

# Surgical Techniques for Sinonasal Malignancies



Alexander Farag, MD<sup>a</sup>, Marc Rosen, MD<sup>a,b</sup>, James Evans, MD<sup>a,b,\*</sup>

## KEYWORDS

- Sinonasal malignancies • Endoscopic resection • Minimally invasive • Craniofacial resection
- Endoscopic techniques

## KEY POINTS

- The first chance is the best chance at an oncological cure.
- Partial resection or debulking has decreased patient overall survival.
- Piecemeal resection by tumor disassembly seems to have the same 5-year overall survival as traditional open approaches, with a marked reduction in morbidity and mortality.
- If negative margins cannot be obtained via an endoscopic approach, the surgeon must be prepared to switch to the appropriate procedures.

Sinonasal malignancies often present late because initial symptoms mimic benign disease. As a result, surgical resection can be extensive and carry a high risk due to the involvement of critical anterior cranial base structures. Traditionally, these advanced tumors were resected via potentially disfiguring open procedures with high morbidity (25%–35%) and mortality.<sup>1</sup> The hallmark treatment is an open craniofacial resection (oCFR), first introduced by Ketcham in 1963.<sup>2</sup> With the implementation of better imaging and technology, skull base surgery, is shifting toward less invasive approaches. Endoscopic resections are gaining traction, with early evidence showing equal outcomes and marked reduction in morbidity. A paradigm shift away from en bloc resection to piecemeal resection, or tumor disassembly, was seen by some as a large obstacle in this transition from open to endoscopic surgery. Opponents speculate that oncological integrity would be compromised by piecemeal resections. McCutcheon and colleagues<sup>3</sup> demonstrated that patients who underwent a piecemeal oCFR were equivalent to patients who were treated with an en bloc oCFR. Proponents argue that resection of

tumors involving the anterior skull base performed via an oCFR are rarely true en bloc resections.<sup>4</sup> Other examples of effective piecemeal resection are transoral laser surgery and Mohs micrographic surgery, which yield acceptable results.<sup>5,6</sup> Similarly, use of the endoscopic endonasal tumor disassembly can provide the same measure of oncological treatment as en bloc resection, if negative margins are achieved.<sup>7</sup>

The endoscope is a tool that has eliminated line-of-sight issues previously encountered with open techniques while providing superior definition and contrast. The implementation of angled scopes has also allowed surgeons to minimize damage or removal of uninvolved structures, greatly decreasing the morbidity and complications of these techniques in select cases.<sup>8</sup> Minimally invasive endoscopic resections (MIERS) have also been noted to have shorter operative time and decreased hospital stays as compared with their open counterparts.<sup>9</sup> However, the team must have the expertise to convert to the appropriate open approach if the tumor cannot be resected endoscopically.

<sup>a</sup> Department of Otolaryngology – Head and Neck Surgery, Thomas Jefferson University, 925 Chestnut Street, 6th Floor, Philadelphia, PA 19107, USA; <sup>b</sup> Department of Neurosurgery, Thomas Jefferson University, 909 Walnut Street, 2nd Floor, Philadelphia, PA 19107, USA

\* Corresponding author.

E-mail address: [James.evans@jefferson.edu](mailto:James.evans@jefferson.edu)

## PRESENTATION

Presenting symptoms are most commonly unilateral nasal obstruction, epistaxis, or nasal mass. Patients also present with symptoms of headache, epiphora, visual disturbance, anosmia, and nasal discharge.<sup>10–12</sup> Unilateral symptoms are more common than bilateral symptoms.<sup>13</sup> Patients with advanced disease also present with paresthesias or other cranial neuropathies. These nonspecific symptoms make early diagnosis challenging as they can be attributed to other common diseases such as chronic rhinosinusitis or atypical headaches. Further complicating diagnosis, nasal endoscopy can reveal a range of findings from smooth pedunculated lesions to friable masses.

## WORKUP

When a suspicious lesion is seen on endoscopy, the primary goal should be to distinguish a benign from malignant process. In most instances, an office biopsy is performed. The lesion is injected with Lidocaine hydrochloride 1 % and Epinephrine 1:100,000. If little bleeding occurs with this, a biopsy is taken. If a highly vascular lesion is suspected on endoscopy, or inadequate tissue is obtained, a biopsy is performed in the operating room after imaging is obtained with computed tomography (CT) and magnetic resonance imaging (MRI).

Debulking is avoided. Partial resections before planned oncological resections have been shown to produce poorer overall patient survival.<sup>14</sup> Postoperative changes from partial resection result in fibrosis and edema, which makes delineation of gross tumor boundaries and attachment sites more difficult.

Radiologic assessment of the tumor is also important for staging; it helps to characterize if the lesion is resectable. A variety of imaging modalities can help to distinguish different aspects of the tumor (**Table 1**). CT best identifies bony anatomy and bony erosion. MRI is an excellent modality to distinguish between soft tissue and inspissated secretions on T2-weighted images. Fluid-attenuated inversion recovery sequence is useful to differentiate cerebrospinal fluid from mucoceles and cystic or fluid contents. Periorbital invasion is best assessed on fat-suppressed images. Dura is best seen on T2-weighted images and postcontrast T1-weighted images. Nerve enhancement on T1-weighted images is helpful for perineural invasion.<sup>4</sup>

The use of fluorodeoxyglucose PET has been limited in sinonasal malignant workups, as preliminary small population studies failed to demonstrate an advantage over combined CT and MRI modalities.<sup>15,16</sup> In the posttreatment setting, it has been found to aid in early detection of locoregional recurrences and distant metastasis, complementary to MRI and CT.<sup>16,17</sup>

**Table 1**  
Tumor features that are best assessed via their respective imaging sequence

Imaging for Sinonasal Masses		
Tumor Features	CT	MRI
Periorbital invasion & orbital fat	Bone erosion precisely shown by CT. The periorbital fat is not usually distinguished from tumor signal	T1-weighted and T2-weighted sequences
Dural invasion	Contrast is useful for large areas of dural invasion. Indirect signs (skull base erosion) can correlate with small areas of dural invasion	T2-weighted and postcontrast T1-weighted sequences
Perineural invasion	Limited to indirect signs (fat effacement or enlarged foramina)	Fat-saturated T1-weighted sequences with abnormal nerve enhancement
Distinguish retained mucous secretions	Cannot be assessed with this modality	T2-weighted sequences
Communication with cisterns	—	T2-weighted sequences
Assess course of internal carotid	CT angiography with Maximum Intensity Projections (MIP) reconstructions	—
Assess neck nodal disease	CT with contrast.	—

*Adapted from* Harvey RJ, Winder M, Parmar P, et al. Endoscopic skull base surgery for sinonasal malignancy. *Otolaryngol Clin North Am* 2011;44:1080–140.

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