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Endoscopic Sinus Surgery in Patients Infected With HIV

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Objectives: **To be able to plan appropriate surgical treatment for patients with HIV infection who have sinusitis refractory to medical therapy.** ***Design:*** **We retrospectively reviewed the charts of 186 patients with HIV who required surgical treatment for sinusitis between 1987 and 1998. One hundred six charts provided the necessary information and an adequate follow-up to be included in the study. Collected data included preoperative and postoperative symptoms, radiographic staging, CD4 count at the time of surgery when available, and type and extent of surgery.** ***Results:*** **Surgical treatment evolved over the 12 years from limited surgery to standard endoscopic sinus surgery (ESS). Eighteen patients had invasive fungal disease or complications of sinusitis requiring radical surgery. Thirty-six patients were treated with minimal procedures to address involved sinuses only. These patients were treated between 1987 and 1991. Recurrent disease or further complications occurred in 80.6% of the patients in this group. Since 1992, 52 patients were treated with standard ESS following the same indications for HIV− patients. This group had an improvement of symptoms in 75% of the cases, a rate comparable to the success rate in HIV− patients.** ***Conclusions:*** **HIV+ patients undergoing standard ESS enjoy a satisfactory success rate. HIV+ patients with surgical indication for endoscopic sinus surgery should be treated as non-HIV+ patients. Apparently, low CD4 count (< 100) does not serve as a contraindication for definitive surgery.**
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INTRODUCTION

Since its development by Messerklinger in the late 1970s and its introduction to the United States by Kennedy in 1985, endoscopic sinus surgery (ESS) has been widely accepted and applied to inflammatory diseases of the paranasal sinuses. Reported results of this technique have been very good in the general population. However, the safety and effectiveness of ESS in HIV+ patients have not previously been established and have rarely been addressed in the otorhinolaryngological literature.

Chronic sinusitis is a very common condition in the HIV+ population. Sinus infections develop in as many as 68% of HIV+ patients,[1] and up to 95% of randomly chosen AIDS patients have MRI findings consistent with sinus disease.[2] Furthermore, this prevalence will likely increase as new treatment strategies and modalities make HIV more of a chronic condition, and the increasing life expectancy of HIV+ patients will make chronic sinusitis an ever-existing health issue for this population.

Sinusitis poses a difficult clinical challenge in HIV+ patients because of high rates of relapse and the association with unusual pathogens. The initial management of sinusitis in HIV+ patients consists of medical therapy that includes broad-spectrum antibiotics, nasal steroids, antihistamines, decongestants, and mucolytics. However, if the sinus disease or its complications persist despite extensive medical therapy, surgery is indicated.

We surgically treated patients with HIV infection during a 12-year period. Three types of surgery were applied: 1) radical surgery—for patients whose disease extended beyond the sinuses; 2) minimally invasive ESS—used between 1987 and 1991 in patients with disease limited to the sinuses; 3) standard ESS—used since 1992. The purpose of this study was to determine the appropriate surgical intervention for sinusitis in HIV+ patients and to assess the success rate and morbidity of such surgery.

MATERIALS AND METHODS

One hundred eighty-six HIV+ patients required surgical treatment for sinus disease between 1987 and 1998. One hundred six charts provided the necessary information and an adequate follow-up to be included in the study. There were 102 men and 4 women (96.2% and 3.8%, respectively). Ages ranged from 24 to 55 years, with a mean of 42 years. Patients' symptoms were assessed before and after surgery. At a minimum of 6 months after surgery, patients were asked whether they experienced a significant

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improvement, some improvement, no improvement, or worsening of symptoms. Before surgery, all patients underwent coronal computed tomography (CT) scan of the sinuses. The CT scan findings were scored based on the Lund-MacKay CT staging system.[3] Magnetic resonance imaging was performed when a clearer soft-tissue imaging was needed or for the assessment of orbital or brain extension. The absolute T-helper lymphocytes count (CD4) at the time of surgery was recorded when available. An attempt was made to find a correlation between the CD4 count and the surgical outcome. The first postoperative visit was 1 week after the surgery and then monthly as required. Fourteen patients died during the early postoperative period, so the follow-up period ranged from 3 days to 33 months. Except for these early deaths, a minimum follow-up period of 6 months was required as an inclusion criterion for the study, and the mean follow-up was 9 months. The extent of the surgical procedures as well as intraoperative and postoperative complications were recorded. All patients received antibacterial or antifungal therapy or both before and after surgery, according to cultures when available. When preoperative cultures were not available or when they were nondiagnostic (no growth), broad-spectrum antibiotic coverage was used as recommended by the infectious disease service. Because the purpose of this study was to assess the safety and success of surgical intervention and not to analyze the bacteriology of sinusitis in patients with HIV, culture results are not included in this paper.

During the studied years, some of the patients who had disease extending beyond the sinuses required radical surgery (group 1). This type of surgery was performed in both the early and recent years when indicated.

Between 1987 and 1991 most of the procedures were endoscopy-guided but limited and are referred to as minimally invasive ESS (group 2). Indications for surgery were systemic signs accompanying sinus infection or intense pain only. Symptoms of stuffiness, postnasal drip or recurrent infections were not considered indications for surgery in this group. Minimally invasive ESS, as used during these early years, was considered a poor surgical technique and was discontinued after 1991. The principle of this technique was "surgical drainage" of the involved sinuses. The rationale for this approach was that these patients were too sick for standard surgery. In addition to establishing drainage for the acutely infected sinus, the goal was to obtain sinus contents for histopathological and microbiological evaluation while minimizing operative time, bleeding, and morbidity. In most cases, septal deformities were not corrected. Ethmoid disease was treated by partial ethmoidectomy. Maxillary disease was treated with middle meatus antrostomy with or without identification of the natural maxillary ostium. Frontal disease was treated with partial anterior ethmoidectomy. Sphenoidotomy was also performed when the sphenoid was involved.

From 1992, as we gained more experience, the vast majority of the patients underwent standard ESS procedures with conventional ESS instruments. Since 1997, almost the entire procedure was performed with powered instrumentation. The technique used since 1992 is identified as standard ESS. Indications for surgery in this group of patients were the same as for HIV− patients (i.e., chronic or recurrent sinus infection resistant to medical therapy). Symptoms of nasal stuffiness, postnasal drip, facial pressure, anosmia and recurrent infection were considered indications for surgery if medical therapy failed. In this group of patients, deviated septums were corrected to improve nasal breathing or to provide access to the middle meatus when indicated. All patients had maxillary sinusotomy with identification of the natural ostium and ethmoidectomy. Middle turbinates were partially resected until 1997. Since then almost all middle turbinates were preserved and medialized.[4] Frontal sinus surgery was performed in the presence of frontal disease and, since 1997, whenever the potential for iatrogenic frontal recess scarring by anterior ethmoidectomy was suspected (Friedman et al., Paper presented at American Rhinological Society meeting, September 1999, New Orleans). Sphenoidotomy was also performed when the sphenoid was involved.

RESULTS

Radical Surgery Group

Eighteen patients had disease that extended beyond the sinuses (Table I). These patients were scattered throughout the 12 years of our study. However, in most patients disease was diagnosed and treated during the early years of the study. Six patients had invasive fungal sinusitis. Three of them had mucormycosis that required radical debridement; orbital exenteration was required in two of these patients. Disease was controlled in one patient, who lived for 2 years free of sinus disease and died of other complications of AIDS. Three patients had *Aspergillus fumigatus* infection and eventually died. Although death was not a direct consequence of their sinus infections, all died without infection resolution. Four patients presented with orbital abscess and were treated with external drainage. All had resolution of the acute infection but had persistent symptoms of chronic sinusitis. One patient presented with cavernous sinus thrombosis and died within 3 days. Two patients presented with meningitis and one presented with a brain abscess that required craniotomy. All three of these patients died. Four patients presented with soft tissue extension of infection. In three patients, the acute infection was also controlled, but chronic symptoms persisted.

Minimally Invasive Endoscopic Sinus Surgery Group

Between 1987 and 1991, 36 patients were treated with minimal procedures (Table II). CT scan stage ranged from 6 to 22 points according to the Lund-MacKay scoring system. Twenty-seven of these patients had pansinus disease (average score, 15 points). Nine patients had unilateral involvement (average score, 9 points). Success was defined as a subjective report of improvement in symptoms without endoscopic or CT evidence of persistent infection. Only seven patients (19.4%) had a significant improvement or some improvement in preoperative symptoms and no endoscopic evidence of persistent infection. There were no intraoperative complications. Postop-

TABLE I.
Distribution of Diseases Among Extensive Disease Group (N = 18).

Disease	Patients (n)
Invasive fungal sinusitis	6
Orbital abscess	4
Cavernous sinus thrombosis	1
Meningitis	2
Brain abscess	1
Soft tissue extension	4

TABLE II.
Outcome of Patients in Minimally Invasive Endoscopic Surgery Group (N = 36).

	Patients	
	n	(%)
Improvement	7	(19.4)
No improvement	29	(80.6)
Complications		
Intraoperative	0	
Postoperative		
Bleeding	7	(19.4)
Periorbital cellulitis	3	(8.3)
Fever	32	(88.9)
Revision surgery	9	(25)

erative bleeding required repacking in seven patients (19.4%). Bleeding did not cause hemoglobin drops of more that 2 g in any patients. Thirty-two (88.9%) of the patients had postoperative fever higher than 100°F. There were no major complications such as cerebrospinal fluid leak, visual loss, diplopia, or orbital hematoma. Three patients (8.3%) had periorbital swelling and subcutaneous emphysema that resolved after a few days.

Eleven patients (31%) died of other causes but had persistent purulent sinus drainage until their death. Nine patients (25%) had persistent symptoms of chronic infection that ultimately resulted in revision surgery. Some of these revision cases are included in the standard ESS group (1992–1998). Nine patients (25%) had persistent symptoms and evidence of infection until they were lost to follow-up. Altogether, in 29 patients (80.6%) the surgery failed to improve sinus disease.

Standard Endoscopic Sinus Surgery Group

This group included 52 patients who were operated on between 1992 and 1998, including 5 patients (9.6%) who had revision surgery after the minimal invasive ESS failed (Table III). Before surgery the most frequent complaints were nasal congestion (89%), facial pain (57%), postnasal drip (48%), nasal discharge (39%), olfactory disturbance (4%), and fever (4%). The CT scan stage ranged from 4 to 22 points according to the Lund-MacKay scoring system. Eighteen of the patients had pansinus disease (average score, 13 points). Thirty-four patients had unilateral disease (average score, 6 points).

TABLE III.
Outcome of Patients in Standard Endoscopic Sinus Surgery Group (N = 52).

	Patients	
	n	(%)
Improvement	39	(75)
No improvement	13	(25)
Complications		
Intraoperative		
Excessive bleeding	1	(1.9)
Cerebrospinal fluid leak	1	(1.9)
Postoperative		
Periorbital cellulitis	2	(3.8)
Revision surgery	8	(15.4)

After surgery 20 patients (38.5%) reported significant improvement. Nineteen patients (36.5%) reported some improvement. Most of the significantly improved patients were operated on after 1996. Overall, 39 patients (75%) reported an improvement in symptoms. Twelve patients (23%) noted no change in symptoms and one patient (1.9%) felt worse after surgery. Complications included cerebrospinal fluid leak in one patient that was sealed primarily by a middle turbinate flap. One patient with preoperative thrombocytopenia needed multiple transfusions of platelets and vasopressin administration during the surgery because of excessive intraoperative bleeding. Postoperative bleeding required repacking in eight (15.4%) patients. Bleeding did not cause hemoglobin drops of more that 2 g in any patient. There were no major complications such as visual loss, diplopia, or orbital hematoma. Two patients (3.8%) had periorbital swelling with subcutaneous emphysema that spontaneously resolved.

Eight patients (15.4%) required revision surgery. Six patients (11.5%) died of other HIV-related disease. Overall, in 13 patients (25%) surgery failed to improve their symptoms. Five of these patients had persistent massive crusting that necessitated daily nasal irrigation through their entire follow-up.

CD4 counts were available in 21 patients, all of whom underwent standard ESS after 1995. Although based on relatively small numbers, it was interesting to note that the improvement rate in patients with counts of less than 100 CD4 cells/mL was similar to that of patients with higher CD4 counts ($P = .54$ by the Fisher's exact test).

DISCUSSION

Complaints of nasal obstruction and thick postnasal rhinorrhea are very common in patients with HIV infection and recurrent and chronic sinusitis often develops despite medical therapy. Persistent low-grade viral or bacterial infection of the nasal osteomeatal complex or edema secondary to the active allergic response of the nasal mucosa may contribute to this predilection for paranasal sinus infection. Mucociliary transport time is significantly prolonged in HIV+ patients, especially if the CD4 count is less than 280.[5] Besides its role in causing chronic sinusitis, impaired ciliary function was likely a contributing factor to the slower healing and massive crusting that we noticed in some of the patients who failed to improve. The etiology of the slowed mucociliary clearance is likely to be multifactorial and may include ciliary dysfunction and the production of more tenacious mucus as a result of chronic viral infections of the mucosa and increased regional atopy. Because of the increased atopy, the management of allergic rhinitis with nasal corticosteroid sprays and antihistamines plays an important role in the management and prevention of sinusitis in these patients. If chronic sinusitis does not resolve despite this first-line therapy

and antibacterial or antifungal medication, surgery should be considered.

A preliminary 1992 review of 20 consecutive HIV+ patients undergoing ESS suggested that this technique was not as effective as would be expected in the HIV− population, but provided substantial symptomatic relief for most patients.[6]

A recent study from 1998 discusses the role of nasal surgery in 33 patients with AIDS. Twenty-four patients underwent ESS and the remaining 9 patients underwent nasal antral window, Caldwell-Luc operation, or both. The authors concluded that patients with AIDS and chronic sinusitis may benefit from ESS.[7]

This study reviews a series of HIV+ patients treated over 12 years with three different surgical approaches. It is not designed to compare these treatments because each group was treated based on extent of disease and on different philosophies of treatment. The patients with extrasinus extension of disease were treated radically for the entire period and are considered a separate group. The other two groups (minimally invasive ESS and standard ESS) had similar levels of sinus disease, but overall the patients included in the minimally invasive ESS group were sicker and had less immune competence.

The philosophy that informed the treatment adopted between 1987 and 1991 was the minimization of the extent of surgery and operating time to reduce intraoperative and postoperative complications. The guiding criteria for surgical indications were also different because it was presumed that recurrent infection was inevitable. Elective endoscopic surgery was not performed. Surgery was reserved only for patients with systemic signs and symptoms, intolerable pain, or extension of infection beyond the sinuses. Although the minimally invasive procedure resulted in an extremely high failure rate, that group of patients proved that intraoperative and postoperative complication rates in HIV+ patients were reasonable and acceptable. Based on the paucity of complications, the concept of treating HIV+ patients as HIV− patients evolved. The introduction of effective therapeutic regimens for HIV+ patients in recent years led to a change in the perception of HIV from a terminal disease to a chronic illness. The improved disease control permitted the use of standard ESS as the most common surgery for sinusitis in HIV+ patients, comparable to the general population. According to this concept, the standard ESS group was treated like HIV− patients; indications and surgical technique were identical. The results demonstrate that intraoperative and postoperative complication rates are acceptable. Nine-month follow-up also showed that 75% of the patients demonstrated improvement in symptoms and endoscopic evidence of infection control. Even patients with low CD4 counts (< 100/mL) enjoyed a significant improvement rate (67%) and a low complication rate.

We identify three main contributing factors to the dramatically improved surgical outcome through the studied years. First, a change in the criteria for patient selection for surgery—from only the acutely life-threatened and severely sick patients to patients whose sinusitis symptoms interfere with their normal everyday activities. Second, improved surgical technique. And third, less severe disease manifestations in HIV+ patients during the more recent years, following the introduction of potent combined regimens (including protease inhibitors). Long-term follow-up is likely to result in an increased number of failures if viral load increases and immunity fails. Nevertheless, quality-of-life improvement probably warrants surgery.

CONCLUSION

HIV+ patients undergoing standard ESS enjoy a satisfactory success rate of 75%. Apparently, a low CD4 count (< 100) does not serve as a contraindication for definitive surgery. Thus decision-making regarding standard ESS in HIV+ patients should follow the same indications that are used for the general population.

BIBLIOGRAPHY

1. Rubin J, Honigsberg R. Sinusitis in patients with acquired immunodeficiency syndrome. *Ear Nose Throat J* 1990;69: 460–463.
2. Chong WK, Hall-Craggs MA, Wilkirson ID, et al. The prevalence of paranasal sinus disease in HIV infection and AIDS on cranial MR imaging. *Clin Radiol* 1993;47:166–169.
3. Lund VJ, Kennedy DW. Quantification for staging sinusitis. *Ann Otol Rhinol Laryngol* 1995;104:17–21.
4. Friedman M, Landsberg R, Tanyeri H. Middle turbinate preservation and medialization in endoscopic sinus surgery. *Otolaryngol Head Neck Surg* 2000;123:76–80.
5. Milgram LM, Rubin JS, Small CB, et al. Mucociliary clearance abnormalities in the HIV-infected patient: a precursor to acute sinusitis. *Laryngoscope* 1995;105:1202–1208.
6. Blevines NH, Lee KC, Tami CA. Endoscopic sinus surgery in patients infected with the human immunodeficiency virus [abstract]. *Otolaryngol Head Neck Surg* 1992;107:274.
7. Sabini P, Josephson GD, Reisacher WR, et al. The role of endoscopic sinus surgery in patients with acquired immune deficiency syndrome. *Am J Otolaryngol* 1998;19: 351–356.