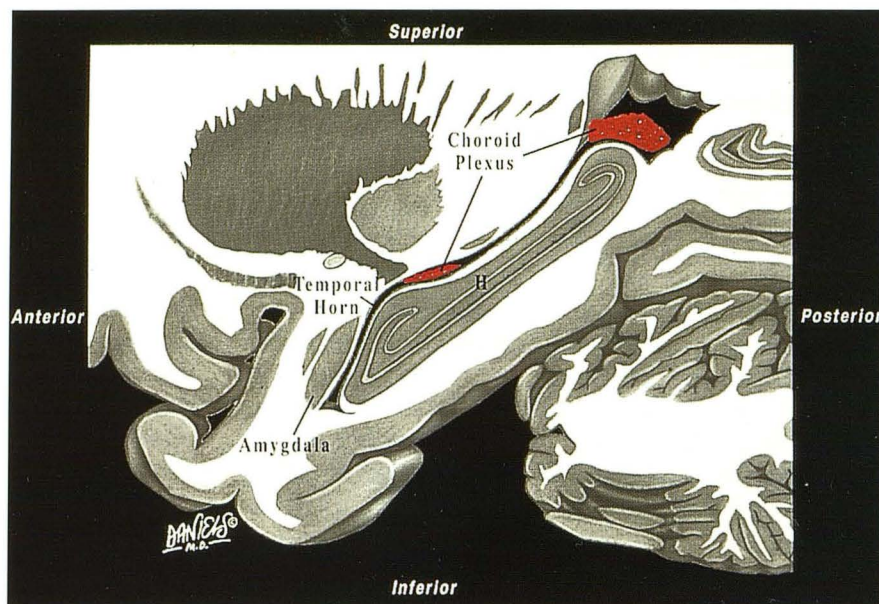
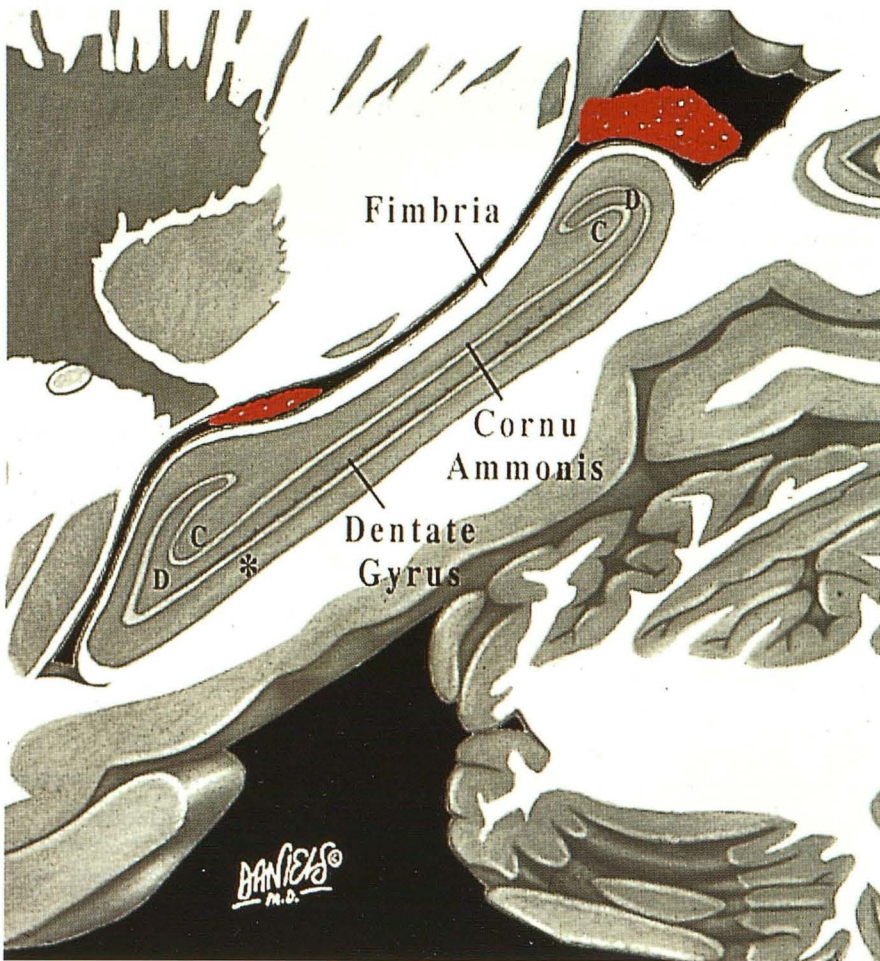


Fig. 2. Magnified view of Fig 1 showing, from superior to inferior, the thin white matter strip of fimbria, the gray matter of the cornu ammonis (*C*), and the dentate gyrus (*D*). The asterisk (*) indicates the gray matter inferior to the dentate gyrus representing the subiculum and CA1 at the anterior and posterior aspects of the hippocampal body, respectively. The cornu ammonis and dentate gyrus form interlocking U's within the hippocampal body.



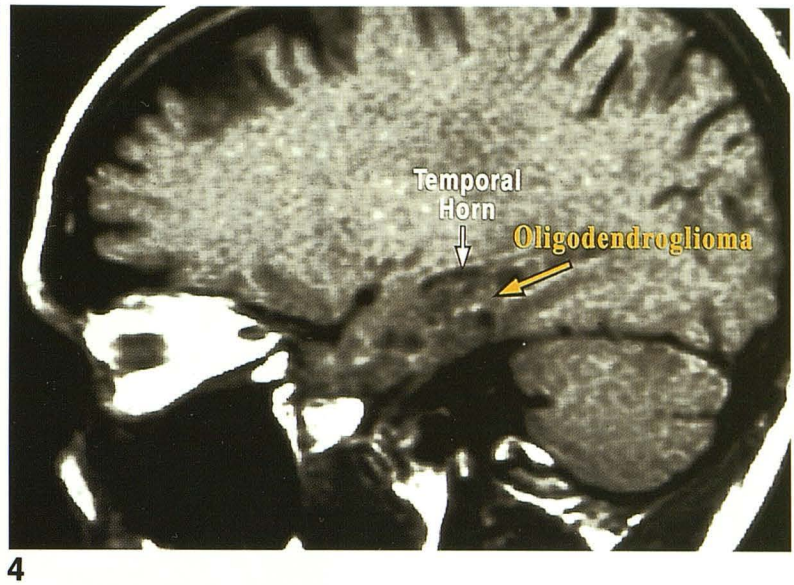
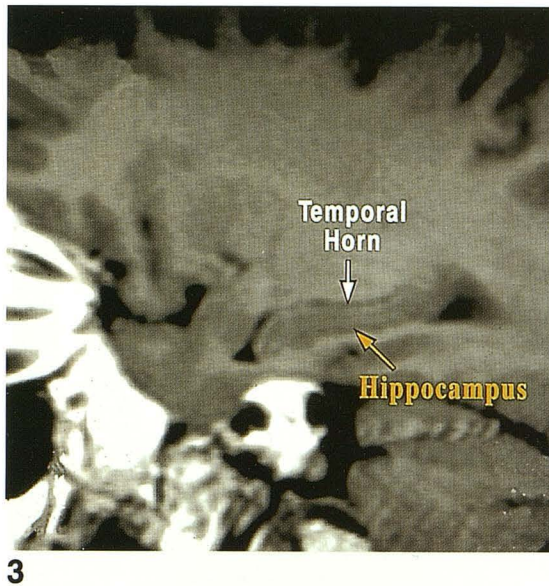


Fig. 3. Parasagittal T1-weighted MR image showing the cigar-shaped hippocampal gray matter inferior to the temporal horn.

Fig. 4. Parasagittal T1-weighted MR image showing an oligodendroglioma with multiple small cystic components distorting the morphology and signals of the hippocampus.

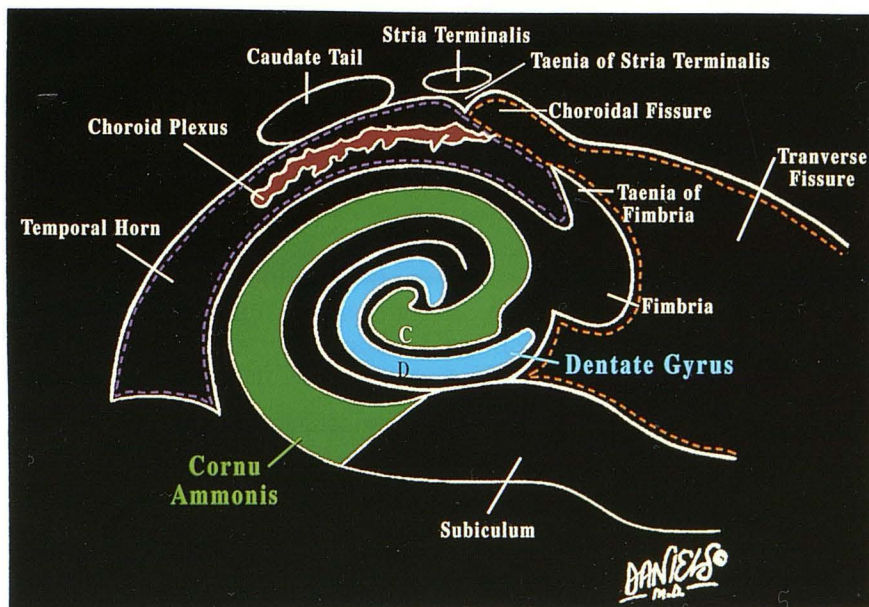


Fig. 5. Coronal schematic drawing through the hippocampal body illustrates the interlocking U's of the dentate gyrus and cornu ammonis located inferior to the temporal horn. The choroid fissure, which is separated from the temporal horn by the tela choroidea, is located just medial to the temporal horn. The tela choroidea is a double-layered structure that consists of both pial (orange dotted line) and ependymal (purple dotted line) layers extending from the taenia of the striae terminalis to the taenia of the fimbria. Adapted from Duvernoy (9) with permission.

Fig. 6. Coronal T1-weighted MR image demonstrates a choroid fissure cyst distorting the choroid fissure and the medial aspect of the temporal horn as well as the superior medial aspect of the right hippocampal body. The almond-shaped gray matter of the normal hippocampus is present on the left just below the temporal horn.

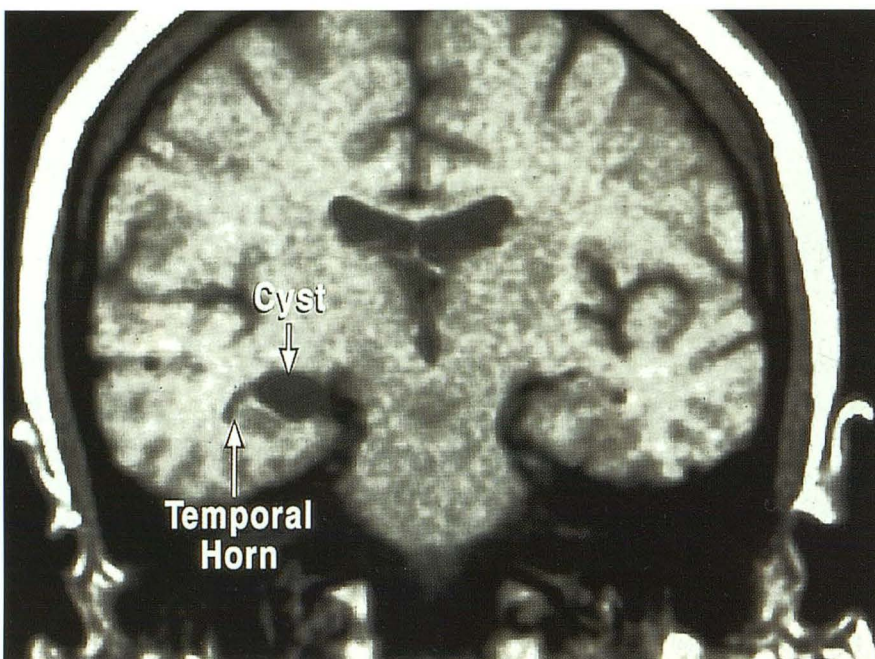
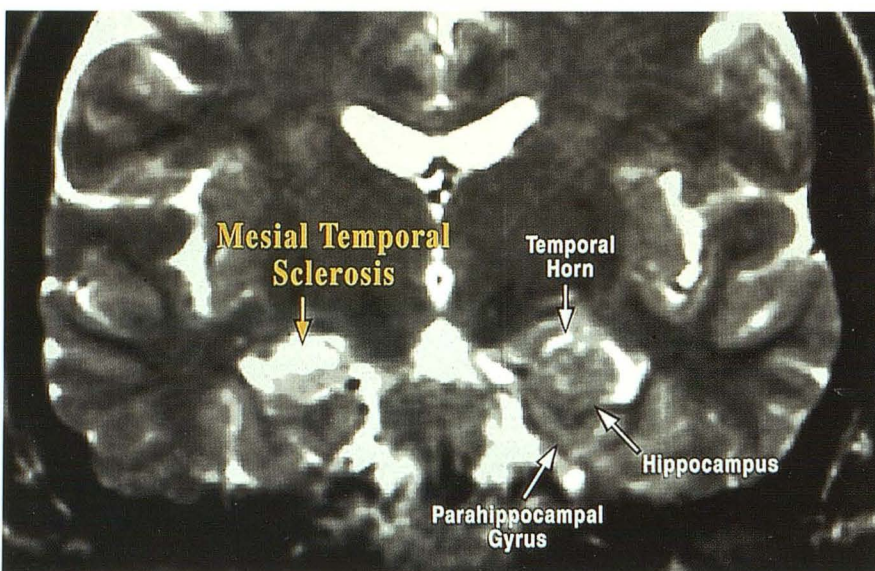


Fig. 7. Coronal T2-weighted MR image demonstrates mesial temporal sclerosis of the right hippocampus. The normal almond-shaped left hippocampus is positioned inferior to the temporal horn but superior to the parahippocampal gyrus.



Suggested Reading

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