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Background:

The Cavernous sinus (CS) is an anatomically complex region of the skull base and is frequently involved in various pathologies. Achieving complete resection and durable biochemical remission can be limited by occult medial wall invasion. Advances in endoscopic endonasal surgery and refined anatomic understanding have expanded safe access to the parasellar space. We describe our concept of a “carotid retractor,” a technique of skeletonization of the cavernous and clinoidal internal carotid artery (ICA) to allow dynamic ICA mobilization, enhancing visualization, medial-to-lateral or direct access, while minimizing blind maneuvers and pituitary manipulation. We also share our observation of medial wall incompetency within the CS.

Methods/Illustrative cases:

Three patients with hormonally active pituitary adenomas and radiographic evidence of CS invasion/involvement underwent expanded endoscopic endonasal approaches with bilateral sphenoidotomy and wide parasellar exposure. After confirming ICA location with doppler and navigation, the cavernous and clinoidal ICA were skeletonized, freeing the ICA from some of its limiting structures and thereby enhances the degree of surgical maneuverability/controlled dynamic ICA retraction. Tumor removal was performed using a two-suction technique, with one suction providing controlled, dynamic ICA retraction.

Results:

All patients achieved gross-total resection, with postoperative biochemical remission in all but one case. In each case, a distinct medial wall defect was visualized over the medial wall of the CS, superior compartment, supporting the concept of medial wall incompetency as a route of tumor extension.

Conclusion:

Dynamic ICA retraction following cavernous and clinoidal ICA skeletonization (the “carotid retractor”) provides, well-visualized medial-to-lateral or direct corridor to the medial wall of the CS. This technique facilitates bimanual tumor dissection, may reduce risk of ICA injury by reducing the need for non-visualized “blind” or uncertain maneuvers, and obviates the need for direct manipulation or retraction on the pituitary gland. The medial CS wall incompetency may serve as route to access lesions with invasion into the CS.

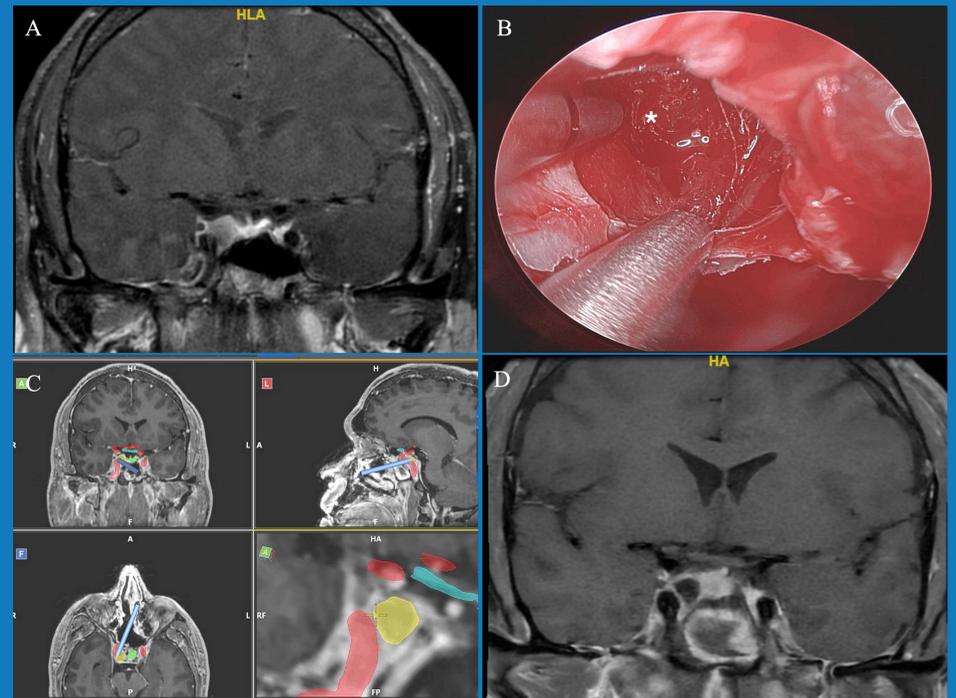


Figure 1. (A) Preoperative T1- weighted MRI with gadolinium demonstrating residual tumor involving the right cavernous sinus. (B, C) Following tumor removal, the medial cavernous sinus wall incompetency/defect become evident *, located superior to the horizontal cavernous ICA and posterior to the anterior genu, leading into the superior compartment of the cavernous sinus. (D) Coronal T1-weighted MRI with gadolinium confirming complete tumor removal.

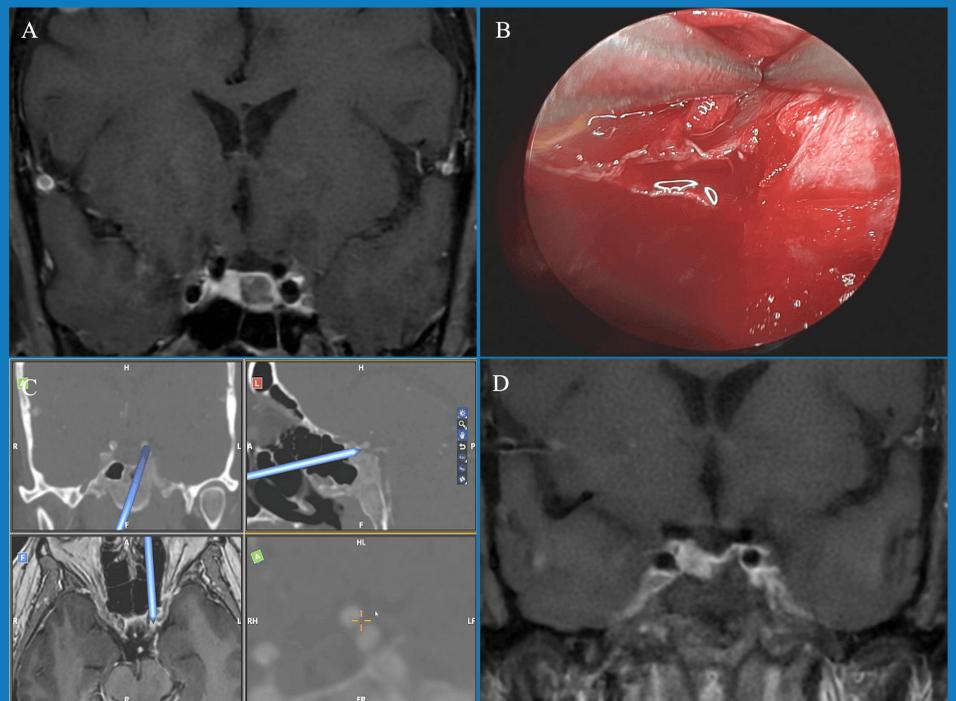


Figure 2. (A) Coronal T1-weighted MRI with gadolinium demonstrating a pituitary tumor adjacent to the left cavernous sinus. (B, C) The tumor was removed using the two-suction technique, with one suction providing a dynamic retraction of the ICA. The medial cavernous sinus wall incompetency/defect can be seen during the removal of the lateral portion of the tumor. (D) Coronal T1-weighted MRI with gadolinium confirming complete tumor removal.

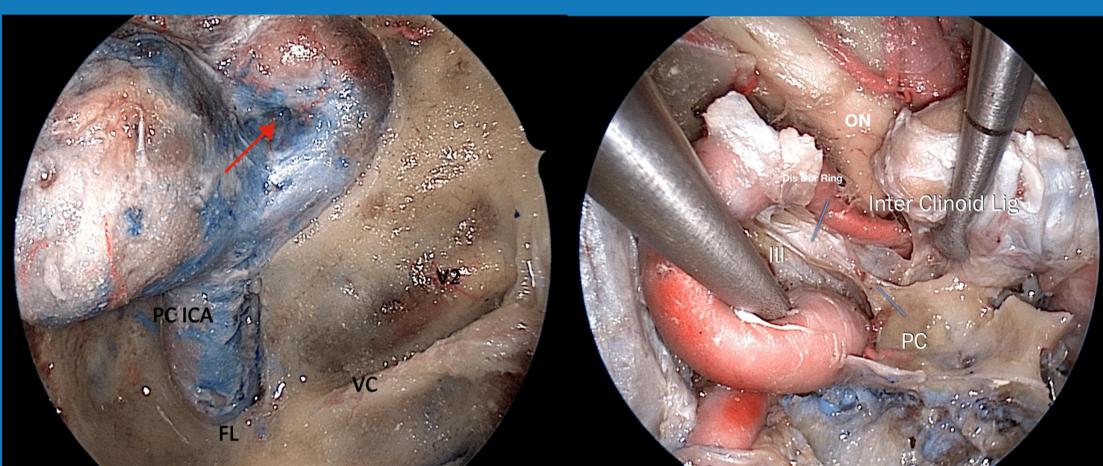


Figure 3. Cadaveric dissection illustrating a medial wall incompetency of the cavernous sinus