Posterior inferior cerebellar artery aneurysm surgery

In 1947, Rizzoli and Hayes trapped and excised a Posterior inferior cerebellar artery aneurysm [1].

In recent years, the trend of treatment of posterior circulation aneurysms has tilted toward the endovascular arm.

Posterior inferior cerebellar artery aneurysm is challenging due to the deep location and intimate relation with the medulla and cranial nerves: glossopharyngeal nerves (IX), vagus nerves (X), accessory nerves (XI).

Microsurgery remains the bedrock for treating PICA aneurysms, with planning depending on size, location, shape, presentation, and clinical condition of the patient.

Approaches

PICA has the most complex and variable course among all arteries of the posterior circulation. The complexities involved in the surgical approach to the PICA aneurysms relate to the narrow corridor limited by the brainstem, petrous-occipital bones, and multiple neurovascular structures occupying the cerebellomedullary cistern and cerebellopontine cisterns [2].

Surgical approach is influenced by VA-BA tortuosity and variations in anatomy, location of the VA-BA junction and the PICA aneurysm relative to the brainstem, and the pattern of collateral supply. The special category of VA-PICA junctional aneurysms and its management; and, the multiple anatomical variations of PICA aneurysms, merit special surgical considerations and have been highlighted in the study of Singh et al. [3].

The far lateral transcondylar craniotomy is the standard approach for posterior inferior cerebellar artery aneurysm exposure through the microsurgical dissection in the vagoaccessory triangle (VAT). However, the extended retrosigmoid craniotomy and dissection through the glossopharyngeal-cochlear triangle (GCT) may be more appropriate when the patient has an aneurysm arising from a high-riding vertebral artery (VA)-PICA origin.

Midline approaches are safe, familiar, and more reasonable, especially for distal PICA aneurysms. Neurovascular conflicts, proximal perforators, and eloquent areas influence dissection and clipping techniques. Options include direct clipping, clipping with wrapping, wrapping, resection, proximal occlusion or trapping with revascularization, and distal occlusion [4].

In aneurysms that cannot be clipped, sacrifice of the PICA without revascularisation procedures in proximally located PICA aneurysms may still be feasible if the occlusion is done distal to the

perforators [5].

Far lateral approach

Although for anterior medullary segment, far lateral approach provides the best exposure to the cerebellomedullary fissure, the recent trend has been on a tailored approach. Seoane et al [6] reported a surgical series using the far-lateral approach to PICA aneurysms without condylar resection. Rodríguez-Hernández and Lawton described the vagoaccessory triangle that is bordered medially by the medulla, laterally by the spinal accessory nerve (CN XI), and superiorly by the vagus nerve (CN X), as an anatomical corridor to reach the PICA aneurysms. [7] As for distal PICA aneurysms, midline approach is, without doubt, sufficient. In the series, of Deora et al. [8]. they used the far lateral approach with condylar resection only in 25% (5/20) of the cases, with the majority (⅘) being anterior medullary or VA–PICA junction cases with acceptable complication rates. Other improvised techniques have been described such as the lateral suboccipital approach, the lateral suboccipital transcondylar approach, removal of the posterior condyle, C1 lateral mass, and/or the jugular tubercle, all of which help in widening the surgical corridor. [9] Proximal control of VA can be secured by the far-lateral approach and dissection of the arachnoid caudal to the IX and X CNs, avoiding the resection of the posterior lip of the foramen magnum (opisthion) [10].

Other more complex skull-base approaches have also been described, such as presigmoid retrolabyrinthine approach and transsigmoid approach. A modified far lateral approach, which has been the approach most frequently used by Ng Hua Bak Ivan in dealing with PICA aneurysms, is described in https://link.springer.com/chapter/10.1007/978-981-10-8950-3_19#Sec3

Videos

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Peitz et al. presented a case of a 41-yr-old woman with hypertension presenting with left occipital pain and left-side hearing loss and past facial spasm and pain. Computed tomography angiography and digital subtraction angiography demonstrated an unruptured 8.4 × 9.0 × 10.2 mm saccular aneurysm at the left VA-PICA junction. Surgical clipping was chosen over endovascular therapy given the relationship of the PICA origin to the aneurysm neck as well as the history of cranial neuropathy. It was noted that the VA-PICA junction and aneurysm were high-riding at the level of the internal auditory canal. An eRS craniotomy was performed with dissection through the GCT, and the aneurysm was clipped as shown in the accompanying 2-dimensional operative video. Postoperative angiography demonstrated complete occlusion of the aneurysm and patency of the left VA and PICA without stenosis, and the patient had a favorable postoperative course although her left-sided hearing remained diminished. The eRS craniotomy allowed direct exposure via the GCT for clipping of the high-riding VA-PICA junction aneurysm and decompression of the cranial nerves. The traditional FL

craniotomy and exposure through the VAT would likely have resulted in a less desirable inferior trajectory. [11].

Occipital artery to posterior inferior cerebellar artery bypass for posterior inferior cerebellar artery aneurysm treatment

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