Endoscopic endonasal transpterygoid approach

The endoscopic endonasal transpterygoid approach has been used to gain exposure for a variety of skull base lesions. This approach was first used as an alternative to transfacial or sublabial approaches to access benign tumors in the pterygopalatine fossa (PPF) [1].

This procedure allow access to lesions in the infratemporal fossa, Meckel cave, petrous apex, and lateral sphenoid sinus.

Accessing the lateral sphenoid sinus and its recess may be necessary in the management of sinonasal tumors (both benign and malignant) as well as in the repair of spontaneous or congenital meningoencephaloceles from this region.

The primary advantage of the endoscopic endonasal transpterygoid approach is its ability to offer maximal exposure and panoramic visualization of encephaloceles in the far-lateral recesses of the sphenoid sinus without the risk of complications associated with brain retraction or facial osteotomies.

Surgical access to the PPF is difficult because of its protected position and its complex neurovascular anatomy. Endonasal approaches using rod lens endoscopes, however, provide better visualization of this area and are associated with less morbidity than external approaches.

Complete or partial removal of the pterygoid process provides lateral extension of the endonasal corridor necessary to approach the Meckel's cave, infrapetrous skull base, and medial infratemporal fossa.

Endoscopic endonasal transpterygoid approaches (EETA) use the pneumatization of the sinonasal corridor to control lesions of the middle and posterior skull base. These surgical areas are complex and the required surgical corridors are difficult to predict.

Eight endoscopic transpterygoid approaches were performed in fresh cadaveric specimens. In all dissections the vidian nerve and the periosteal sac enclosing the pterygopalatine fossa were preserved.

Pinheiro-Neto et al. transposed the pterygopalatine fossa to approach the Meckel cave, infrapetrous skull base, and medial infratemporal region, preserving the neurovascular structures inside the pterygopalatine fossa in all specimens.

The transposition of the pterygopalatine fossa neurovascular structures for endoscopic endonasal approaches to the skull base is an alternative technique that is both feasible and desirable. The transposition requires no additional technical skills but requires comprehensive knowledge of its anatomy. The anatomical preservation of the neurovascular structures is potentially beneficial to the quality of life of patients. Clinical studies are necessary to prove the real benefits of this technique [2].

An anatomical study from reviewed images from high-resolution maxillofacial CT scans with (0.6-mm

axial slice acquisition). Cephalometric measurements were obtained using Kodak Carestream Image Software (Rochester, NY).

Average distance from midline to the vidian canal was 12.78 mm (range 9.4-15.8 mm). Average horizontal distance from the vidian canal to the foramen rotundum was 5.6 mm (range 2.8-11.5 mm). Average vertical distance from the vidian canal to the foramen rotundum was 6.22 mm (range 4.3-9.3 mm). These landmarks are consequential during the preoperative planning of the surgical corridor. To facilitate communication, we classified EETAs as: A) Partial removal of the pterygoid plates (transposition of temporo-parietal fascia); B) removal of anteromedial aspect of the pterygoid process (lesions involving the lateral recess of the sphenoid sinus); C) involves dissecting the vidian nerve to control the petrous ICA and removing the pterygoid plates base to reach the petrous apex, Meckel's cave, or cavernous sinus; D) variable removal of the pterygoid plates to access the infratemporal fossa; and E) removal of pterygoid process and medial third of the Eustachian tube to expose the nasopharynx.

The novel classification and landmarks system helps to understand the anatomy of this complex area and to accurately plan the EETA [3)].

Fortes et al dissected six PPF in three cadaveric specimens prepared with intravascular injection of colored material using two different injection techniques. An endoscopic endonasal approach, including a wide nasoantral window and removal of the posterior antrum wall, provided access to the PPF.

They produced the best anatomical model injecting colored silicone via the common carotid artery. They found that, using an endoscopic approach, a retrograde dissection of the sphenopalatine artery helped to identify the internal maxillary artery (IMA) and its branches. Neural structures were identified deeper to the vascular elements. Notable anatomical landmarks for the endoscopic surgeon are the vidian nerve and its canal that leads to the petrous portion of the internal carotid artery (ICA), and the foramen rotundum, and V2 that leads to Meckel's cave in the middle cranial fossa. These two nerves, vidian and V2, are separated by a pyramidal shaped bone and its apex marks the ICA.

This anatomical model provides the means to learn the endoscopic anatomy of the PPF and may be used for the simulation of surgical techniques. An endoscopic endonasal approach provides adequate exposure to all anatomical structures within the PPF.

These structures may be used as landmarks to identify and control deeper neurovascular structures. The significance is that an anatomical model facilitates learning the surgical anatomy and the acquisition of surgical skills. A dissection superficial to the vascular structures preserves the neural elements. These nerves and their bony foramina, such as the vidian nerve and V2, are critical anatomical landmarks to identify and control the ICA at the skull base [4)].

In a report Schmidt et al, review the endoscopic endonasal transpterygoid approach to the lateral recess of the sphenoidal sinus for repair of temporal lobe encephaloceles, including an overview of the surgical anatomy from an endoscopic perspective, and describe the technical operative nuances and surgical pearls for these cases. The authors also present 4 new cases of lateral sphenoid recess encephaloceles that were successfully treated using this approach [5)].

1)

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5)
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