Endoscopic Resection of Pterygopalatine Fossa and Infratemporal Fossa Malignancies

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KEYWORDS

• Pterygopalatine fossa • Infratemporal fossa • Sinonasal malignancy • Endoscopic • Skull base

KEY POINTS

- The surgical approach should be sufficiently wide to allow the limits of dissection to be visualized and accessed easily with a 0° endoscope and straight instruments.
- Following fixed anatomic landmarks and finding normal boundaries are 2 principles that ensure safe surgery and complete resection in distorted anatomy.
- Rather than avoiding the internal carotid artery for fear of causing injury, it should be sought out and identified to ensure its safety and guide surgery.
- The junction of the vidian nerve and cartilaginous eustachian tube lies just anterior to the anterior genu of the petrous internal carotid artery and is an excellent surgical guide.
- The most common postoperative comorbidities are ipsilateral palate numbness, eustachian tube dysfunction (rather than effusion), and trismus.

INTRODUCTION

The pterygopalatine fossa (PPF) and infratemporal fossa (ITF) house complex and densely packed neurovascular anatomy. Surgery in this area is made possible by improved anatomic understanding of the complex ventral skull base anatomy, advances in endoscopic instrumentation, and improved ventral skull base reconstruction strategies.

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The transition from traditional craniofacial to endoscopic resections of sinonasal and ventral skull base malignancies initially brought on concerns about the appropriateness of the procedure. There was speculation that the lack of en bloc tumor resection in an endoscopic approach may compromise oncologic results. However, many clinicians are of the opinion that an en bloc resection of tumors in locations such as the skull base is rarely possible regardless of the approach used. The goal is always complete resection with negative margins regardless of technique. The endoscopic approach offers several additional advantages, including a shorter operation time, less morbidity, and a shorter hospital stay.[1,2] In addition, complication rates have been shown to be lower[3] and the reduction of quality of life likely less than in open resections.[4]

PREOPERATIVE PLANNING

If a portion of the tumor is accessible in the nasal or paranasal cavity, a tissue biopsy can be taken either in the office or in the operating room to gain further information as to the origin of the disorder for the purposes of treatment planning. A lesion extending anterior to the head of the middle turbinate that is without the clear appearance of a vascular neoplasm can safely be biopsied in a clinic setting. A bleeding tumor edge in the anterior nasal cavity can readily be managed with topical vasoconstriction and bipolar electrocautery with minimal discomfort to the patient. A problem posterior to this becomes more cumbersome and difficult for the patient to tolerate. However, tumors in the PPF or ITF often cannot be reached for biopsy without a surgical approach identical to that used for the endoscopic resection. In this scenario, imaging characteristics, location, involved structures, and tumor behavior are used to determine the most likely disorder, on which surgical planning is based. It is important also to prepare for any alterations to the plan that could occur if intraoperative diagnosis is different than expected. A metastatic work-up should also be completed before proceeding to the operating theater with either combined computed tomography (CT) and MRI or fluorodeoxyglucose PET.

Preoperative CT imaging for lesions of the PPF and ITF is useful to assess the surrounding bony anatomy, expansion versus erosion of the involved bone, and widening of adjacent foramina. T1 postcontrast MRI with fat suppression removes the fat signal of the ITF and the marrow of the bone of the skull base, and is vital for evaluating tumor margins, surrounding soft tissue detail, any tumor extension into the orbit, or involvement of adjacent nerves or dura. V2 should be followed from the roof of the maxillary sinus through the foramen rotundum, and V3 through the foramen ovale. Perineural spread associated with the vidian nerve is common, so it should be considered preoperatively as well. Particular attention should also be paid to perineural involvement in the cavernous sinus and the descending palatine nerve, because either of these could alter management. Involvement of the descending palatine nerve may indicate a need for some degree of hard palate resection. Any tumor extension through the inferior orbital fissure or intracranially must be noted as well. Direct extension through the middle cranial fossa will be apparent, so it is subtler dural enhancement, particularly adjacent to foramina, that is important to detect. Research has shown that 1 mm and greater than or equal to 2 mm of dural thickening correlate with a positive predictive value of dural invasion of 46.7% and 100%, respectively.[5] Tumor positioned laterally to the internal carotid artery (ICA) at its carotid foramen precludes a strictly endoscopic approach. An open approach, whether combined, staged, or on its own, is required to access this area. A checklist of important preoperative imaging evaluation steps is shown in **Box 1**.