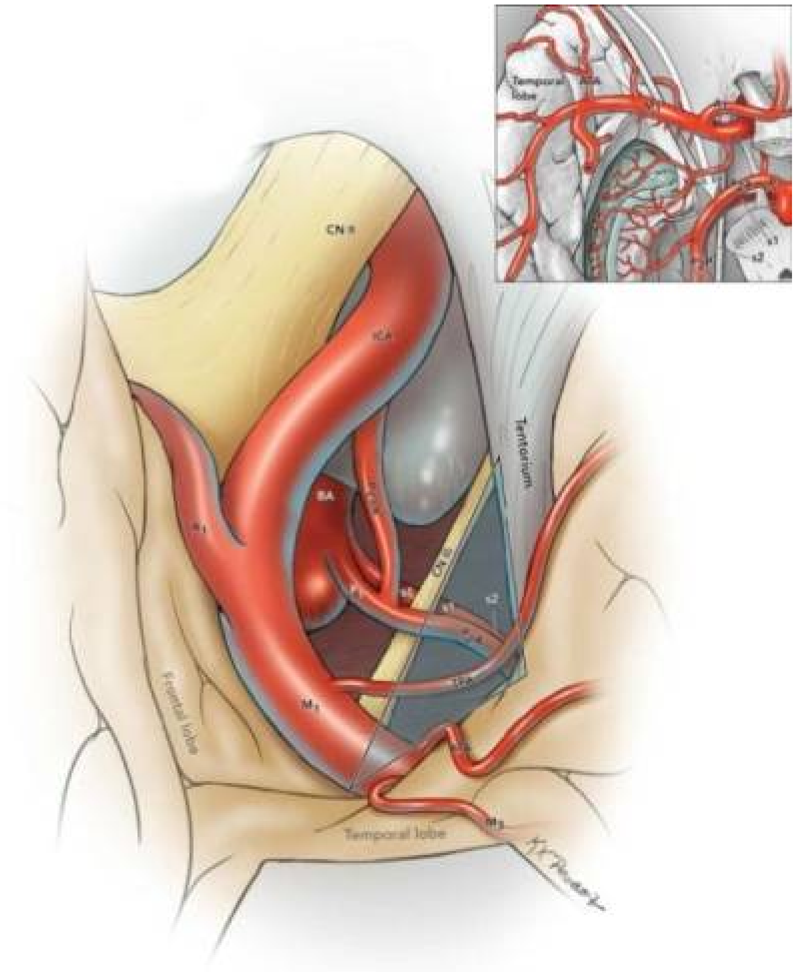
Oculomotor-tentorial triangle



The Oculomotor-tentorial triangle (OTT) is an important anatomical triangle and surgical workspace for vascular lesions in and around the crural and ambient cisterns. The OTT can be used to approach a wide variety of vascular pathologies in the region of the basilar artery quadrifurcation and anterolateral midbrain [1].

Access to the ventrolateral pontomesencephalic area may be required for resecting cavernous malformations, performing revascularization of the upper posterior circulation, and treating vascular lesions such as aneurysms. However, such access is challenging because of nearby eloquent structures. Commonly used corridors to this surgical area include the opticocarotid, supracarotid, and carotid-oculomotor triangles. However, the window lateral to the oculomotor nerve can also be used [2].

Tayebi Meybodi et al., described the anatomical window formed between the oculomotor nerve and the medial tentorial edge (the oculomotor-tentorial triangle [OTT]) to the ventrolateral pontomesencephalic area, and assess techniques to expand it.

Four cadaveric heads (8 sides) underwent orbitozygomatic craniotomy. The OTT was exposed via a pretemporal approach. The contents of the OTT were determined and their anatomical features were recorded. Also, dimensions of the brainstem surface exposed lateral and inferior to the oculomotor nerve were measured. Measurements were repeated after completing a transcavernous approach (TcA), and after resection of temporal lobe uncus (UnR).

The s1 segment and proximal s2 segment of the superior cerebellar artery (SCA) and P2A segment of the posterior cerebral artery (PCA) were the main contents of the OTT, with average exposed lengths of 6.4 ± 1.3 mm and 5.5 ± 1.6 mm for the SCA and PCA, respectively. The exposed length of the SCA increased to 9.6 ± 2.7 mm after TcA (p = 0.002), and reached 11.6 ± 2.4 mm following UnR (p = 0.004). The exposed PCA length increased to 6.2 ± 1.6 mm after TcA (p = 0.04), and reached 10.4 ± 1.8 mm following UnR (p < 0.001). The brainstem surface was exposed 7.1 ± 0.5 mm inferior and 5.6 ± 0.9 mm lateral to the oculomotor nerve initially. The exposure inferior to the oculomotor nerve increased to 9.3 ± 1.7 mm after TcA (p = 0.003), and to 9.9 ± 2.5 mm after UnR (p = 0.21). The exposure lateral to the oculomotor nerve increased to 8.0 ± 1.7 mm after TcA (p = 0.001), and to 10.4 ± 2.4 mm after UnR (p = 0.002).

The OTT is an anatomical window that provides generous access to the upper ventrolateral pontomesencephalic area, s1- and s2-SCA, and P2A-PCA. This window may be efficiently used to address various pathologies in the region and is considerably expandable by TcA and/or UnR [3].

Mascitelli et al., explored the anatomy of the oculomotor-tentorial triangle (OTT). They demonstrated the versatility of the OTT as a surgical workspace for treating vascular pathology.

Sixty patients with 61 vascular pathologies treated within or via the OTT from 1998 to 2017 were retrospectively reviewed. Patients were grouped together based on pathology/surgical procedure and included 1) aneurysms (n = 19); 2) posterior cerebral artery (PCA)/superior cerebellar artery (SCA) bypasses (n = 24); 3) brainstem cavernous malformations (CMs; n = 14); and 4) tentorial region dural arteriovenous fistulas (dAVFs; n = 4). The majority of patients were approached via an OZ craniotomy, wide sylvian fissure split, and temporal lobe mobilization to widen the OTT.

Aneurysm locations included the P1-P2 junction (n = 7), P2A segment (n = 9), P2/3 (n = 2), and basilar quadrification (n = 1). Aneurysm treatments included clip reconstruction (n = 12), wrapping (n = 3), proximal occlusion (n = 2), and trapping with (n = 1) or without (n = 1) bypass. Pathologies in the bypass group included vertebrobasilar insufficiency (VBI; n = 3) and basilar trunk aneurysm (n = 13), basilar apex aneurysm (n = 4), P1 PCA (n = 2), and s1 SCA (n = 2). Bypasses included M2 middle cerebral artery (MCA)-radial artery graft (RAG)-P2 PCA (n = 8), M2 MCA-saphenous vein graft (SVG)-P2 PCA (n = 3), superficial temporal artery (STA)-P2 PCA (n = 5) or STA-s1 SCA (n = 3), s1 SCA-P2 PCA (n = 1), V3 vertebral artery (VA)-RAG-s1 SCA (n = 1), V3 VA-SVG-P2 PCA (n = 1), anterior temporal artery-s1 SCA (n = 1), and external carotid artery (ECA)-SVG-s1 SCA (n = 1). CMs were located in the midbrain (n = 10) or pontomesencephalic junction (n = 4). dAVFs drained into the tentorial, superior petrosal, cavernous, and sphenobasal sinuses. High rates of aneurysm occlusion (79%), bypass patency (100%), complete CM resection (86%), and dAVF obliteration (100%) were obtained. The overall rate of permanent oculomotor nerve palsy was 8.3%. The majority of patients in the aneurysm (94%), CM (93%), and dAVF (100%) groups had stable or improved modified Rankin Scale scores [4].

References

[1], [4]
Mascitelli JR, Gandhi S, Tayebi Meybodi A, Lawton MT. The oculomotor-tentorial triangle. Part 2: a microsurgical workspace for vascular lesions in the crural and ambient cisterns. J Neurosurg. 2018 Jun 1:1-11. doi: 10.3171/2018.2.JNS173141. [Epub ahead of print] PubMed PMID: 29957110.
[2], [3]
Tayebi Meybodi A, Gandhi S, Mascitelli J, Bozkurt B, Bot G, Preul MC, Lawton MT. The oculomotor-

tentorial triangle. Part 1: microsurgical anatomy and techniques to enhance exposure. J Neurosurg. 2018 Jun 1:1-9. doi: 10.3171/2018.1.JNS173139. [Epub ahead of print] PubMed PMID: 29957111.