“Choose Your Own Adventure!": Endoscopic Trans-Cavernous and Trans-Pterygoid Approach for Recurrent GH-Secreting Pituitary Adenoma with Skull Base Reconstruction

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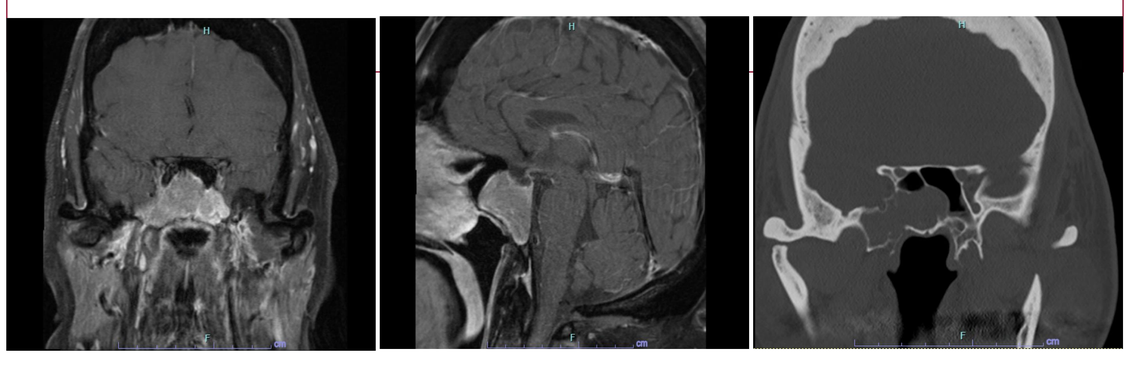
Pre-Operative Imaging



Introduction

Invasive growth hormone–secreting pituitary adenomas with cavernous sinus and skull base extension represent a significant surgical challenge. Tumor invasion of the parasellar region, clivus, and cavernous sinus increases the complexity of safe resection while preserving neurovascular structures.

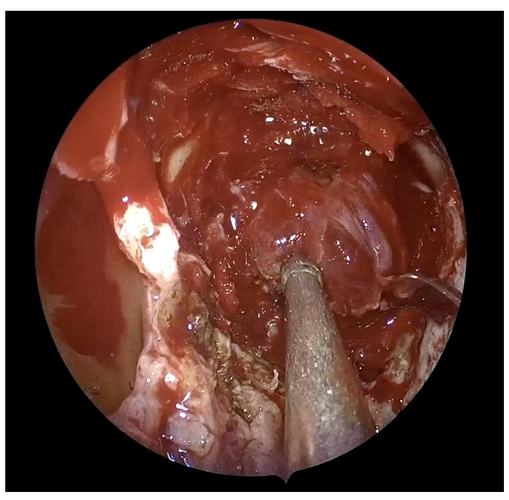
Endoscopic craniofacial approaches allow expanded access to the cavernous sinus and parasellar region. In cases requiring staged or revision surgery, reuse of a previously harvested nasoseptal flap offers a reliable reconstructive strategy while minimizing additional donor-site morbidity.

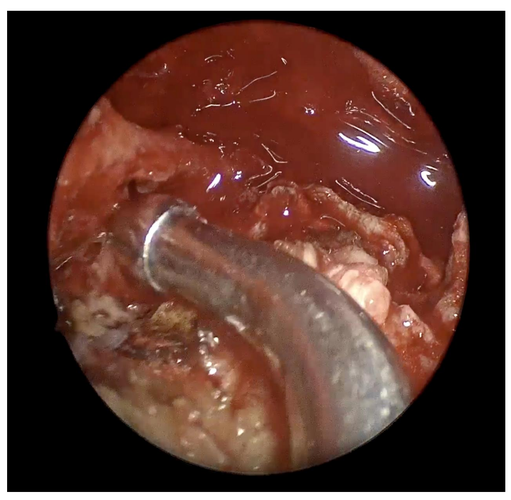
Methods and Materials

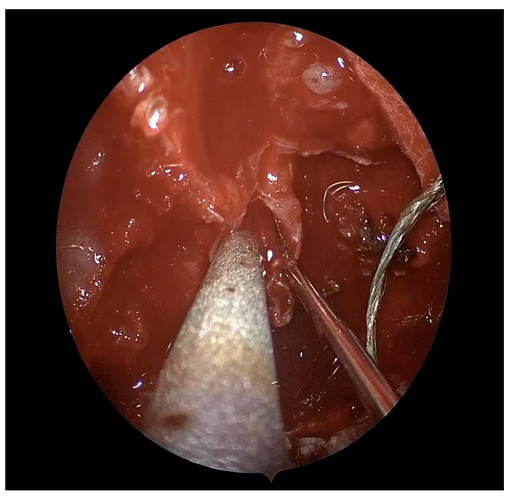
A 62-year-old female presented with progressive enlargement of her hands and feet. Endocrine evaluation revealed markedly elevated growth hormone (GH) at 84 ng/mL and insulin-like growth factor-1 (IGF-1) at 927 ng/mL, consistent with acromegaly. Magnetic resonance imaging demonstrated a large, invasive pituitary macroadenoma with extensive extrasellar extension.

Imaging revealed significant bilateral cavernous sinus involvement, more pronounced on the right, with extension into the parasellar region, petroclival fissure, clivus, and anterior cranial fossa, as well as posterior extension toward the right middle cranial fossa. There was substantial sphenoid sinus involvement secondary to osseous erosion of the sella, with tumor filling the sphenoid sinus and extending into the right lateral sphenoid recess. The mass demonstrated involvement of the cavernous and petrous segments of the internal carotid artery, necessitating careful surgical planning to preserve critical neurovascular structures.

Given the extent of skull base invasion and persistent endocrine hypersecretion, the patient was offered an expanded endoscopic craniofacial approach for maximal safe resection.







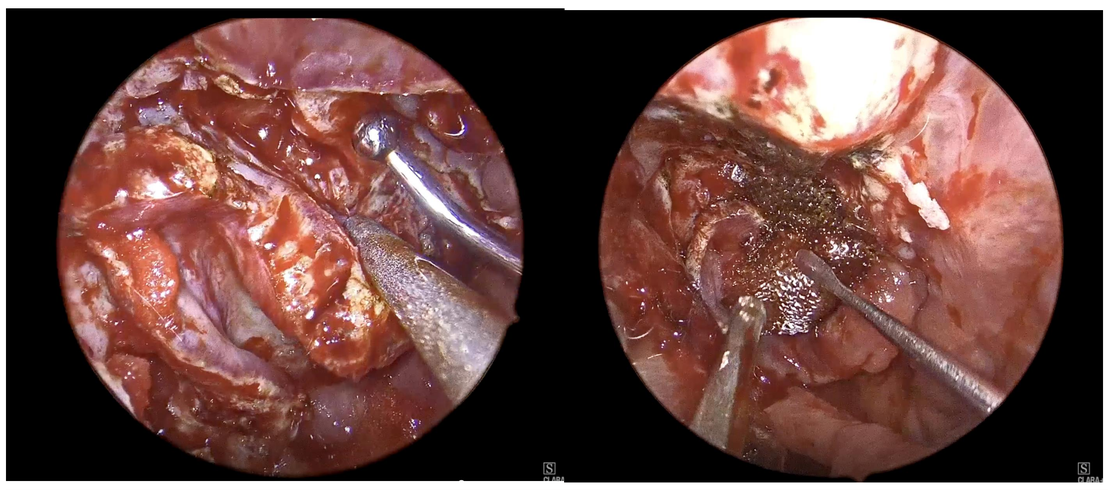
1. After wide access is obtained, tumor is seen filling the sphenoid sinus
2. Preservation of the vidian nerve during clearance of disease within the lateral sphenoid recess
3. Anteromedial approach to the cavernous sinus for clearance of tumor within the sinus

Post-Operative Course & Revision

Postoperative imaging following the initial surgery demonstrated gross total resection of the sellar and parasellar tumor with preservation of the bilateral internal carotid arteries and decompression of the optic apparatus. The patient recovered without neurologic deficit, and no cerebrospinal fluid leak was observed. Despite an excellent radiographic result, follow-up endocrine evaluation revealed persistently elevated growth hormone and IGF-1 levels. Subsequent MRI demonstrated a small focus of residual disease within the right parasellar region extending into the superior compartment of the cavernous sinus.

Given the biochemical persistence of acromegaly and radiographic evidence of residual tumor, the patient underwent revision endoscopic surgery. Intraoperatively, the previously harvested left-based nasoseptal flap was carefully elevated from the skull base defect using blunt dissection while preserving its vascular pedicle. The dura over the sellar face was reopened, and residual tumor was identified within the right cavernous sinus. Targeted resection was performed with meticulous dissection around the cavernous carotid artery.

Reconstruction was achieved using a multilayer technique consisting of DuraGen inlay and underlay grafting followed by repositioning of the previously harvested nasoseptal flap. Postoperative MRI demonstrated no evidence of residual tumor. The patient had no postoperative CSF leak, confirming successful reconstruction with flap reuse.



Reuse of the Nasoseptal Flap

Reuse of a previously harvested pedicled nasoseptal flap (NSF) is a reliable reconstructive option in revision and staged endoscopic skull base surgery. The technique involves careful elevation of the existing flap while preserving its vascular pedicle, allowing repositioning over recurrent or newly created skull base defects without harvesting additional vascularized tissue.

Clinical series demonstrate high success rates. In one report of 28 consecutive cases, there were no flap losses, and 95% of patients with intraoperative cerebrospinal fluid (CSF) leaks achieved successful reconstruction without postoperative leakage. More recent data report a 100% CSF leak prevention rate when reused NSFs were employed alone or with inlay grafts, with mean re-mucosalization occurring at approximately 61 days.

An alternative strategy involves repositioning unused NSFs to their native septal location at the index surgery to preserve them for future revision procedures, minimizing donor-site morbidity while maintaining reconstructive options. NSF reuse provides durable multilayer closure in complex parasellar and cavernous sinus surgery while avoiding additional flap harvest.

Conclusions

This case demonstrates successful endoscopic craniofacial resection of a giant invasive growth hormone–secreting pituitary adenoma with bilateral cavernous sinus and parasellar extension. In the setting of revision surgery, reuse of a previously NSF provides durable multilayer reconstruction while avoiding additional donor-site morbidity.

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Surgical Video (Scan)

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