Transorbital Transcavernous Approach: Key Steps and Anatomical Landmarks

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Abstract

The trans-orbital corridor is an unconventional selection for skull base/cavernous sinus pathologies. Here we deliver a key step-by-step dissection of specific surgical targets to formulate an unrestricted corridor and offer reasonable maneuverability for the gulfuer region of the cavernous sinus.,

Introduction

In this original study we provide a three stepwise-surgical phases that allows realistic visual validation and maneuverability for all selected all (n=168) surgical/anatomical targets.

Methods and Materials

Twelve sides of 6 colored-injected embalmed heads, were examined to study the key surgical steps to the gulfer region of the cavernous sinus via a modified microscopic eyebrow transorbital approach. Anatomical targets (n= 14) were elected to identify the degree of adequate exposure, accessibility, and maneuverability. The data were collected and analyzed.

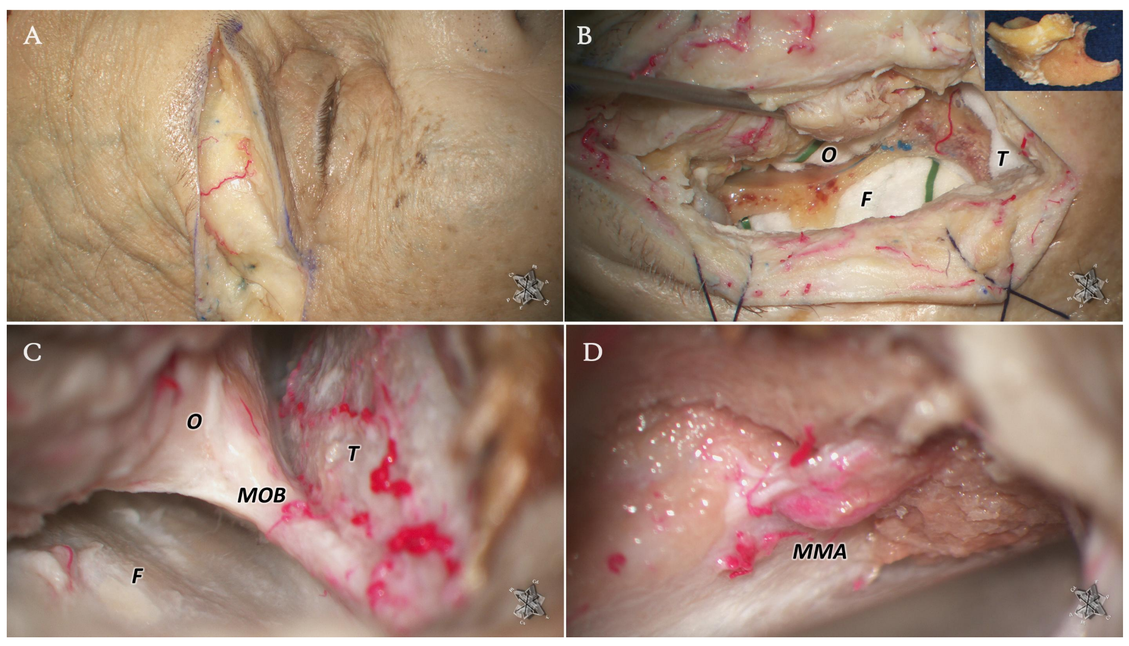

Figure 1. Surgical phase 1: exposure. O: orbit, F: frontal lobe, T: temporal lobe, MOB: meningiorobital band, MMA: middle meningeal artery.

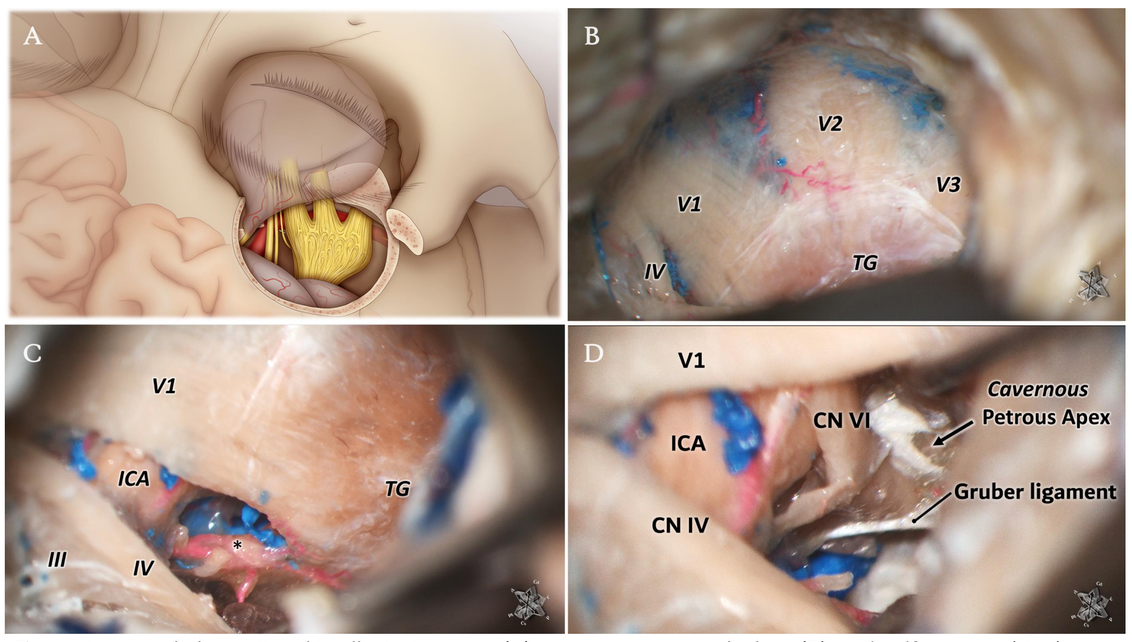

Figure 2. Surgical phases 2 and 3 : illustrative view (A), cavernous sinus unlocking (B), and gulfer region (C, D).

Chart 1. Surgical phase 3: gulfer region dissection.

Results

The three stepwise-surgical phases (exposure/cavernous sinus unlocking/gulfer region dissection) allowing reasonable visual validation and maneuverability for all (n=168 (14 x 6 heads x 2 sides)) targets (subfrontal lobe, temporal pole, meningio-orbital band, middle meningeal artery, orbital apex, anterior clinoid process, optic nerve, oculomotor nerves, trochlear nerve, trigeminal nerve/ganglion, cavernous carotid artery/meningio-hypophyseal trunk, abducent nerve, Gruber's ligament, and petrous apex) (chart 1 and table 1). . Besides, a step-by-step identification of key surgical landmarks defeats the tunnel-like corridor to the deepest targets, offers adequate maneuverability, and provides a precise landing at the gulfuer region of the cavernous sinus (Fig. 1-2). This extradural approach could be combined with intradural exposure to control extended tumors. The current limit for this approach is the beyond Meckle's Cave "trigeminal ganglion" opening (=inadequate microscopic visualization/maneuverability within the posterior fossa).

	Target	Sides (n=12)		heads (n=6)
		Rt	Lt	
	Phase 1 (exposure)			
1	subfrontal lobe	+	+	+
2	temporal pole	+	+	+
3	meningio-orbital band	+	+	+
4	middle meningeal artery	+	+	+
5	orbital apex	+	+	+
6	anterior clinoid process	+	+	+
7	optic nerve	+	+	+
	Phase 2 (cavernous sinus unlocking)			
8	oculomotor nerve	+	+	+
9	trochlear nerve	+	+	+
10	trigeminal nerve/ganglion	+	+	+
	Phase 3 (gulfer region dissection)			
11	cavernous carotid artery/meningio-hypophyseal trunk	+	+	+
12	abducent nerve	+	+	+
13	Gruber's ligament	+	+	+
14	petrous apex	+	+	+
Total				168

Table 1. Visual validation and maneuverability for surgical/anatomical targets.

Discussion

A trans-orbital corridor (1,2) is an alternative option for selected skull base/cavernous sinus pathologies, particularly when standard approaches are limited (ex. ipsilateral previous extracranial-intracranial vascular anastomosis for compromised internal carotid artery by the tumor). For those cases, a reasonable alternative approach is an indispensable prerequisite.

Conclusions

To ensure fruitful microscopic trans-orbital trans-cavernous surgery, our three stepwise surgical phases could be considered as a guide for surgeons. The key step-by-step dissection of specific surgical targets prepares an unrestricted corridor and provides reasonable maneuverability for the gulfuer region of the cavernous sinus.

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