

Ten Pearls for Safe Endoscopic Sinus Surgery

Marc A. Tewfik, MD, MSc, FRCSC^a,
Peter-John Wormald, MD, FRCS, FRACS^{a,b,*}

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- Chronic rhinosinusitis • Nasal polyposis

Endoscopic sinus surgery (ESS) is effective in improving the symptoms of chronic rhinosinusitis and thus in ameliorating the quality of life of patients suffering from this common disease. However, one important drawback to this type of surgery remains the potential for serious complications. This is inevitably because of the proximity of critical anatomic structures such as the orbit, the internal carotid arteries, the skull base, dura, and brain.

Several risk factors exist for the occurrence of complications in ESS¹; these can be broadly divided into anesthetic, surgeon-related, and disease-related factors. General anesthesia increases the risk of complications because of the lack of patient feedback when approaching sensitive structures like the lamina papyracea and the skull base. Right-sided surgery for a right-handed surgeon is a risk factor, as is left-sided surgery for a left-handed surgeon, because of the angle of the endoscope and instruments. Another risk factor is lack of surgeon experience, for the obvious reasons of unfamiliarity with the anatomy and use of instrumentation. Extensive sinus disease, excessive bleeding, and revision surgery, all of which can obscure or distort the sinonasal structures normally encountered during surgery, are important risk factors.

Although some of these factors are unavoidable, and the avoidance of others such as general anesthesia is impractical, there are several measures and technical points that can be used to remain safe when performing ESS. This article highlights 10 pearls that are routinely taught in our institution and have stood us in good stead. We believe that by adhering to these simple principles, ESS can be made safe and the likelihood of intraoperative complications reduced.

^a Department of Otolaryngology–Head and Neck Surgery, The Queen Elizabeth Hospital, 28 Woodville Road, Woodville South, South Australia 5011, Australia

^b Department of Otolaryngology–Head and Neck Surgery, Adelaide and Flinders Universities, Adelaide, 28 Woodville Road, Woodville South, South Australia 5011, Australia

* Corresponding author. Department of Otolaryngology–Head and Neck Surgery, The Queen Elizabeth Hospital, 28 Woodville Road, Woodville South, South Australia 5011, Australia.

E-mail address: peterj.wormald@adelaide.edu.au

IDENTIFY HIGH-RISK SITUATIONS

Before surgery can begin, preoperative imaging must be carefully scrutinized. This is done to identify anatomic variants that, if unrecognized, may lead to adverse outcomes. A high-definition helical multislice computed tomography (CT) scan of the sinuses should be obtained after an adequate trial of maximal medical therapy. Ideally, cuts should measure between 0.5 and 1 mm in the axial plane, and be reconstructed in the coronal and parasagittal planes.

Several key areas must be systematically evaluated on the preoperative CT scan. As a memory aid for performing this thorough checklist, the acronym CLOSE can be used. The “C” stands for cribriform plate, the position of which should be assessed according to the Keros classification.² A deeper olfactory fossa with a longer lateral wall (Fig. 1), such as with Keros 2 and 3, exposes a longer lateral wall of thin bone at risk of injury and leaking of cerebrospinal fluid (CSF). The angle that this lateral wall forms with the perpendicular should also be assessed, because those that are more tilted (away from the perpendicular plane) are predisposed to skull base injury during dissections of the frontal recess (Fig. 2). The “L” stands for lamina papyracea, which should be scanned along its entire length, looking for dehiscences or orbital fat protrusion into either the ethmoid or maxillary sinuses (Fig. 3). The lamina may also be in an excessively medialized position relative to the lateral nasal wall, particularly in cases of atelectasis of the maxillary sinus (Fig. 4A, B). This situation must be recognized before performing the uncinctomy, or anterior ethmoidectomy, as either of these steps can readily result in orbital penetration. The “O” stands for Onodi cell and optic nerve dehiscence. An Onodi cell is a posterior ethmoid cell that pneumatizes into the superolateral aspect of the sphenoid sinus, and its presence places the optic nerve at risk of injury during instrumentation of the posterior ethmoids. This cell is best detected if there is a horizontal septation within the sphenoid sinus, as seen in the first coronal CT slice in which the complete posterior bony choana can be identified (Fig. 5). The “S” stands for the sphenoid and skull base. The pneumatization of the sphenoid sinus needs to be assessed; if the anterior clinoid is pneumatized, the optic nerve may be in a mesentery across the roof of the sphenoid. In addition, the internal carotid arteries should be assessed for overlying bony dehiscences, a medialized trajectory, or the presence of an aneurysm. It is also important to assess the vertical



Fig. 1. CT scan of the sinuses, coronal view, demonstrating a deep olfactory fossa with a low-lying cribriform plate (Keros 2); note also the position of the anterior ethmoidal arteries (white arrows), hanging in bony mesenteries below the skull base, placing them at risk of injury during surgery.

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