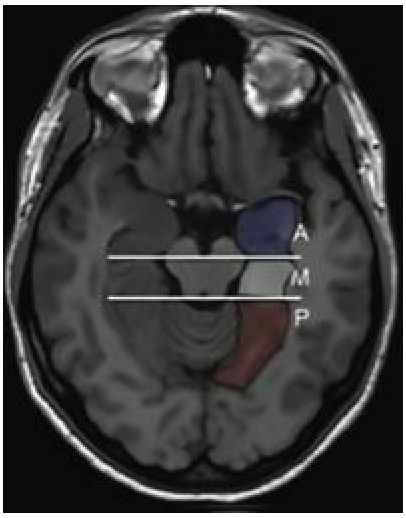
Temporomesial region

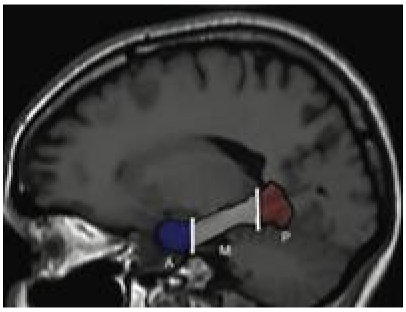
Parmar et al. used 26 postmortem cadaveric cerebral hemispheres (13 right and 13 left hemispheres).

Several neurosurgically significant mesial structures were studied by blunt dissection under the operating microscope. The observed surface-based qualitative variations and right-left asymmetries were tabulated under well-defined, moderately defined, and ill-defined classification.

Among the areas, uncus (100%), limen insulae (88.4%), rhinal sulcus and hippocampus (81%), intralimbic gyrus (77%), Heschl's gyrus (73%), gyrus ambiens, semilunar gyrus, sulcus semiannularis, and calcar avis (69.2%) were well defined, and band of Giacomini (38.4%) was found to be distinctly ill-defined areas in the list. Further, our analysis confirmed the presence of consistent left-greater-than-right asymmetry in all the areas of interest in temporal region under well-defined category. Rightward asymmetry was noticed in moderately defined and ill-defined classification. However, no asymmetry was detected in the uncal region. P value for all the obtained results was >0.05.

The study offers a preliminary anatomic foundation toward the better understanding of temporal lobe structures. These variations may prove valuable to neurosurgeons when designing the appropriate and least traumatic surgical approaches in operating the temporomesial lesions [1].





The mediobasal temporal region has been divided into three portions: anterior, middle, and posterior. Surgical access, especially to the middle portion, presents a formidable challenge to neurosurgeons, and much controversy still exists regarding the selection of the surgical approach to this region.

Electrical stimulation of the basal temporal region of the dominant hemisphere before partial temporal lobectomy for epilepsy sometimes produces temporary interruption of language function, but the significance of removal of this area is unknown.

Knowledge of the surgical anatomy provides improvement for microsurgical approaches. The evolution from a small opening to a resection of the tentorium absolutely changed the exposure of the mediobasal aspect of the temporal lobe. The paramedian supracerebellar transtentorial approach with tentorial resection is an excellent alternative route to the posterior part of mediobasal aspect of the temporal lobe, and it was enough to achieve the best neurosurgical management of tumoral and vascular lesions located in this area [2)].

A safe and appropriate surgical approach to the medial temporal structure is a prerequisite to perform surgeries for temporal lobe epilepsy.

Each approach to medial temporal lesions has technical or functional drawbacks that should be considered when selecting a surgical treatment for a given patient. Dividing the medial temporal region into smaller areas allows for a more precise analysis, not only of the expected anatomic relationships, but also of the possible choices for the safe resection of the lesion [3)].

An understanding of the vascular variability of the medial temporal region (MTR) is essential for accurate microsurgical resection of MTR arteriovenous malformation AVMs [4)].

see Posteromedial temporal region

The surface of the TMR is subdivided into several areas: anteriorly, the lateral olfactory gyrus is covered by prepiriform cortex; dorsomedially, the semilunar gyrus and uncus hippocampi consist, respectively, of cortical amygdaloid nucleus and hippocampal cytoarchitectonic fields; and ventrolaterally, the anterior part of the parahippocampal gyrus is covered by periamygdaloid cortex, entorhinal, and transentorhinal areas and its posterior part is covered by Fields TH and TF per Von Economo and subicular complex.

Six cortical arterial groups were defined:

Group I, anterosuperior parahippocampal arteries (mean, 3.9 arteries) vascularize the ambiens, semilunar, and lateral olfactory gyri (origins: middle cerebral artery, anterior choroidal artery [AChA], posterior cerebral artery [PCA], and internal carotid artery);

Group II, anteroinferior parahippocampal arteries (mean, 2.8 arteries) irrigate the anterior ventrolateral region of the parahippocampal gyrus (origins: middle cerebral artery, PCA, and AChA);

Group III, medial uncal arteries (mean, 1.9 arteries) supply the medial part of uncus hippocampi (origins: AChA and PCA);

Group IV, lateral uncal arteries (mean, 2.9 arteries) vascularize the lateral part of the uncus hippocampi (origins: AChA and PCA);

Group V, several small posterior parahippocampal arteries irrigate Fields TF and TH per Von Economo (origins: PCA and AChA); and

Group VI, posterior hippocampal arteries (mean, 3.2 arteries) irrigate the posterior part of hippocampal formation (origin: PCA). Many anastomoses are found among these arteries, particularly in the ventrolateral part of the TMR. Three groups of amygdaloid arteries were defined: Group I, the anterolateral group (mean, 5.7 arteries) (origin: middle cerebral artery); Group II, the medial group (mean, 6.4 arteries) (origins: AChA, internal carotid artery, and PCA); and Group III, the posterolateral group (mean, 5 arteries) (origins: AChA and internal carotid artery).

This work will be useful for any microneurosurgical procedures on the TMR. The authors clarified the macroscopic and histological definitions of the cortical and nuclear areas of the TMR and the arterial groups closely related to them. The systematic analysis of the variability of the arterial vascularization of this area was our second goal; such a goal, however, requires more observations to be exhaustive.

The numerous interterritorial anastomoses found inside the TMR imply that a selective presurgical injection of short-acting barbiturates to evaluate its functions (Wada test) may well result in its diffusion to other areas of the TMR [5].

Videos

<html><iframe width="420" height="315" src="https://www.youtube.com/embed/qAThNbvB1cE" frameborder="0" allowfullscreen></iframe></html>

1)

Parmar SK, Pruthi N, Ravindranath R, Ravindranath Y, Somanna S, Philip M. Anatomical Variations of the Temporomesial Structures in Normal Adult Brain - A Cadaveric Study. J Neurosci Rural Pract. 2018 Jul-Sep;9(3):317-325. doi: 10.4103/jnrp.jnrp_73_18. PubMed PMID: 30069085; PubMed Central PMCID: PMC6050764.

2)

de Oliveira JG, Párraga RG, Chaddad-Neto F, Ribas GC, de Oliveira EP. Supracerebellar transtentorial approach-resection of the tentorium instead of an opening-to provide broad exposure of the mediobasal temporal lobe: anatomical aspects and surgical applications: clinical article. J Neurosurg. 2012 Apr;116(4):764-72. doi: 10.3171/2011.12.JNS111256. Epub 2012 Jan 13. PubMed PMID: 22242666.

3)

Campero A, Tróccoli G, Martins C, Fernandez-Miranda JC, Yasuda A, Rhoton AL Jr. Microsurgical approaches to the medial temporal region: an anatomical study. Neurosurgery. 2006 Oct;59(4 Suppl 2):ONS279-307; discussion ONS307-8. PubMed PMID: 17041498.

4)

Fernández-Miranda JC, de Oliveira E, Rubino PA, Wen HT, Rhoton AL Jr. Microvascular anatomy of the medial temporal region: part 1: its application to arteriovenous malformation surgery. Neurosurgery. 2010 Sep;67(3 Suppl Operative):ons237-76; discussion ons276. doi: 10.1227/01.NEU.0000381003.74951.35. PubMed PMID: 20679924.

5)

Huther G, Dörfl J, Van der Loos H, Jeanmonod D. Microanatomic and vascular aspects of the temporomesial region. Neurosurgery. 1998 Nov;43(5):1118-36. PubMed PMID: 9802856.