



Endoscopic Transorbital Extradural Anterior Clinoidectomy: Technical Nuance Using the Superior Orbital Fissure as a Surgical Corridor

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Introduction

The extradural anterior clinoidectomy technique, originally proposed by Dolenc, has been widely adopted in transcranial skull base surgery to improve exposure of central skull base structures, including the optic nerve (ON) and internal carotid artery, for the removal of parasellar and pericarotid lesions. More recently, the endoscopic transorbital approach (ETOA) has gained popularity for lesions of the middle fossa, anterior fossa, and even selected posterior fossa pathologies. As its indications expand, performing an anterior clinoidectomy through this corridor has become increasingly common. However, the anatomy may appear confusing for neurosurgeons, given the markedly different perspective compared to traditional transcranial approaches.

In this report, we propose a **technical nuance of the anterior clinoidectomy through ETOA**, building upon previously described methods for transcranial, to achieve safer exposure of the anterior clinoid process (ACP) by approaching it from lateral to medial.

Methods

The study was conducted in the Surgical Neuroanatomy Laboratory, University of Pittsburgh Medical Center. Two colored silicone-injected cadaveric heads were dissected using a classic endoscopic transorbital approach (ETOA) through a superior trans-eyelid incision to expose the ACP. Endoscopic visualization was achieved with a Hopkins II rigid endoscope (0° and 30°, 45°, Karl Storz, Tuttlingen, Germany) connected to a high-definition camera system (Karl Storz). Bone removal was performed using a high-speed drill (Stryker).

Results

An extradural anterior clinoidectomy was successfully performed step-by-step using the ETOA.

1- Removal of the lateral orbital rim provided a wider working corridor and reduced retraction of the ocular globe.

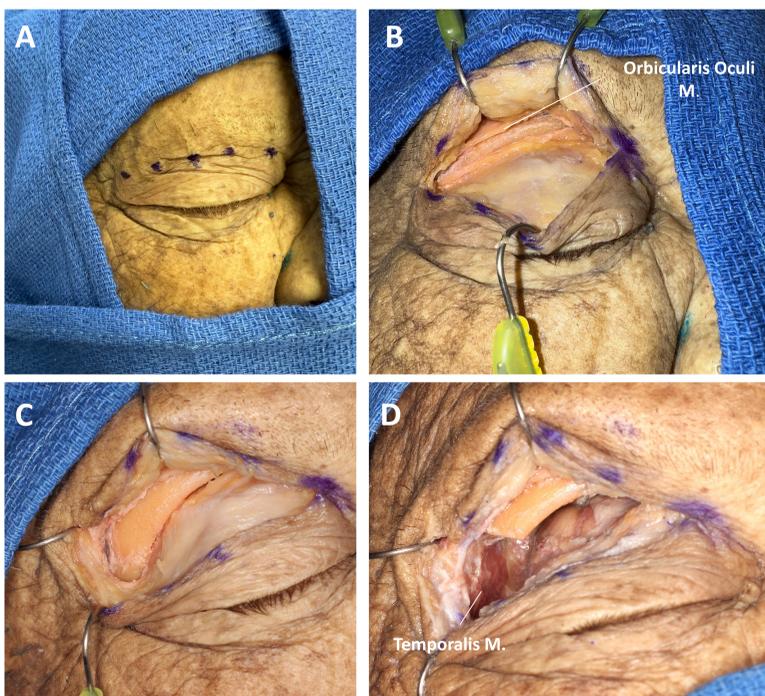


Figure 1. Initial steps illustrating the eyelid incision and removal of the lateral orbital rim (right side)

2- The frontotemporal dura was exposed by sequential drilling of the greater sphenoid wing, the lateral aspect of the frontal base, and subsequently the lesser sphenoid wing. The lateral aspect of the superior orbital fissure (SOF) was then identified, allowing continued drilling in a lateral-to-medial direction to expose the sagittal crest and achieve complete exposure of the temporal dura down to the middle fossa floor.

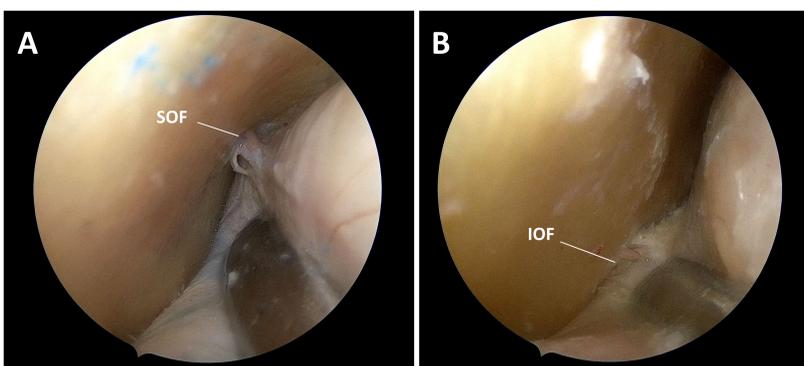


Figure 2. Initial landmarks : lateral aspect of the SOF and inferior orbital fissure (IOF) below (right side)

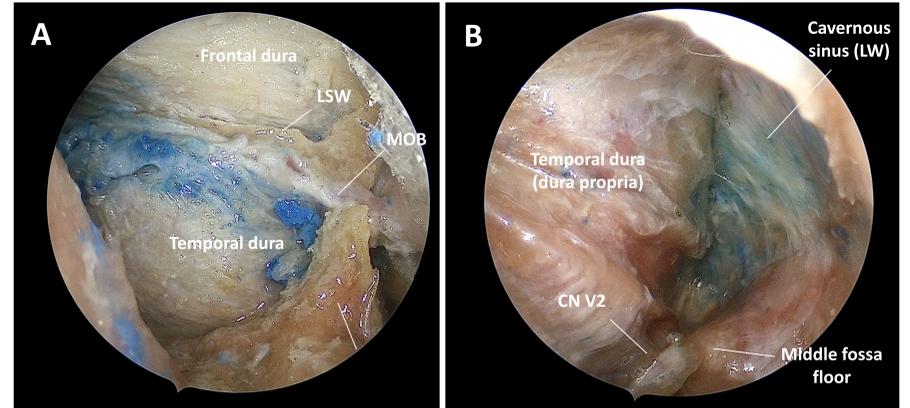


Figure 3. Sagittal crest and peeling of the lateral wall of the cavernous sinus at the level of the SOF (right side)

3- The next step consisted of removing the sagittal crest. Before sectioning the meningo-orbital band (MOB) to expose the ACP, we first peeled the lateral wall of the cavernous sinus starting at the level of the SOF, superomedial to V2, which revealed the inferior and lateral surfaces of the ACP. The MOB was then carefully sectioned along the inferior aspect of the ACP, allowing complete extradural exposure of the ACP up to its tip, with good control of the cranial nerves within the lateral wall of the cavernous sinus.

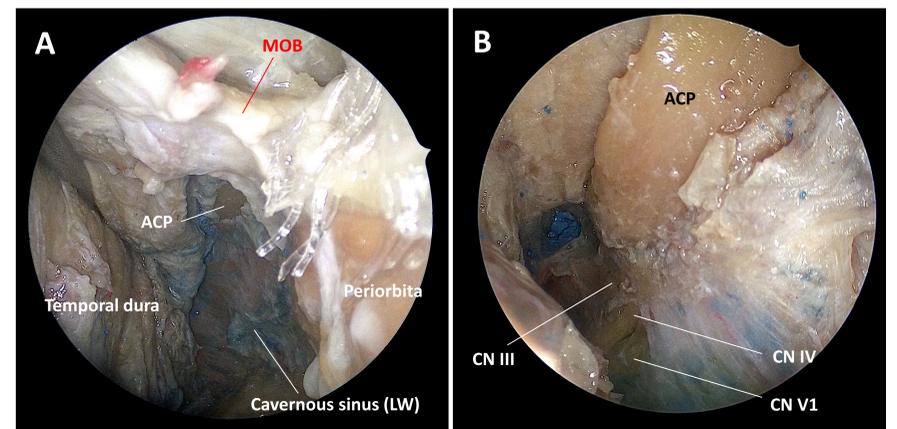


Figure 4. Cutting of the MOB after exposing the lateral wall of the cavernous sinus and the inferior aspect of the ACP (right side)

4- The anterior end of the optic canal (OC) was subsequently exposed to confirm its trajectory. The ACP was then drilled using an eggshell technique, progressively thinning the bone until unroofing the OC under direct control of the cranial nerves. Finally, the ACP was gently fractured at the optic strut, completing the extradural anterior clinoidectomy.

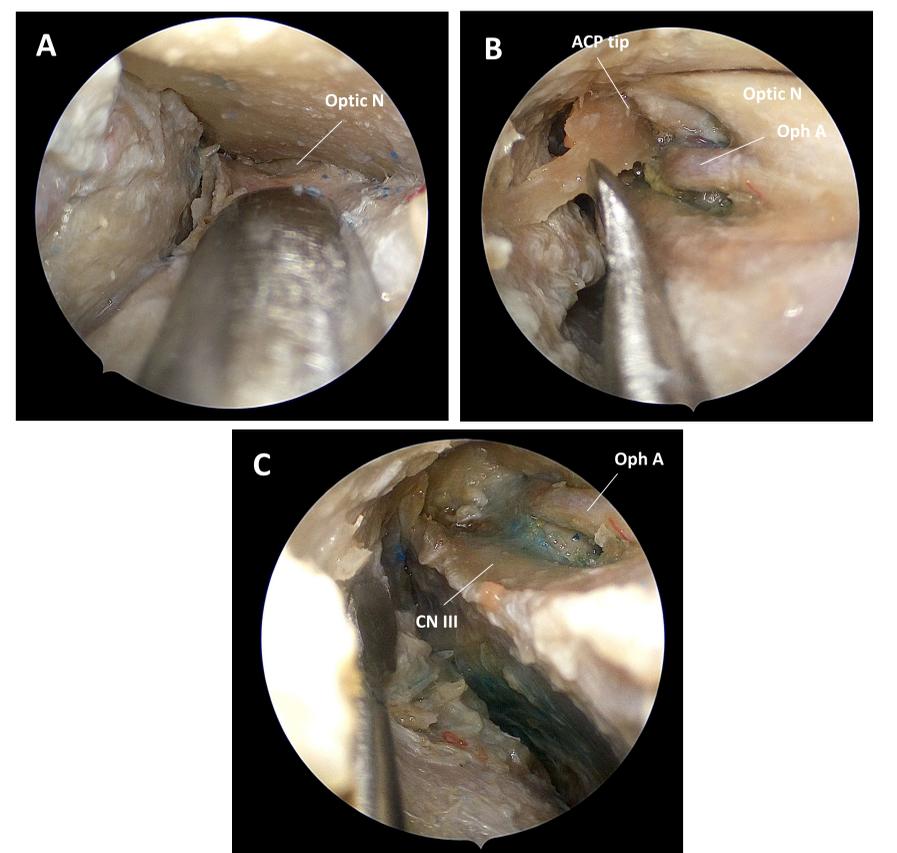


Figure 5. Extradural anterior clinoidectomy using the eggshell technique (right side)

Conclusions

The ETOA provides a feasible and effective corridor for performing an extradural anterior clinoidectomy. After removal of the sagittal crest, adopting a lateral-to-medial trajectory, by first peeling the lateral wall of the cavernous sinus starting at the level of the SOF before sectioning the MOB, offers a safer and more controlled exposure of the ACP.