Clinical Outcomes After Revision Endoscopic Sinus Surgery

Neil Bhattacharyya, MD

Objective: To determine if patients undergoing revision endoscopic sinus surgery (ESS) for chronic rhinosinusitis obtain significant symptomatic benefit from surgery.

Design: Prospective controlled clinical trial.

Methods: Adult patients undergoing revision ESS were evaluated preoperatively with a computed tomographic scan and the Rhinosinusitis Symptom Inventory. After the revision ESS, patients were reevaluated with the Rhinosinusitis Symptom Inventory. Data were analyzed for symptom score changes and effect sizes, changes in medication, and economic variables. Improvements in sinonasal symptom scores, medication use, and economic variables were compared with those of a contemporaneous control group of patients undergoing primary ESS and matched for age, sex, and Lund score.

Results: The 21 patients (mean age, 44.8 years) who completed evaluation after revision ESS had a mean follow-up of 12.4 months. Mean preoperative Lund score was 12.6. Large effect sizes indicating significant symptom improvements were noted for nasal obstruction (effect size, −1.9), hyposmia (−0.9), and headache (−0.6), as well as nasal (−1.1) and total symptom domains (−0.9; \( P < .05 \) in all cases). Nasal steroid and nonsedating antihistamine use did not decrease significantly after ESS, but oral antibiotic use showed a downward trend (net change, −2.9 wk/yr; \( P = .23 \)). Improvements in clinical symptoms were statistically similar to corresponding improvements in the matched cohort of patients undergoing primary ESS.

Conclusions: The symptomatic relief that revision ESS can provide for patients with refractory chronic rhinosinusitis is similar to that following a primary ESS. However, many patients undergoing revision ESS require continued intense medical management of their chronic rhinosinusitis.

Arch Otolaryngol Head Neck Surg. 2004;130:975-978

CHRONIC RHINOSINUSITIS (CRS) is an extremely common clinical condition affecting approximately 20 million Americans.1 Given its prevalence, the cost of treating CRS is expensive for both the patient and the health care system.2 Despite several recent advances potentially lending insight into the pathophysiology of CRS, a nonnegligible proportion of patients will require endoscopic sinus surgery (ESS) for medically refractory disease. Much attention has been focused on the impact of CRS on the patients' quality of life, and data have been published regarding quality of life improvements imparted by ESS in this patient population.3 However, relatively little has been published about specific symptomatic improvement for patients undergoing ESS. Recent publications examining symptom score improvements after ESS suggest that ESS is beneficial for patients with medically refractory CRS.4

Unfortunately, despite the medical and surgical advances, a significant number of patients with CRS will eventually require a secondary ESS procedure. The proportion of patients requiring revision ESS has been estimated between 3% and 14% of patients undergoing primary ESS,5 and even less is known about symptom outcomes after revision ESS. The purpose of this study was to determine if patients undergoing revision ESS obtain significant symptomatic improvement from the procedure. In addition, we sought to examine changes in medication use and other factors associated with disease after revision ESS.

METHODS

A prospective series of adult patients undergoing revision ESS formed the study group. The study was approved by our hospital's committee on clinical investigations. Each patient had previously undergone 1 or more ESS procedures for medically refractory CRS. Prior to re-
vision surgery, each patient received additional and extended medical management with topical nasal steroids, decongestants, and broad-spectrum antibiotics, and were considered for revision ESS only if this medical management failed. A preoperative computed tomographic (CT) scan was obtained and staged according to the Lund-MacKay system.6 In addition, as part of the preoperative evaluation, patients completed the Rhinosinusitis Symptom Inventory (RSI), which catalogs major and minor sinonasal symptoms on a 6-point Likert scale (with 0 representing absence of symptoms and 5 representing maximally severe symptoms).2,7 Moreover, data were obtained regarding medication use (topical nasal steroids, decongestants, and broad-spectrum antibiotics, and antibiotics) for the 12 calendar months prior to revision ESS.

Patients underwent revision ESS specifically targeting sinonasal polyposis. Of the 23 adult patients undergoing revision endoscopic sinus surgery, 19 patients (6.1%) had sinonasal polyposis. The mean Lund score was 12.6 (range, 5-21). Mean follow-up period was 33.5 months (range, 8.6-72.4 months). All patients met specific criteria for the diagnosis of CRS.10 The mean duration between the most recent previous sinus procedures ranged from 1 to 3 (mean, 1.33). The mean age was 44.8 years, with a male-female ratio of 1:1. The mean Lund score was 12.6 (range, 5-21). Follow-up duration was 12.4 months, and 13 patients (61.9%) had sinonasal polyposis.

<table>
<thead>
<tr>
<th>Table 1</th>
<th>Likert Scale Scores for Sinonasal Symptoms Before and After Endoscopic Sinus Surgery</th>
</tr>
</thead>
<tbody>
<tr>
<td>Symptom</td>
<td>Preoperative</td>
</tr>
<tr>
<td>Major symptoms</td>
<td></td>
</tr>
<tr>
<td>Facial pressure</td>
<td>2.5</td>
</tr>
<tr>
<td>Congestion</td>
<td>2.5</td>
</tr>
<tr>
<td>Nasal obstruction</td>
<td>3.2</td>
</tr>
<tr>
<td>Rhinorrhea</td>
<td>3.4</td>
</tr>
<tr>
<td>Hyposmia</td>
<td>3.0</td>
</tr>
<tr>
<td>Minor symptoms</td>
<td></td>
</tr>
<tr>
<td>Headache</td>
<td>3.0</td>
</tr>
<tr>
<td>Fever</td>
<td>0.6</td>
</tr>
<tr>
<td>Halitosis</td>
<td>0.8</td>
</tr>
<tr>
<td>Fatigue</td>
<td>2.7</td>
</tr>
<tr>
<td>Dental plan</td>
<td>1.1</td>
</tr>
<tr>
<td>Cough</td>
<td>1.9</td>
</tr>
<tr>
<td>Ear pain</td>
<td>1.7</td>
</tr>
<tr>
<td>Nasal obstruction</td>
<td>3.4</td>
</tr>
<tr>
<td></td>
<td>3.0</td>
</tr>
</tbody>
</table>

Scores may range from 0 (no symptoms) to 5 (severe symptoms); symptom domains are scaled from 0 (no symptoms) to 100 (maximum number of symptoms).

†Wilcoxon signed rank test.

RESULTS

A total of 23 adult patients undergoing revision endoscopic sinus surgery were enrolled after undergoing complete preoperative evaluation. Of these, 21 patients completed follow-up. The average age was 44.8 years, with a male-female ratio of 1:1. The patients’ number of prior sinus procedures ranged from 1 to 3 (mean, 1.33). The mean duration between the most recent previous sinus surgery and the ESS procedure evaluated for the present study was 33.5 months (range, 8.6-72.4 months). All patients met specific criteria for the diagnosis of CRS.10 The mean Lund score was 12.6 (range, 5-21). Mean follow-up duration was 12.4 months, and 13 patients (61.9%) had sinonasal polyposis.

Table 1 delineates mean preoperative and postoperative raw sinonasal symptom scores as well as net change in symptom scores for this cohort. Individual effect sizes for symptom score changes are also depicted in Table 1. The largest improvements after revision ESS according to effect sizes were noted for nasal obstruction, hyposmia, and headache. Accordingly, large effect sizes were
noted for improvements in the nasal symptom domain and total symptom score. **Table 2** lists results for medication use before and after revision ESS. Overall, use of topical nasal steroids, antihistamines, and antibiotics was not significantly different before and after revision ESS, although antibiotic use tended to decrease. After revision ESS, patients reported a mean decrease of 5.3 days in workdays missed because of CRS, a net decrease of 4.7 days in number of physicians' visits specifically for CRS, and a decrease of 2.3 episodes per year of acute exacerbations of CRS. However, only the reduction in number of physicians' visits was statistically significant (P = .37, P = .01, and P = .12, respectively). **Table 3** lists comparative values for the group that underwent revision ESS vs the matched control group that underwent primary ESS for individual sinonasal symptom domains. As indicated, patients with revision ESS had symptom score improvements statistically similar to those of the matched primary ESS group.

### COMMENT

In the hands of an experienced surgeon, ESS is considered clinically effective, cost-effective, and safe in the management of medically refractory CRS. Despite well-performed surgical interventions, a small percentage of patients will experience persistent or recurrent disease and require consideration for revision ESS. In the literature, revision rates range from 3% to 14%, largely depending on follow-up duration. Although revision surgery may be clinically required on the basis of endoscopic and CT findings, several factors may dissuade patients from undergoing another procedure. First, revision ESS is likely to pose more surgical risks than primary ESS, as major complication rates approximate 1%. These surgical risks, which often result from distorted anatomy and are especially elevated in recurrent disease, may now be somewhat offset by image guidance. Second, patients may be skeptical about undergoing a secondary procedure when the original procedure has failed to control or improve their disease. In fact, not surprisingly, a history of unsuccessful ESS has been associated with failure of revision ESS. Therefore, patients and physicians are naturally interested in clinical outcomes after revision ESS to determine the risk-benefit ratio and the appropriateness of a revision procedure.

Recently there has been a renewed interest in clinical outcomes after ESS, and several studies have documented the impact of CRS on patients' quality of life. In terms of costs, the diagnosis of CRS typically means overall health care–related costs of $13,500 per year of treatment. In addition, important works by Gliklich and Metson have highlighted the improvements in quality of life and utilization of health care economic resources that result from ESS. Although these studies are important in validating ESS macroeconomically as a suitable treatment modality for CRS, patients are more often interested in specific symptom outcomes after ESS. In addition, patients are often interested in the likelihood that their medication use, particularly of antibiotics, will decrease after ESS. In a large series of patients undergoing ESS, Damm and colleagues evaluated symptom responses to ESS with a Likert scale questionnaire. They documented significant percentages of symptom reductions after ESS, with excellent results for nasal obstruction, headache, and postnasal drip. We previously found similarly strong improvements in these major symptoms, and also lesser improvements in the minor symptoms after ESS for medically refractory CRS. However, such improvements after primary ESS cannot be extrapolated to patients undergoing revision ESS because of medical factors (eg, different stages of mucosal disease), differences in extent of operation, and changes in patients' expectations after an unsatisfactory primary ESS.

The findings of several studies at the time of revision ESS have been collected and published in an effort to determine factors that may predict primary ESS failure. Most of these studies have identified that the main causes of failure were retained ethmoid air cells and synechiae formation after primary ESS. Although analysis of causes for failure of primary ESS was not the focus of the present study, we encountered similar root causes leading to primary ESS failure. In many instances, limited initial surgery coupled with significant mucosal disease recurrence led to the need for revision ESS. While the current data suggest that revision ESS is a clinically effective procedure, the best management option is to perform adequate initial surgery, followed by rigorous medical management when necessary, to avoid the need for revision.
CONCLUSIONS

Revision ESS is associated with significant improvements in sinonasal symptom scores after surgery, especially in nasal obstruction, perceived sense of smell, and headache. These symptomatic improvements are similar to those generated by primary ESS. However, a significant proportion of patients will require intense medical management postoperatively.

Submitted for publication September 9, 2003; final revision received December 15, 2003; accepted December 18, 2003.

I thank Lynn J. Kepnes, RNP, for her assistance with the data collection for the manuscript.

Correspondence: Neil Bhattacharyya, MD, Division of Otolaryngology, 333 Longwood Ave, Boston, MA 02115 (neiloy@massmed.org).

REFERENCES