Transsylvian approach to middle cerebral artery aneurysm

Technique

Skin incision

It is important to understand of the running of a facial nerve for its preservation in a pterional approach. At the axial level of the upper edge of the zygomatic arch, the mean distance between the anterior border of the tragus and the most posterior branch of the facial nerve is 15.3 mm (range, 11.0–22.9 mm; SD, 3.5 mm) [1]. The branches of the facial nerve that innervates the orbicularis oculi muscle and frontalis muscle are located in the surface of superficial layers of deep temporal fascia and cross at a mean distance of 40.4 mm (range, 35.2–45.6 mm; SD, 3.3 mm) above the lateral canthus of the eye [2].

After injection of lidocaine to the supraorbital and infraorbital nerves as preemptive analgesia, the skin incision is started at the level of the upper rim of the zygomatic arch and 2.0 cm anterior to the external acoustic meatus. The incision curves forward, passing 5 cm lateral from the lateral cantus of the eye, and ends at about 7 cm in length inside the hairline. This design of the skin incision contains a sufficient safety margin to avoid facial nerve injury. The temporal fascia is sharply cut, and subfascial dissection is performed, protecting the temporal branch of the facial nerve [3].

After the fascia is reflected anteriorly along with the skin flap, the temporal muscle is dissected—beginning at McCarty’s point from the temporal plane—by the retrograde dissection method, and the bulky temporal muscle is retracted laterally so as not to disturb visualization along the sphenoid ridge. The dissection needs no incision of temporal muscle.

Because of minimal preparation and dissection of bones and muscles, iatrogenic surgical trauma, cranial deformities, and temporal muscle atrophy are significantly decreased postoperativel

Interfascial dissection

see Interfascial dissection.

Craniotomy

Two burr holes are drilled at McCarty’s point and in temporal bone, and the bone flap is removed. The sphenoid ridge is removed as in the conventional pterional approach.

For middle cerebral artery aneurysm surgery, the transsylvian approach through a pterional craniotomy is the most commonly used approach.

Dural opening

The dura mater is cut in a semi-arched shape and opened to a size of 30–40 mm.

In the microsurgical view, we can see the Sylvian fissure at the center and the frontal and temporal lobes on both sides. The Sylvian point [4)] , which is the confluence of three rami of the sylvian fissure and a suitable to start for opening the sylvian fissure because of the wide subarachnoid space, is included in the operative view. The sphenoid ridge is removed to the lateral edge of the superior orbital fissure. Therefore, we can see that this size of craniotomy provides sufficient working space and a familiar view for sharp dissection of the sylvian fissure from the sylvian point to the internal carotid cistern, equal to a conventional large pterional craniotomy.

After dural opening dissect down sylvian fissure with major vector of retraction on tip of temporal lobe (less on frontal lobe than in anterior communicating artery aneurysm). Open arachnoid and drain CSF. Elevate temporal tip, coagulate bridging temporal tip veins, and expose the ICA for proximal control in the event of rupture.

Follow the ICA distally by splitting the sylvian fissure to expose the M1 (again, for proximal control). Although exposure for proximal control is helpful to have as a contingency, one may be able to avoid temporary clipping of the MCA in the event of intraoperative rupture by controlling bleeding with a large suction, and subsequent clip placement (since the blood flow through the MCA is not as voluminous as through the ICA, and the surgical access to these aneurysms is usually fairly unrestricted). Critical branches to preserve: distal MCA branches, recurrent perforators from the origin of the major MCA branches.

Sylvian opening

Sylvian fissure dissection.

Videos

http://surgicalneurologyint.com/unruptured-left-middle-cerebral-artery-aneurysm/

From Juha Hernesniemi.

<html><iframe width="560" height="315" src="https://www.youtube.com/embed/RlKH2Km9z5Y" frameborder="0" allow="accelerometer; autoplay; encrypted-media; gyroscope; picture-in-picture" allowfullscreen></iframe></html>

From Robert F. Spetzler.

<html><iframe src="https://player.vimeo.com/video/14944702" width="640" height="424"

frameborder="0" webkitallowfullscreen mozallowfullscreen allowfullscreen></iframe> How I Do It: Middle Cerebral Artery Aneurysm from Surgical Neurology International on Vimeo. </html>

References

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Türe U, Yaşargil DC, Al-Mefty O, Yaşargil MG. Topographic anatomy of the insular region. J Neurosurg. 1999 Apr;90(4):720-33. PubMed PMID: 10193618.