Pterional approach

The history of neurosurgery is filled with descriptions of brave surgeons performing surgery against great odds in an attempt to improve outcomes in their patients. In the distant past, most neurosurgical procedures were limited to trephination, and this was sometimes performed for unclear reasons. Beginning in the Renaissance and accelerating through the middle and late 19th century, a greater understanding of cerebral localization, antisepsis, anesthesia, and hemostasis led to an era of great expansion in neurosurgical approaches and techniques. During this process, frontotemporal approaches were also developed and refined over time. Progress often depended on the technical advances of scientists coupled with the innovative ideas and courage of pioneering surgeons. A better understanding of this history provides insight into where we originated as a specialty and in what directions we may go in the future. This review considers the historical events enabling the development of neurosurgery as a specialty, and how this relates to the development of frontotemporal approaches 1).

The frontotemporal, so-called pterional, approach has evolved with the contribution of many neurosurgeons over the past century. It has stood the test of time and has been the most commonly used transcranial approach in neurosurgery. In its current form, drilling the sphenoid wing as far down as the superior orbital fissure with or without the removal of the anterior clinoid process, thinning the orbital roof, and opening the Sylvian fissure and basal cisterns are the hallmarks of this approach.

Interfascial dissection

see Interfascial dissection.

Pterional craniotomy

see Pterional craniotomy.

Indications

Aneurysms

The pterional approach to aneurysms of the circle of Willis is one of the most common approaches in vascular neurosurgery 2) 3) 4).

The aim of the pterional approach is to use a naturally occurring plane, through the sylvian fissure (SF), to approach an aneurysm without extensive brain retraction 5).

see Pterional approach for anterior communicating artery aneurysm

Tumoral lesions

Places optic nerve and sometimes carotid artery in line of vision of tumor. There is also incomplete access to intrasellar contents. Good access for tumors with significant lateral extrasellar extension.

Involving the sellar/parasellar region, anterior and anterolateral circle of Willis, middle cerebral artery, anterior brainstem, upper basilar artery, insula, basal ganglia, mesial temporal region, anterior cranial fossa, orbit, and optic nerve are within the reach of the frontotemporal approach 6).

Olfactory groove meningioma 7).
Cavernous sinus meningioma

Meckel Cave

Traditionally, a pterional approach is utilized to access the Meckel cave. Depending on the tumor location, extradural dissection of the Gasserian ganglion can be performed. An endoscopic endonasal access could potentially avoid a craniotomy in these cases.

Cavernous sinus hemangiomas (CSH)

The microsurgery through modified pterional approach combined with fronto-temporal preauricular subtemporal approach is an effective procedure for CSH.

Variants

Orbital Rim (ORo) Zygomatic Arch (ZAo) and Orbito-Zygomatic (OZo) osteotomies can be useful adjuncts to the classical Fronto-Pteriono-Temporal craniotomy in facilitating the exposure of deep seated skull base lesions, sparing brain retraction injuries.

There are different variants of the pterional approach described, such as the orbito-cranial approach as an extended and the sphenoid ridge keyhole approach as a less invasive approach.

Gupta et al., report the experience with cranial fixation plate removal because of pain and protrusion in patients who underwent craniotomy without orbitozygomatic osteotomy, particularly frontotemporal craniotomy. In an attempt to reduce this complication, they recently stopped placing a full-size burr hole in the keyhole area of a frontotemporal craniotomy, eliminating the need for a titanium burr hole cover plate.


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