Extended Endoscopic Techniques for Sinonasal Resections

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KEYWORDS

• Endoscopic • Skull base • Tumor • Sinonasal
• Angiofibroma • Juvenile nasopharyngeal angiofibroma
• Inverted papilloma • Osteoma

Endoscopic resections of benign neoplastic disease of the anterior skull base and paranasal sinuses is now widely practiced.[1] Selected malignancies can also be successfully managed by an endoscopic approach.[2,3] However, the approach should never dictate the surgery performed. Anatomic location and areas involved by a pathologic condition should always be the determining factor. Similarly, pathology such as inverted papilloma, should never imply a particular surgery (endoscopic medial maxillectomy or lateral rhinotomy). Although endoscopic resection has replaced many open approaches at our institutions, the authors still use a combination of techniques to remove extensive disease.

The endoscopic surgeon performing extended procedures should be equally comfortable performing a similar open procedure. Endoscopic surgery should not imply conservative surgery. If a pathologic lesion is considered irresectable via an open approach then it is axiomatic that this is true for the endoscopic option. There are a variety of open approaches that can be applied and they have been well described,[4,5] however, they have a limited role in the management of benign disease. The midface degloving approach is perhaps 1 open approach that is still sometimes used to manage lesions for which an endoscopic approach may not suffice.

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The authors believe the foundations of successful extended endoscopic surgery, whether for accessing a lateral frontal mucocele or removing malignant disease, relies on 5 important concepts: preoperative planning (surgery and equipment required), obtaining appropriate surgical access, micro- and macrovascular control; reconstruction of nasolacrimal physiology; and postoperative care of the large endoscopic cavity (**Table 1**).

PREOPERATIVE PLANNING

The philosophy of complete endoscopic resection can be retained without the need for traditional en bloc surgery. The limits of the area to be resected and bone removed can often be defined before surgery begins. An attempt should be made to define the surgical margins preoperatively. This ensures that a surgical plan is adhered to and will enhance total removal. The authors believe there needs to be a shift away from the patho-etiology focus of traditional teachings and emphasize the need to resect anatomic zones or regions, therefore tailoring surgery to the exact extent of disease and preserving normal structures. This is not pathology-specific surgery but site-specific surgery. The ability to gain good visualization and access to the anatomic region of the lesion is essential. Particularly in malignant disease, being able to accurately map resection margins is vital for intra- and postoperative decision making (**Fig. 1**). Further resection of positive frozen section margins can be inaccurate if many (>10) biopsies are taken. Postoperatively, accurate surgical mapping aids radiation oncologists in defining treatment fields and assists focused endoscopic surveillance.

ENDOSCOPIC SURGICAL ACCESS

There are 4 areas notorious for recurrence and present challenging access[1]:

1. Anterolateral maxilla
2. Frontal sinus
3. Supraorbital ethmoid cell
4. Floor of a well-pneumatized maxillary sinus.

Table 1
Foundations of extended endoscopic surgery

Preoperative planning	Ensure that imaging, skill, equipment, and a predefined surgical plan are created
Surgical access	Accessing anterolateral disease of the maxilla and within the frontal sinus requires unconventional or combination techniques
Anatomic orientation	Preoperatively defining a structured approach to identify fixed anatomic landmarks
Vascular control	Microvascular management: preoperative reduction of associated inflammatory changes, anesthetic techniques, and intraoperative vasoconstriction Macrovascular control with a structured approach to the ethmoidal, sphenopalatine, internal maxillary, and carotid artery
Reconstruction	Ensuring a functional lacrimal system, the formation of a final cavity that will allow relatively normal nasal physiology Reconstruction of dura or periorbita
Postoperative management of the large cavity	Controlling adhesions, crusting, bacterial colonization and facilitating mucosalization