MESIAL TEMPORAL LOBE STRUCTURES

Anatomy

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INTRODUCTION

To properly evaluate magnetic resonance imaging (MRI) scans of the mesial temporal region, its specific human morphology (Duvernoy, 1988) should be well understood.

CURRENT RESEARCH

I have dissected temporal lobes of normal human brains and studied this region in coronal, sagittal and horizontal, serial Nissl and myelin-stained histological sections at the Yakovlev Collection in the Armed Forces Institute of Pathology in Washington D.C.

The mesial temporal region of primates is anatomically complex, because a series of flexions and rotations which have occurred in primate phylogeny have profoundly affected the original topographical relationships between amygdala, hippocampus and entorhinal cortex. The rostral hippocampus has undergone a medial, and in its terminal segment an upward, flexion which caused it to emerge on the brain surface forming the posterior one-third of the uncal surface (Figures 1 and 2). This led to the formation of the uncal notch or cleft which separates the hippocampus proper forming its roof from part of the subiculum, and the presubicular part of the parahippocampal gyrus in its floor (Figure 2). The amygdala has been rotated upwards such that its posterior part now lies dorsally on top of the rostral hippocampus (Figure 3). The amygdala underwent an additional rotation around its vertical axis. Both rotations carried the entorhinal cortex forward, thus wrapping much of it around the amygdala to form the gyrus ambiens which covers the anterior two-thirds of the mesial surface of the uncus (Figures 1 and 3). Below the uncal notch the entorhinal cortex forms the rostral extension of the parahippocampal gyrus, but it extends only for a short distance behind the posterior border of the uncus along this gyrus. The entorhinal cortex is bordered laterally by the perirhinal cortex which extends from the mesial temporal pole to about halfway along the posterior extent
Figure 1. Subdivisions of the mesial temporal region. Stippled: hippocampus; cross-hatched: entorhinal cortex; vertically striped: perirhinal cortex. The small elevation on the top of the uncus left blank and located dorsal to the dorsal border of the entorhinal cortex is the part of the amygdala that rises to the brain surface.

Figure 2. Coronal section through the posterior uncus. Note that the hippocampus forms the mesial surface of the uncus at this level as well as the roof of the uncal notch (specimen from the Yakovlev Collection, Armed Forces Institute of Pathology, Washington DC). Abbreviations in this and subsequent figures: A: amygdala; AAA: anterior amygdaloid area; ASA: amygdalostriatal area; CA1, CA3: hippocampal fields; CA3(GIL): hippocampal field CA3 forming part of the mesial surface of the uncus (gyrus intralimbicus); CAT: corticoamygdaloid transition area (periamygdaloid cortex); CHP: choroid plexus within the temporal horn of the lateral ventricle; CP: cerebral peduncle; DG: dentate gyrus; DG(LG): dentate gyrus forming part of the mesial surface of the uncus (limbus Giacomini); EC: entorhinal cortex; EN: endopiriform nucleus; ES: endorhinal sulcus; FAH: zone of fusion between amygdala and hippocampus across obliterated ventricular cleft; FI: fimbria; FUCP: fissure between uncus and cerebral peduncle; GSV: gyrus semilunaris; HIP: hippocampus; IN: insula; OT: optic tract; PAS: parasubiculum; PC: perirhinal cortex; PPC: prepiriform (olfactory) cortex; PRES: presubiculum; PU: putamen; RS: rhinal sulcus; SF: sylvian fissure; SSA: sulcus semiannularis; SUB: subiculum; TN: tentorial notch; UD: uncal diverticulum of temporal horn of lateral ventricle; UN(DP): deep part of uncal notch; UN(O): opening of uncal notch on mesial surface of uncus; UVC: unfused ventricular cleft between amygdala and hippocampus; VCL: ventral claustrum.