

Revision Sinus Surgery

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KEYWORDS

• Sinus • Rhinosinusitis • Revision surgery • Inflammation

Chronic rhinosinusitis (CRS) is a common illness affecting approximately 18 to 22 million Americans per year, placing a significant burden on patient quality of life and the health care system. Direct treatment costs have been estimated to range from \$3.5 to \$5 billion annually.^{1,2} When symptoms persist despite optimal medical management, surgical intervention represents the preferred treatment. Functional endoscopic sinus surgery (FESS) is currently the gold standard in management of CRS refractory to medical management, and has a success rate for symptom improvement of more than 90%. However, symptom improvement correlates poorly with disease resolution, and up to approximately 20% of patients go on to require surgical revision. Those patients requiring revision endoscopic sinus surgery (RESS) are therefore in a minority but represent a therapeutic challenge for the otolaryngologist.³ Before embarking on revision sinus surgery, a thorough reassessment of the patient's underlying disorder should be conducted. A key concept is that chronic sinusitis is a multifactorial disease with surgery serving as an adjunct to medical management and control of environmental factors. In addition, continued medical therapy plays a pivotal role in disease maintenance following revision surgery. Major contributing factors leading to RESS can be general host, environmental, and local host factors.⁴ In those patients who have failed an initial attempt at endoscopic sinus surgery, a checklist should be completed evaluating each of these categories before an attempt at surgical revision (**Table 1**). The categories most amenable to revision sinus surgery are inadequate surgery extirpation or postoperative scarring either caused by poor

operative technique or inadequate postoperative care. Lazar and colleagues⁵ found that fibrous bands, adhesion formations, and recurrence of nasal polyposis are among the most common post-surgical findings in patients undergoing revision sinus surgery. Other factors contributing to failures in primary sinus cases include lateralization of the middle turbinate, scarring and stenosis of sinonasal ostia, retained anterior and posterior ethmoidal cells, residual uncinate, and the presence of initial frontal sinus disease. In addition, patients who have developed significant neosteogenesis as a result of mucosal stripping from prior surgical intervention also pose a significant challenge in revision cases. This problem can be difficult or impossible to resolve with revision surgical intervention and seems to be associated with a poorer long-term prognosis as well as persistent sinonasal pain.

This article examines revision surgical treatment of persistent inflammatory sinus disease. Advancements in endoscopic sinus surgery have enabled most revision sinus surgery to be conducted using this technique. The addition of stereotactic image guidance has been a useful adjunct in surgically managing these patients. Open surgical approaches may have a role in revision sinus surgery cases, although these are more commonly confined to the occasional trephination or osteoplastic flap procedure in patients who fail revision surgery with an extended frontal sinus approach.

PREOPERATIVE EVALUATION

History

Patients who are candidates for revision sinus surgery should undergo a complete medical reassessment as if they were being evaluated for the

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Table 1
Checklist prior to surgical revision

Environmental	General Host	Local Host
Cigarette smoke	Reactive airway Immunodeficiency	Iatrogenic Neosteogenesis
Chemical irritants	Genetic factors: Cystic fibrosis	Nasal polyps
Inhalant allergy	Kartagener	
Emotional stress	Samter triad	

first time. Documentation of the patient's initial complaints and the operative records are also important items to secure. It is critical to understand whether the patient's complaints before the first surgical procedure were of sinus origin, as well as reviewing and evaluating the patient before medical therapy. Common symptoms such as nasal obstruction, hyposomnia, and headaches are all amenable to RESS in primary failures.⁶ In addition, understanding the extent of the initial procedure, as well as identifying any orbital or intracranial violation, allows for critical preoperative planning to help decrease surgical complications and postoperative morbidity.

Some of the key areas to evaluate are potential genetic predisposition (cystic fibrosis, cilia dysmotility, immunodeficiency, autoimmune state), allergy assessment if clinical suspicion exists, and environmental exposure to dust, mold, chemicals, and smoke inhalation. Smoking cessation is critical in smokers with CRS undergoing elective endoscopic sinus surgery. Failure to maintain abstinence can lead to quick relapse and poor postoperative wound healing.

Any patients who had their first operations for chronic sinusitis or polyposis before the age of 18 years should be evaluated for a cystic fibrosis variant. However, the possibility of cystic fibrosis should also be considered in patients who present even later in life if they have had multiple disease recurrences. Among the most difficult cohort of patients to treat are those with the Samter triad and asthma-associated nasal polyposis. It is important that they understand that their disease process is chronic and requires ongoing medical care. Asthma has been extensively cited in the literature as being a prognosticator for poor surgical outcomes in endoscopic sinus surgery.⁷⁻⁹ Mendelsohn and colleagues⁹ reported a 5-year polyp recurrence rate of 45% in asthmatic patients, and this rate was as high as 90% in patients with Samter triad, with associated revision rates of 25% and 37% respectively,

compared with 10% for controls. If both the physician and the patient are not vigilant with regard to ongoing medical therapy and regular routine endoscopic follow-up, the likelihood of further revision sinus surgery is high. In any patient undergoing revision sinus surgery, evaluation of both active and passive immunocompetence is a consideration, in addition to allergy evaluation.

Physical Examination

A complete head and neck examination should be performed in the initial visit. The presence of lymphadenopathy may suggest sarcoidosis, chronic serous otitis media could be associated with Wegener granulomatosis, or laryngeal findings of posterior glottic erythema and edema may reveal underlying gastroesophageal reflux.

Diagnostic nasal endoscopy is an essential component of the preoperative physical examination, particularly in patients who have undergone prior surgical procedures. This endoscopy can often provide more information regarding the anatomy and the presence of active disease than routine imaging. When identified on endoscopy, reactive nasal mucosa should be controlled with topical and oral steroids before surgical intervention. Typically a course of 20 to 30 mg of prednisone daily for 3 to 7 days before surgery is sufficient. The steroids also help stabilize lower airway reactivity as well as reduce sinonasal inflammation. In addition, any purulence within the sinonasal cavity should be cultured and treated with the appropriate antibiotic. The cavity should be assessed for evidence of iatrogenic factors contributing to recurrent or recalcitrant disease (**Table 2**).

Radiographic Evaluation

The radiologic assessment should include review of films taken before the first surgical procedure whenever possible, and then compared with the present studies. Khalil and colleagues¹⁰

Table 2
Iatrogenic factors

Physiological Problem	Common Anatomic Source
Lateralization of middle turbinate	Absence of middle turbinate
Mucus recirculation	Residual uncinata process
Scarring of bulla to middle turbinate	Residual ethmoid bony partitions
Scarring of frontal recess	Scarring of sphenoid sinus ostia

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