Read all three of our prestigious publications, each offering high-quality content to keep you informed with the latest developments in the field.

**Laryngoscope**
Founded in 1896
Editor-in-Chief: Michael G. Stewart, MD, MPH
The leading source for information in head and neck disorders.
[www.Laryngoscope.com](http://www.Laryngoscope.com)

**Investigative Otolaryngology**
Editor-in-Chief: D. Bradley Welling, MD, PhD, FACS
Rapid dissemination of the science and practice of otolaryngology-head and neck surgery.
[www.InvestigativeOto.com](http://www.InvestigativeOto.com)

**ENTtoday**
A publication of the Triological Society
Editor-in-Chief: Alexander Chiu, MD
Must-have timely information that Otolaryngologist-head and neck surgeons can use in daily practice.
[www.ENTtoday.org](http://www.ENTtoday.org)
Long-Term Impact of Endoscopic Orbital Decompression on Sinonasal-Specific Quality of Life

Sarina K. Mueller, MD; Marcel M. Miyake, MD; Daniel R. Lefebvre, MD; Suzanne K. Freitag; Benjamin S. Bleier, MD

Objective: Endoscopic orbital decompression (EOD) is the workhorse surgical intervention for severe thyroid eye disease in Graves disease. Although EOD is a safe and effective procedure, the objective of this study is to determine the impact of orbital decompression on long-term sinonasal-specific quality of life.

Methods: Retrospective study of 27 patients who underwent EOD by a single surgeon. The primary endpoint was change in preoperative 22-item Sinonasal Outcomes Test (SNOT-22) score at a minimum of 1 year. The secondary endpoint was to determine whether the performance of septoplasty for surgical access in patients without nasal obstruction impacted domain 1 (i.e., rhinologic domain) and total SNOT-22 scores.

Results: The mean follow-up was 25.7 ± 11.4 months. Domain 1 scores significantly increased at the first postoperative visit (P ≤ 0.01) and returned to baseline values between 1 and 3 months. At 1 year, significant improvements in both total score and domain 4 and 5 (psychological and sleep dysfunction, respectively) scores were seen (P < 0.01 for all scores). Septoplasty was not associated with a significant change in SNOT-22 score at 1 year (P = 0.48).

Conclusion: Endoscopic orbital decompression is associated at 1 year with a significant improvement in sinonasal-specific quality of life, which is driven by the psychological and sleep dysfunction domains. Adjunctive septoplasty has no significant impact on SNOT-22 scores.

Key Words: Endoscopy, paranasal sinus, orbit, surgical decompression, quality of life, Graves disease.

Level of Evidence: 4.

Laryngoscope, 128:785–788, 2018

INTRODUCTION

Orbital decompression was first described by Dollinger in 1911 as a lateral canthotomy for patient suffering from Graves disease. The transantral approach to the medial wall and floor of the orbit was first reported by Walsh and Ogura and paved the way for the development of endoscopic orbital decompression (EOD). As techniques improved over time, EOD has emerged as the preferred method for addressing the medial and inferior walls in patients with Graves orbitopathy. Advantages of EOD relative to open approaches include improved visualization of key anatomical landmarks, lower complication rates, and the obviation of facial scars. The endoscopic approach also affords the opportunity to simultaneously address other conditions that might compromise surgical access to the orbit, including a high nasal septal deflection and turbinate hyperplasia. These adjunctive nasal procedures often are performed in otherwise asymptomatic patients to maximize the surgical corridor.

Although the functional success and outcomes following orbital decompression have been well established, the impact on quality of life only recently has been studied using the Graves’ Ophthalmopathy Quality-of-Life Questionnaire (GO-QOL). Despite this, the impact of instrumenting an otherwise healthy nasal cavity on sinonasal quality of life remains unknown. The primary aim of this study was therefore to determine the impact of EOD on long-term sinonasal-specific QOL using the validated 22-item Sinonasal Outcomes Test (SNOT-22) score. The secondary aim was to determine whether the performance of adjunctive septoplasty for surgical access in otherwise asymptomatic patients altered SNOT-22 scores.

MATERIALS AND METHODS

Patient Population

This was an institutional review board-approved, retrospective study of 27 patients who underwent EOD by the same ophthalmologist between June 2013 and April 2016 and had a minimum follow-up time of 1 year. Medical history, demographic information, comorbidities, procedural data, and sinonasal complications were collected. All patients completed a SNOT-22...
questionnaire at their preoperative visit and all postoperative visits. Exclusion criteria were patients with an a priori diagnosis of chronic rhinosinusitis or orbital pathology extending into the sinonasal labyrinth. The timing of postoperative follow-up visit SNOT-22 scores was categorized as baseline, time point 1 (day 5–15), time point 2 (day 30–180), and time point 3 (day ≥ 365). Among the total cohort of 27 patients, 16 patients had SNOT-22 scores at all four time points, and 18 asymptomatic patients underwent septoplasty for surgical access. The assessment of complications was conducted in all 27 patients.

### Outcome Measures

The primary outcome measure was a change in long-term (i.e., ≥ 1 year) quality-of-life scores, as measured using the validated, disease-specific SNOT-22 score.9,10 This questionnaire provides a symptom score for 22 parameters (range 0 to 5) relating to sinonasal function and can be categorized into five different domains: Domains 1, 2, and 3 relate to sinus-specific symptoms (rhinologic, extranasal rhinologic, and ear/facial symptoms, respectively). Domains 4 and 5 (psychological and sleep dysfunction, respectively) cover general health-related QOL.9,10 A higher score indicates a worse outcome.

The secondary outcome measure was to determine whether the performance of septoplasty for surgical access in patients without nasal obstruction impacted SNOT-22 scores.

All outcome measures were analyzed by both total score and by subdomain scores.

### Statistical Measures

Standard descriptive statistics were reported as mean ± standard deviation for continuous variables and frequency count (%) for categorical variables. The analysis of variance and the paired t-test were used to compare changes in SNOT-22 scores over multiple time points. An adjusted alpha was used given the small sample size in which only P values < 0.025 were considered statistically significant. For the subgroup analysis, the paired t-test was used. Statistical analyses were performed using the statistical software SAS (SAS Institute Inc., Cary, NC) and STATA 14.2 (StataCorp LP, College Station, TX).

### RESULTS

In total, 27 patients who underwent EOD surgery were included in the study (Table I). The mean follow-up time was 25.69 ± 9.56 months. With respect to our primary outcome, a significant and clinically meaningful decrease in total SNOT-22 was seen between baseline (21.00 ± 17.81) and ≥ 1 year (7.33 ± 8.48; P < 0.01) follow-up. Significant improvements were also seen in domains 4 (8.48 ± 10.59 to 2.19 ± 3.59; P < 0.01) and 5 (7.48 ± 6.05 to 2.89 ± 4.50; P < 0.01) over the same time period but not in domains 1 through 3 (Fig. 1).

### TABLE I.

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Sample Distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean age in years*</td>
<td>58.0 ± 11.8</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>9 (33)</td>
</tr>
<tr>
<td>Female</td>
<td>18 (67)</td>
</tr>
<tr>
<td>Comorbidity</td>
<td></td>
</tr>
<tr>
<td>Asthma</td>
<td>3 (11)</td>
</tr>
<tr>
<td>Allergies†</td>
<td>16 (59)</td>
</tr>
<tr>
<td>Orbital decompression</td>
<td></td>
</tr>
<tr>
<td>Strut preservation</td>
<td>15 (56)</td>
</tr>
<tr>
<td>Middle turbinate resection</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Lateral decompression</td>
<td>11 (41)</td>
</tr>
<tr>
<td>Medial decompression</td>
<td>27 (100)</td>
</tr>
<tr>
<td>Inferior decompression</td>
<td>20 (74)</td>
</tr>
<tr>
<td>Bilateral</td>
<td>16 (60)</td>
</tr>
<tr>
<td>Unilateral</td>
<td>11 (41)</td>
</tr>
<tr>
<td>BMI</td>
<td>29.63 ± 5.76</td>
</tr>
<tr>
<td>Septoplasty</td>
<td>18 (67)</td>
</tr>
</tbody>
</table>

*Mean ± SD
†Including drug allergies
BMI = Body Mass Index

---

Fig. 1. Total and subdomain preoperative and 1-year postoperative endoscopic orbital decompression SNOT-22 scores (n = 27). The upper limit of the boxes represents the mean, and the bars represent the standard deviation.

SNOT-22 = 22-item Sinonasal Outcomes Test. [Color figure can be viewed in the online issue, which is available at www.laryngoscope.com.]
Domain 1 scores ($P < 0.01$) were significantly elevated in the immediate postoperative time point (days 5–15). However, by the second time point (postoperative month 1–3), both the domain 1 score and all other subdomain scores were not significantly different from baseline levels (Fig. 2). When analyzing individual patient outcomes, 30% of the patients had a minimal clinically important difference of $8.9^{11}$ in their total SNOT-22 score after 1 to 3 months, 42.9% after 3 to 6 months, and 44.4% after 1 year.

With respect to the secondary endpoint, patients who underwent septoplasty ($n = 18$) did not demonstrate any significant difference in either total ($P = 0.48$) or domain 1 ($P = 0.39$) SNOT-22 scores at 1-year relative to patients who did not have septoplasty ($n = 9$) (Fig. 3). Additionally, no difference in SNOT-22 score was seen between patients undergoing unilateral versus bilateral decompression ($P = 0.58$) or additional lateral decompression ($P = 0.54$). Among the 27 patients, 52% did not use systemic steroids at all, whereas 26% only used systemic steroids preoperatively.

**Sinonasal Complications**

No severe sinonasal complications were seen among all 27 patients. Mild complications included postoperative V2 hypoesthesia ($n = 1$) and perioperative lid edema ($n = 1$), both of which resolved without further intervention. Postoperative diplopia was reported in 55.6% of patients, all of whom underwent strabismus surgery, 87.5% within the first year. Among both the septoplasty and nonseptoplasty groups, no intranasal adhesions or medial synechiae were seen at any of the time points studied.

**DISCUSSION**

EOD has evolved to become a popular, effective, and safe approach. This technique requires the performance of extensive sinus surgery and occasional septoplasty in patients who generally have normal preoperative sinonasal function. This raises the question as to whether extensive instrumentation of an otherwise normal sinonasal complex impacts long-term sinonasal-specific quality of life. Despite the proliferation of EOD, this is the first study to address this question in a rigorous fashion.

Based on the SNOT-22 scores, our findings indicate that EOD is a well-tolerated approach without any mid- to long-term negative impact in sinonasal quality of life for the patient. Scores in all domains returned to preoperative levels within 30 to 90 days after surgery and did not decline with longer follow-up. The initial increase in domain 1 scores in the perioperative period likely is due to the presence of crusting; postoperative edema; and in some patients, intranasal splints. Interestingly, a significant decrease in SNOT-22 scores starting 3 to 6 months postoperatively and improving further by 1 year was observed in both total score as well as domain 4 and 5 scores. It is possible that some component of this improvement was driven by a reduction in systemic steroid use and enhanced cosmesis following decompression. However, the majority of the population did not use preoperative systemic corticosteroids. The most conservative interpretation of our results would suggest that, at a minimum, EOD does not result in a decrement in sinonasal-specific quality of life. This is an important
finding from a patient-counseling standpoint, as well as a clinical standpoint, because it indicates that an otherwise healthy nose can recover function even following significant instrumentation.

A second interesting finding is that correction of a septal deformity in patients without preexisting nasal obstruction does not confer any significant benefit to the patient in terms of both rhinologic- and global sinonasal-specific quality of life. This is consistent with previous reports\textsuperscript{13} and also can be used to guide patient counseling on postoperative expectations in EOD as well as other endoscopic endonasal approaches.

The principle weakness of this study is the relatively small sample size. Although follow-up studies will be required on larger cohorts, the statistical and clinical significance of our findings suggest that these results can be used to guide patient counseling on expected sinonasal recovery following EOD.

CONCLUSION

Endoscopic orbital decompression performed in patients with severe thyroid eye disease is not associated with any significant decrement in long-term sinonasal-specific quality of life. Thirty percent of patients experience a clinically important improvement in total SNOT-22 score after 3 months. Significant reductions in total SNOT-22 score at 1 year primarily are driven by improvements in psychological and sleep domains, which may be due to multiple factors including surgical outcome and reduction in medication usage.

BIBLIOGRAPHY