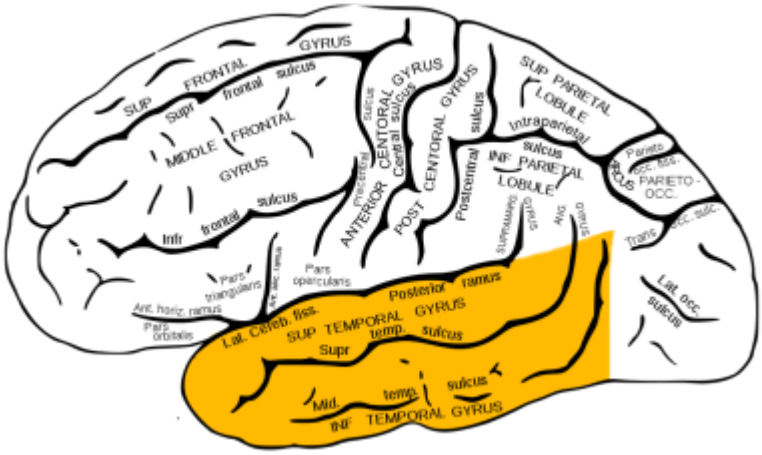
Temporal lobe

Anatomy



One of the four major lobes of the cerebral cortex in the brain.

It is located beneath the lateral fissure on both cerebral hemispheres.

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1. Sylvian Fissure (Lateral Sulcus): The temporal lobe is separated from the frontal and parietal lobes by the Sylvian fissure. It is a deep groove that extends laterally from the base of the brain.

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2. Superior Temporal Gyrus: Located on the upper surface of the temporal lobe. Involved in auditory processing and is essential for language comprehension. The posterior part of this gyrus is known as Wernicke's area, associated with language comprehension.

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3. Middle Temporal Gyrus: Positioned below the superior temporal gyrus. Involved in visual processing and recognition of faces and objects. Plays a role in semantic memory and language processing.

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4. Inferior Temporal Gyrus: Found below the middle temporal gyrus. Integral to visual processing and object recognition. Lesions in this area can lead to visual agnosia, a condition where individuals have difficulty recognizing familiar objects or faces.

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5. Hippocampus: Located in the medial part of the temporal lobe, in the temporal horn of the lateral ventricle. Crucial for the formation and consolidation of new memories. Involved in spatial navigation.
6. Amygdala: Situated in the anterior part of the temporal lobe, adjacent to the hippocampus. Plays a

key role in the processing of emotions, particularly fear and pleasure. Forms part of the limbic system. 7. Fusiform Gyrus: Located on the ventral surface of the brain. Involved in facial recognition. Important for processing information about color, body parts, and other complex visual stimuli. 8. Parahippocampal Gyrus: Surrounds the hippocampus. Important for spatial memory and navigation. Connects the hippocampus with other parts of the brain. 9. Entorhinal Cortex: Located in the medial temporal lobe, adjacent to the hippocampus. Acts as a hub for information flow between the hippocampus and neocortical regions. Essential for memory and navigation. 10. Temporal Pole: The most anterior part of the temporal lobe. Involved in social and emotional processing. Understanding the anatomy of the temporal lobe is crucial for diagnosing and treating neurological conditions that may affect this region. Lesions or abnormalities in the temporal lobe can lead to various cognitive and sensory disturbances, including language deficits, memory impairment, and emotional changes.

The temporal lobe has four surfaces. The medial surface has a complicated microanatomy showing a close relation to the intraventricular structures, such as the amygdala or the hippocampus. There are many white matter bundles in the temporal lobe showing relation to the extra- and intraventricular structures [1)].

see Anterior temporal lobe.

see Left temporal lobe.

see medial temporal lobe.

see mesial temporal lobe.

see Inferior temporal gyrus.

see Middle temporal gyrus.

see Superior temporal gyrus.

Functions

The temporal lobes are involved in the retention of visual memories, processing sensory input, comprehending language, storing new memories, emotion, and deriving meaning.

Venous drainage

Those of the temporal lobe anastomose with the middle cerebral vein and basal veins, and join the cavernous, sphenoparietal, and superior petrosal sinuses.

The venous drainage of the temporal lobe, through bridging veins to the middle cranial fossa, is pivotal in determining the surgical corridor for skull base tumors. In dealing with select cases, where venous drainage was an obstacle in the surgical approach In an attempt to detether the temporal lobe, the disconnection of the bridging veins from the temporal lobe to the middle cranial fossa floor in the first stage may lead to re-direction of the venous outflow over time. This may allow skull base surgeons a better surgical corridor and ensure safety of venous structures during the definitive surgery [2)].

Pathology

Mesial temporal lobe epilepsy

In the first phase of central herniation, the diencephalon and the medial parts of both temporal lobes are forced through a notch in the tentorium cerebelli.

Temporal lobe tumor

see Temporal lobe tumor.

1)
Kucukyuruk B, Richardson RM, Wen HT, Fernandez-Miranda JC, Rhoton AL Jr. Microsurgical anatomy of the temporal lobe and its implications on temporal lobe epilepsy surgery. Epilepsy Res Treat. 2012;2012:769825. doi: 10.1155/2012/769825. Epub 2012 May 21. PubMed PMID: 22957242; PubMed Central PMCID: PMC3420566.
2)
Savardekar AR, Goto T, Nagata T, Ishibashi K, Terakawa Y, Morisako H, Ohata K. Staged 'intentional' bridging vein ligation: a safe strategy in gaining wide access to skull base tumors. Acta Neurochir (Wien). 2014 Apr;156(4):671-9. doi: 10.1007/s00701-014-2028-6. Epub 2014 Feb 27. PubMed PMID: 24573983.