

Office-Based Sinus Surgery for Cystic Fibrosis Chronic Rhinosinusitis

Daniel B. Spielman David A. Gudis

Department of Otolaryngology-Head and Neck Surgery, Columbia University Irving Medical Center, New York, NY, USA

Keywords

Cystic fibrosis · Chronic rhinosinusitis · Endoscopic sinus surgery · Office-based procedures

Abstract

Objective: Chronic rhinosinusitis (CRS) is nearly ubiquitous in the cystic fibrosis (CF) population, and many patients require multiple endoscopic sinus surgeries throughout their lifetime. Recent studies have demonstrated the profound pulmonary and systemic health benefits of comprehensive CRS treatment. Both endotracheal intubation with mechanical ventilation and inpatient hospital care represent significant risks for CF patients. The goal of this study is to evaluate the safety and feasibility of performing revision endoscopic sinus surgery for CF patients in the outpatient office setting using only local anesthesia to decrease the need for mechanical ventilation and inpatient hospitalization. **Methods:** This is a prospective cohort study conducted at a tertiary care academic medical center with a CF Foundation-accredited care center. Patients with CF and refractory CRS despite prior surgery and medical therapy were eligible for inclusion. Comprehensive revision ESS was performed in the office using only local anesthesia. **Results:** Five patients were enrolled and underwent revision endoscopic sinus surgery without complication. The average preoperative Sinonasal Outcome Test-22 score was 52.0 ± 12.1 and the average pre-

operative Lund-Mackay score was 15.2 ± 3.8 . No patients requested aborting the procedure early due to pain, discomfort, or any other reason. No subjects required prolonged observation or postoperative hospital admission. **Conclusion:** This prospective pilot study is the first to demonstrate the safety and feasibility of performing comprehensive revision endoscopic sinus surgery for CF patients in the outpatient office setting using only local anesthesia.

© 2020 S. Karger AG, Basel

Introduction

Chronic rhinosinusitis (CRS) is exceedingly common in patients with cystic fibrosis (CF) with abnormalities on sinus CT scan in >95% of patients [1]. Comprehensive CRS treatment including endoscopic sinus surgery (ESS) and postoperative topical antibiotic sinus irrigation reduces sinonasal colonization by pathogenic bacteria and delays gram-negative pulmonary infections [2, 3].

Patients with CF CRS often require multiple ESS procedures throughout their lifetime. While ESS has been demonstrated to be safe in patients with CF, these patients require rigorous preoperative optimization and over half ultimately require overnight hospitalization following planned outpatient surgery with general anesthesia [4, 5].

Table 1. Baseline characteristics

	Patient 1	Patient 2	Patient 3	Patient 4	Patient 5
Age, years	32	35	28	34	31
Sex	female	male	female	male	female
Race/ethnicity	Caucasian	Caucasian	Caucasian	Caucasian	Hispanic
CFTR mutation	$\Delta F508/\Delta F508$	$\Delta F508/\Delta F508$	$\Delta F508/\Delta F508$	unavailable	$\Delta F508/c.1680-886A \rightarrow G$
Number of previous ESS	2	1	9	2	11
Most recent ESS (months prior)	39.7	24.8	8.2	19.0	15.7
Extent of prior surgery	bilateral MM + ESF	bilateral MM + ESF	bilateral ESF + MM, R orbital wall decompression	bilateral MESF	bilateral ESF + MM, L orbital wall decompression
Lung transplant status	DLTx	DLTx \times 2	DLTx	DLTx	DLTx
Preoperative SNOT-22 score	59	43	67	54	37
Preoperative Lund-Mackay score	11	20	16	n.a.*	14
Surgery	bilateral MESF	bilateral MESF	bilateral ESF	bilateral MESF	bilateral MESF

DLTx, double lung transplant; MM, medial maxillectomy; MESF, maxillary antrostomy, ethmoidectomy, sphenoid sinusotomy, and frontal sinusotomy; ESF, ethmoidectomy, sphenoid sinusotomy, and frontal sinusotomy.

* No available data due to no preoperative CT scan (diagnosis made via nasal endoscopy).

We hypothesize that performing revision ESS with only local anesthesia in the outpatient office instead of in the operating room decreases perioperative morbidity and rates of inpatient hospitalization by avoiding general anesthesia and mechanical ventilation.

Primary ESS involves removing the bony partitions that separate the sinus cavities from one another. After comprehensive ESS, bony partitions have largely been removed, and therefore revision ESS involves predominantly soft tissue resection, making it less uncomfortable for awake patients under local anesthesia. Therefore, all patients in this pilot series had already undergone primary ESS in the operating room under general anesthesia performed by the senior author (D.A.G.). This often included modified endoscopic medial maxillectomy. The decision to perform a modified medial maxillectomy in the primary procedure was made based upon the burden of disease present. The aim of this prospective study is to investigate the safety and feasibility of performing office-based revision ESS in patients with CF CRS in an effort to decrease rates of endotracheal intubation, mechanical ventilation, and inpatient hospitalization in this patient population.

Methods

This prospective study was conducted at a tertiary care academic medical center with a CF Foundation-accredited care center. Patients were eligible based on the following inclusion criteria: a diagnosis of CF confirmed by genetic testing, a diagnosis of CRS according to the International Consensus Statement on Allergy and Rhinology diagnostic criteria, a history of prior ESS performed by the senior author, and the failure of medical therapy to control the CRS [6]. Patients were enrolled on a voluntary basis between May 2018 and January 2019.

Patients were surveyed preoperatively using the Sinonasal Outcome Test-22 (SNOT-22) to assess symptoms (on a scale of 0–110). Lund-Mackay scores were calculated using preoperative CT sinus scans to assess the radiologic severity of their disease (on a scale of 0–24) [7].

Procedure Details

The surgery is scheduled as an outpatient procedure in the otolaryngology clinic. The patient is seated with his or her head reclined at 30°. The patient's choice of music is played in the procedure room. Cotton pledgets soaked in 0.05% oxymetazoline and 4% Lidocaine are placed in each nare for 5 min. When indicated, image navigation is calibrated. On each side, approximately 5 mL of 2% Lidocaine with 1:100,000 epinephrine is injected into the axilla of the middle turbinate and the sphenopalatine region. The soaked cotton pledgets are replaced and an additional 15 min are allowed to pass until the procedure is begun. The patient's level of

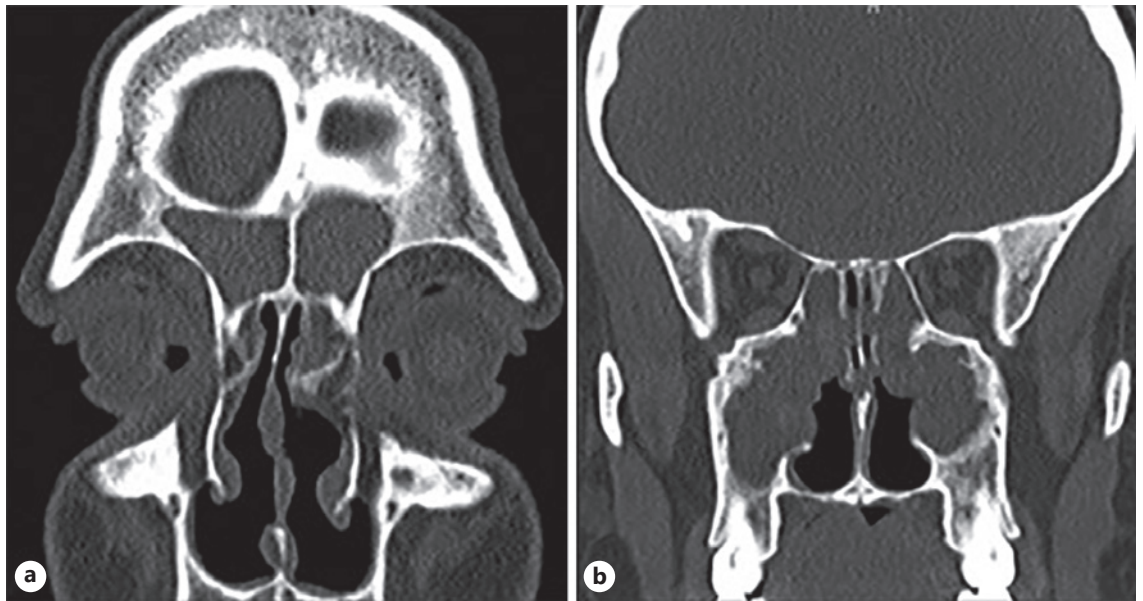


Fig. 1. Representative preoperative sinus CT scans, coronal view. **a** Frontal sinus disease. **b** Maxillary and anterior ethmoid sinus disease.



Fig. 2. Representative preoperative nasal endoscopy demonstrating mucopurulence (Λ) and polypoid disease (*) in the left nasal cavity.

comfort and pain are continually assessed throughout the procedure. No additional systemic analgesic or anxiolytic medications are administered.

A combination of grasping and cutting forceps, rongeurs, and a suction debrider are used to resect extensive hyperplastic mucosa obstructing the maxillary, ethmoid, sphenoid, and frontal sinuses. The skull base and medial orbital wall are skeletonized. Sinus cultures are obtained. After comprehensive tissue resection, forceful saline irrigation using a luer-lock, curved suction catheter on a 30-mL syringe is used to flush out the sinus cavities. Topical oxymetazoline pledgets are used for hemostasis. Following the completion of the procedure, the patient remains under observation for a minimum of 30 min. An online supplementary video (www.karger.com/doi/10.1159/000512495) is provided for illustration of the surgical technique.

Results

Five patients were enrolled. Baseline characteristics are described in Table 1. Each patient had undergone an average of 5 ± 4.6 ESS procedures previously. The average preoperative SNOT-22 score was 52.0 ± 12.1 . The average preoperative Lund-Mackay score was 15.2 ± 3.8 . A representative preoperative CT scan is demonstrated in Figure 1. A representative preoperative nasal endoscopy is illustrated in Figure 2. All 5 patients underwent in-office ESS as described above. The procedure was well tolerated by all with limited discomfort experienced during the procedure. No patients requested aborting the procedure early due to pain, discomfort, or any other reason. One patient requested a postoperative narcotic prescription for pain control on postoperative day zero. No other patients required postoperative narcotics for pain control. There were zero major and zero minor complications. No subjects required prolonged observation or postoperative hospital admission.

Discussion

This pilot study demonstrates the safety and feasibility of performing revision ESS in an outpatient office-based setting for patients with CF CRS. In the 1980s, several trials noted significantly elevated risks of general anesthesia,

endotracheal intubation, and mechanical ventilation in CF patients undergoing surgery [8, 9]. More recent studies demonstrate lower complication rates using modern anesthesia techniques, but these individuals require highly specialized care with diligent preoperative optimization [4, 10, 11].

In-office rhinologic procedures have been demonstrated to be safe and effective in otherwise healthy individuals with CRS [12, 13]. As a result, there has been a general increase in office-based rhinologic procedures over the last 5 years [14]. The ability to avoid the operating room provides added convenience for patients at a significantly lower cost [15]. Minimizing hospitalization and general anesthesia in patients with severe CF is especially important.

This study was limited by its small sample size. Furthermore, as a safety and feasibility pilot study, clinical outcomes data regarding postoperative progression of CRS and frequency of pulmonary infectious exacerbations were not included. A larger prospective study including such outcomes data is currently underway.

Conclusion

Revision ESS in CF patients can be safely performed in the outpatient office setting. In this pilot study, office-based ESS was well tolerated without complications. The

ability to avoid endotracheal intubation and mechanical ventilation is particularly advantageous in this patient population with poor pulmonary reserve.

Statement of Ethics

This study was conducted in accordance with the prewritten study protocol approved by the Institutional Review Board according to the methods outlined above (IRB ref. No. IRB-AAAR9036). All patients gave their informed written consent.

Conflict of Interest Statement

The authors declare that there are no conflicts of interest.

Funding Sources

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Author Contributions

D.A.G. was involved in study design, patient recruitment, and manuscript drafting and revision. D.B.S. was involved in data collection and analysis and manuscript drafting and revision. Both authors provided approval of the final manuscript and are accountable for all aspects of the work.

References

- 1 Kang SH, Piltcher OB, Dalcin PT. Sinonasal alterations in computed tomography scans in cystic fibrosis: a literature review of observational studies. *Int Forum Allergy Rhinol*. 2014 Mar;4(3):223–31.
- 2 Alanin MC, Aanaes K, Hoiby N, Pressler T, Skov M, Nielsen KG, et al. Sinus surgery postpones chronic Gram-negative lung infection: cohort study of 106 patients with cystic fibrosis. *Rhinology*. 2016 Sep;54(3):206–13.
- 3 Aanaes K, von Buchwald C, Hjulter T, Skov M, Alanin M, Johansen HK. The effect of sinus surgery with intensive follow-up on pathogenic sinus bacteria in patients with cystic fibrosis. *Am J Rhinol Allergy*. 2013 Jan; 27(1):e1–4.
- 4 Schulte DL, Kasperbauer JL. Safety of paranasal sinus surgery in patients with cystic fibrosis. *Laryngoscope*. 1998 Dec;108(12):1813–5.
- 5 Soudry E, Mohabir PK, Miglani A, Chen J, Nayak JV, Hwang PH. Outpatient endoscopic sinus surgery in cystic fibrosis patients: predictive factors for admission. *Int Forum Allergy Rhinol*. 2014 May;4(5):416–21.
- 6 Orlandi RR, Kingdom TT, Hwang PH, Smith TL, Alt JA, Baroody FM, et al. International Consensus Statement on Allergy and Rhinology: rhinosinusitis. *Int Forum Allergy Rhinol*. 2016 Feb;6(Suppl 1):S22–209.
- 7 Lund' VJ, Mackay IS. Staging in rhinosinusitis. *Rhinology*. 1993 Dec;31(4):183–4.
- 8 Lamberty JM, Rubin BK. The management of anaesthesia for patients with cystic fibrosis. *Anaesthesia*. 1985;40:448–59.
- 9 Price JF. The need to avoid general anaesthesia in cystic fibrosis. *J R Soc Med*. 1986; 79(suppl 12):10–12.
- 10 Huffmyer JL, Littlewood KE, Nemergut EC. *Perioperative management of the adult with cystic fibrosis*. Vol. 109, Anesthesia and Analgesia. Lippincott Williams and Wilkins; 2009. p. 1949–61.
- 11 Weeks AM, Bucklandt MR. *Anaesthesia for Adults with Cystic Fibrosis*. Volume 23. Anaesth Intens Care; 1995.
- 12 Scott JR, Sowerby LJ, Rotenberg BW. Office-based rhinologic surgery: A modern experience with operative techniques under local anesthetic. *American Journal of Rhinology and Allergy*. OceanSide Publications Inc.; 2017. pp. 135–8.
- 13 Sikand A, Silvers SL, Pasha R, Shikani A, Karanfilov BI, Harfe DT, et al.; ORIOS 2 Study Investigators. Office-based balloon sinus dilation: 1-year follow-up of a prospective, multicenter study. *Ann Otol Rhinol Laryngol*. 2015 Aug;124(8):630–7.
- 14 Lee JT, DelGaudio J, Orlandi RR. Practice Patterns in Office-Based Rhinology: Survey of the American Rhinologic Society. *Am J Rhinol Allergy*. 2019 Jan;33(1):26–35.
- 15 Prickett KK, Wise SK, DelGaudio JM. Cost analysis of office-based and operating room procedures in rhinology. *Int Forum Allergy Rhinol*. 2012 May-Jun;2(3):207–11.