

Endoscopic Sinus Surgery: How Safe is Safe?

Harris Mosher described intranasal ethmoidectomy as “one of the easiest operations with which to kill a patient” (*Ann Otolaryngol*, 1929).

Utilizing the illumination and magnification of endoscopes, intranasal sinus surgery has significantly evolved in the past two decades. Early in the evolution of endoscopic sinus surgery, major complication rates were as high as 8 percent (*Laryngoscope*, 1987). By 1994, a survey of 3,933 fellows of the American Academy of Otolaryngology-Head and Neck Surgery revealed 77.37 percent were performing ethmoidectomy and by 1999, one multi-surgeon review showed a 0.5% major complication rate (*Otolaryngol Head Neck Surg*, 1994; *Laryngoscope*, 1999). Two approaches to ethmoidectomy were refined and later combined during the first decade of endoscopic surgery. The

first approach entailed resection of the middle turbinate to gain exposure to the posterior ethmoid cells and face of the sphenoid sinus, cannulation of the sphenoid

noid ostium or removal of the anterior wall of the sphenoid sinus, and total ethmoidectomy. The disadvantage of this posterior-to-anterior procedure is that a

patient with limited or isolated sinus disease must undergo surgery of the entirety of sphenoid, ethmoid and maxillary sinuses. In contrast, Messerklinger and Stammberger utilized their studies of the physiology of the sinuses to apply the optical telescope to modify the anterior ethmoidectomy of Halle (*Arch Laryngol Rhinol*, 1915; *Otolaryngol. Head Neck Surg*, 1986). This permitted selectively limiting surgery to the pathologic sinuses. In performing this anterior-to-posterior approach, surgery begins with anterior ethmoidectomy and is extended posteriorly depending on the diseased sinuses. The disadvantage of an anterograde dissection of the ethmoid cells is penetration of the postero-inferiorly



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The State of Biofilm

Biofilm has attracted a lot of research interests in recent years. The Centers for Disease Control and Prevention estimate that biofilm is involved in more than 65% of all bacterial infectious processes in humans.¹ A biofilm is defined as a collection of bacteria in an organized matrix attached to a surface. It is believed that 99% of all bacteria exist in this biofilm state while only 1% in the planktonic state. The formation of biofilm dictates a different gene expression in those bacteria from their free floating counterpart and hence affords them increased resistance to antibiotics.

A number of clinical conditions are believed to be associated with biofilms. Within our specialty, biofilm is implicated in tympanostomy tube otorrhea, frontal recess stent, voice prosthesis, and chronic rhinosinusitis (CRS).^{2,3,4} The condition of CRS is especially relevant since we all know the recalcitrant nature

of the disease despite antibiotic and surgical treatments.

So does biofilm really matter in CRS?

A few studies recently investigated the incidence of biofilm in patients with CRS. Using scanning electron microscopy (SEM), Ramadan et al. and Sanclement et al. demonstrated the presence of biofilm in 100% and 80% of the study population, respectively.^{5,6} Moreover, the latter group found no biofilm in the control population. On the other hand, Sanderson et al. used fluorescent in situ hybridization (FISH) technique and detected biofilms in both the patient and the control group.⁷ The incidence rates had no statistical difference between the two study groups. Interestingly, FISH allowed specific speciation of the bacteria involved in the biofilm, an advantage over the SEM technique. However, no correlation was found between the bacteria discovered in the

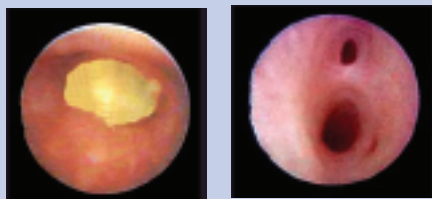
biofilms and those from conventional cultures in patients with CRS.

A more recent investigation by Psaltis et al. used confocal scanning laser microscopy (CSLM) as a nondestructive and noninvasive method to examine biofilms in CRS patients.⁸ It avoided the inherent problems with tissue preparation in electron microscopy, including tissue dehydration and sampling. In their study, CSLM detected a lower incidence of biofilm in patients with CRS (44%) compared with the SEM technique in the previous two studies. The significance of biofilm was brought into question when the authors discovered no statistical difference in symptom scores comparing CRS patients with and without biofilms.

In conclusion, the debate on the role of biofilm in CRS underscores the importance in developing a universally accepted method to identify and

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Sialoendoscopy Permits Treatment in Ambulatory Setting



The first picture is sialolith in the submandibular gland duct.

The second is endoscopic view of the Wharton's duct and first generation divisions.

Sialolithiasis (formation of stones in the ducts of the major salivary gland) is one of the major reasons for recurrent parotid and submandibular swellings. Stones create mechanical obstruction for the salivary flow and cause repetitive transitory swelling and pain often complicated by the recurrent infections. Traditionally, recurrent episodes of infections lead to open surgery with a necessary hospital admission and postoperative facial scars.

Sialoendoscopy is a novel minimally invasive approach which allows us to visualize the lumen of the salivary ducts and their pathology. With the help of the miniature endoscopes we are able to both visualize and remove salivary gland stones in the ambulatory setting.

Prepared by Gennady Ukrainsky, MD

Prescribing Antibiotics Appropriately for Rhinosinusitis

The appropriate antibiotic regimen for acute bacterial rhinosinusitis (ABRS) requires that the patients be divided into two categories: 1) patients with mild symptoms and have not received antibiotics in the past 4-6 weeks, and 2) patients with mild symptoms and have received antibiotics in the past 4-6 weeks or with moderate symptoms regardless of recent antibiotic exposure. As seen in the first table, for adult patients who have not received recent antibiotics and have mild symptoms, appropriate antibiotics include: amoxicillin/clavulanate (1.75-4 gm/250 mg per day), amoxicillin (1.5-4 gm per day), cefpodoxime proxetil, cefuroxime axetil, or cefdinir. For β -lactam allergic patients, TMP/SMX, doxycycline, azithromycin, clarithromycin, erythromycin, or telithromycin may be considered as alternatives but a failure rate as high as 25% may be possible so these patients need to be evaluated closely. For adult patients who have received

recent antibiotic exposure or for those with moderate disease, the appropriate antibiotic would be 1) a respiratory fluoroquinolone (eg. levofloxacin), or 2) high dose amoxicillin/clavulanate (4 gm/250 mg per day). The patient needs to be reevaluated if the symptoms are not improved in 72 hours. A change of antibiotics may be needed with consideration of the limitations of coverage by the first antibiotic, possible fiberoptic endoscopy, CT scan, and/or sinus culture. As seen in the second table, for children with mild disease and no recent antibiotic exposure, the recommended antibiotics are the same as in adults at pediatric doses (amoxicillin/clavulanate at 90 mg/6.4 mg per kg per day, amoxicillin at 90 mg/kg per day). For children who have mild disease and recent antibiotic exposure or moderate disease, the recommendation is high dose amoxicillin/clavulanate (90 mg/6.4 mg per kg per day). TMP/SMX, azithromycin, clarithromycin, and erythromycin is pre-

ferred if the child is β -lactam allergic in either of the above two groups.

Additionally, the importance and effectiveness of non-antibiotic treatment modalities should be emphasized. Treatment with nasal saline irrigations and topical anti-inflammatory agents such as nasal corticosteroids can provide symptomatic relief and expedite the resolution of symptoms from ABRS. The predicted spontaneous resolution rate of ABRS has been found to be as high as 62% so physicians should use their clinical judgment to determine whether or not their patients with ABRS has symptoms mild enough to warrant a non-antibiotic treatment regimen and whether they would be compliant with such a regimen.

References

1. Sinus and Allergy Health Partnership. Antimicrobial treatment guidelines for acute bacterial rhinosinusitis. *Otolaryngol Head Neck Surg* 2000;123:S1-31.

Prepared by Edwin K. Chan, MD

Table 1: Recommended antibiotic therapy for adults with ABRS

Initial therapy	Calculated clinical efficacy (%)	Calculated bacteriologic efficacy (%)	Switch therapy options (no improvement or worsening after 72 hours)
Mild disease with no recent antimicrobial use (past 4 to 6 weeks)			
Amoxicillin/clavulanate (1.75-4 g/250 mg/d)	90-91	97-99	
Amoxicillin (1.5-4 g/d)	87-88	91-92	Gatifloxacin, levofloxacin, moxifloxacin
Cefpodoxime proxetil	87	91	Amoxicillin/clavulanate 4g/250 mg
Cefuroxime axetil	85	87	Ceftriaxone
Cefdinir	83	85	Combination Therapy
β-Lactam allergic#			
TMP/SMX	83	84	
Doxycycline	81	80	Gatifloxacin, levofloxacin, moxifloxacin
Azithromycin, clarithromycin, erythromycin	77	73	Rifampin plus clindamycin
Telithromycin	77	73	
Mild disease with recent antimicrobial use (past 4 to 6 weeks) or moderate disease			
Gatifloxacin/levofloxacin/moxifloxacin	92	100	
Amoxicillin/clavulanate (4 g/250mg)	91	99	Re-evaluate patient
Ceftriaxone	91	99	
(Combination Therapy)			
β-Lactam allergic#			
Gatifloxacin, levofloxacin, moxifloxacin	92	100	Re-evaluate patient
Clindamycin and rifampin			Re-evaluate patient

Table 2: Recommended antibiotic therapy for children with ABRS

Initial therapy	Calculated clinical efficacy (%)	Calculated bacteriologic efficacy (%)	Switch therapy options (no improvement or worsening after 72 hours)
Mild disease with no recent antimicrobial use (past 4 to 6 weeks)			
Amoxicillin/clavulanate (90 mg/6.4 mg/kg per day)	91-92	97-99	Amoxicillin clavulanate (90 mg/6.4 mg/kg per day)
Amoxicillin	86-87	90-92	Ceftriaxon
Cefpodoxime Proxetil	87	92	Combination therapy
Cefuroxime axetil	85	88	
Cefdinir	84	86	
β-Lactam allergic#			
TMP/SMX	83	84	Re-evaluate patient
Azithromycin, clarithromycin, erythromycin	78	76	Combination therapy
Mild disease with recent antimicrobial use (past 4 to 6 weeks) or moderate disease			
Amoxicillin/clavulanate (90 mg/6.4 mg/kg per day)	92	99	Re-evaluate patient
Ceftriaxone	91	99	
β-Lactam allergic#			
TMP/SMX	83	84	Re-evaluate patient
Azithromycin, clarithromycin, erythromycin	78	76	Combination therapy (clindamycin or TMP/SMX plus rifampin)
Clindamycin	79	78	

Table 1. Recommended antibiotic therapy for adults with ABRS (Reproduced with permission from Elsevier, Sinus and Allergy Health Partnership. Antimicrobial treatment guidelines for acute bacterial rhinosinusitis. *Otolaryngol Head Neck Surg* 2000;123:S1-31)

Table 2. Recommended antibiotic therapy for children with ABRS (Reproduced with permission from Elsevier, Sinus and Allergy Health Partnership. Antimicrobial treatment guidelines for acute bacterial rhinosinusitis. *Otolaryngol Head Neck Surg* 2000;123:S1-31)

Combined Endoscopic and Transconjunctival Orbital Decompression for Compressive Thyroid Orbitopathy/Neuropathy

Orbital manifestations develop in nearly half of all patients with Graves disease. The pathophysiology of thyroid-related orbitopathy (TRO) has not been clearly elucidated, although autoimmunity against eye muscle and orbital fat antigens has been proposed. Patients with TRO can have ocular findings ranging from mild exposure to acute vision loss, with up to 9% of patients developing compressive optic neuropathy (CON). Because CON results from orbital apex compressive myopathy and is not related to exophthalmos, such patients may be unrecognized and their treatment delayed (Fig. 1). Interstitial edema, lymphocyte and mast cell infiltration, and mucopolysaccharide accumulation, especially in the extraocular muscles and retrobulbar fat, can result in compression of the optic nerve. When this occurs at the orbital apex, where there is limited cross-sectional area, patients may present with optic nerve dysfunction but with minimal proptosis. Clinically, in these patients with thyroid-related orbitopathy, exposure keratopathy can lead to corneal ulceration and chemosis. Restrictive ocular myopathy causing diplopia results from inferior and medial rectus muscle enlargement leading to restriction of globe movement. In the most severe cases, CON results from encroachment by the extraocular muscle mass on the optic nerve in the orbital apex.

In 2002, The New York Eye and Ear Infirmary reported their nine-year expe-

rience with combined endoscopic and transconjunctival orbital decompression for severe TRO orbitopathy/neuropathy (*Laryngoscope*, 2002). 72 combined endoscopic and transconjunctival decompressions were performed on 41 patients with orbital apex compression. Visual acuity improved in 89.3% of the patients with compressive optic neuropathy ($P < .0005$) and in 34.1% of those without neuropathy. Proptosis was reduced by 3.65 mm, on average. (see Table II)

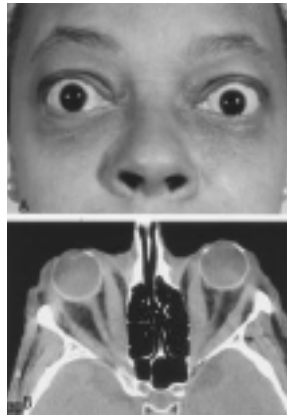


Fig. 1 Reproduced with permission of Laryngoscope, 2003

Over the past five years, approximately 534 patients have undergone surgical treatment with similar results to the early population. These combined results demonstrate that surgical treatment of severe TRO is both efficacious and safe in patients who have failed initial medical management and/or rapid loss of vision refractive to medical treatment.

Prepared by Steven D. Schaefer, MD

Table II.
Percentage Change in Visual Acuity Lines During Postoperative Course

	Vision Loss at Preoperation		Not Vision Loss at Preoperation	
	No. (28)	Percent	No. (44)	Percent
Postoperation visit				
Visual lost	5	(17.9)	18	(40.9)
No vision change	9	(32.1)	22	(50.0)
1-5 lines improved	13	(46.4)	4	(9.1)
≥6 lines improved	1	(3.6)	0	(0.0)
One-month visit				
Visual lost	1	(3.6)	15	(34.1)
No vision change	3	(10.7)	21	(47.7)
1-5 lines improved	15	(53.6)	7	(15.9)
≥6 lines improved	9	(32.1)	1	(2.3)
Final Visit				
Visual lost	1	(3.6)	6	(13.6)
No vision change	2	(7.1)	23	(52.3)
1-5 lines improved	13	(46.4)	14	(31.8)
≥6 lines improved	12	(42.9)	1	(2.3)

Note: Fisher's exact test (two-tailed): Vision loss at preoperation: postoperation vs. 1-month visit: $P = .0052$; postoperation vs. final visit: $P = .000454$. 1-month visit vs. final visit: $P = .857$.

Not vision loss at preoperation: postoperation vs. 1-month visit: $P = .578$; postoperation vs. final visit: $P = .000287$. 1-month visit vs. final visit: $P = .063$.

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Nasopharyngeal Cancer in New York City

Nasopharyngeal cancer (NPC) is highly prevalent in Southern China and Southeast Asia. In New York City, where there is a large number of Chinese immigrants from the endemic areas in Asia, the average incidence is over 100 cases per year, with the majority involving Asians. High-risk patients include those with family members with NPC and those of Southern Chinese descent. However, American born Chinese are still 7 times more likely to develop NPC than their non-Asian counterparts.

There are three subtypes of NPC as classified by the World Health Organization (WHO). The NPC found in many Chinese patients are of the WHO type II and III varieties. These two undifferentiated forms of NPC are often associated with prior Epstein-Barr Virus (EBV) exposure. EBV associated NPC makes up approximately 90-95% of Asian NPC cases. Environmental factors and genetic predispositions are also believed to play a role in the development of NPC, but the exact pathophysiology has not been elucidated.

While early NPC is highly curable, the location of the nasopharynx can pose a diagnostic challenge even to the otolaryngologist. Early or endophytic tumors can be missed on routine endoscopy and CT scan. Usually by the time a patient develops symptoms such as nasal obstruction, hearing loss, or a neck mass, the disease is in the later stages. Definitive diagnosis can only be made by a tissue biopsy. Serologic testing for NPC had been limited

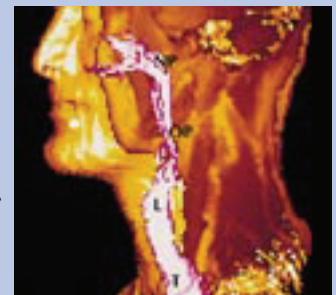
to nonspecific tests for immunoglobulin against EBV capsid antigen. Since a significant portion of the general population has past exposure to EBV, the IgA level in many patients would be positive. A novel method using rapid PCR was developed in Hong Kong, China to detect EBV DNA in the peripheral blood of patients. This assay has a high degree of sensitivity (95%) and specificity (98%) in the test population in Hong Kong. The plasma EBV DNA level also correlates well with the stage of the disease.

At The New York Eye and Ear Infirmary, we have utilized both EBV IgA and DNA methods in evaluating our NPC patients. Our results are encouraging and data have recently been published (O et al., Plasma Epstein-Barr virus immunoglobulin A and DNA for nasopharyngeal carcinoma screening in the United States. *Otolaryngol Head Neck Surg.* 136(6):992-7, 2007). We are continuing our effort to refine our methods to improve sensitivity and specificity. Our hope is that these tests will become important tools in detecting and monitoring the disease in NPC patients.

To promote awareness of NPC, The



Latest technology in PCR technique being employed at The New York Eye and Ear Infirmary for Nasopharyngeal Cancer research



View of nasopharynx

New York Eye and Ear Infirmary and Beth Israel Medical Center have jointly sponsored an annual NPC awareness event for the nearby Chinatown community. Volunteer physicians and staff donate their time for a day of lectures and physical examinations to provide free NPC screening for participants. It is our hope that such effort along with our research will lead to earlier detection and treatment, and improved outcome for our patients who are afflicted with this insidious cancer.

Prepared by James C.L. Li, MD

Endoscopic Sinus Surgery

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sloping skull base as instruments are advanced into the nose. In 1992, the faculty of the Department of Otolaryngology at The New York Eye and Ear Infirmary formalized a combined approach to endoscopic sinus surgery (**CAPS**). **CAPS** seeks to bring together the salient features of the anterior-to-posterior and posterior-to-anterior approaches, while observing the concept of functional endoscopic sinus surgery. In the current vernacular, **CAPS** is an example of *minimally invasive* surgery by seeking the least disruption of form and function of the paranasal sinuses. Schaefer reported in 1998 a five-year experience with **CAPS** in 509 patients undergoing a total of 2,509 procedures (*Laryngoscope*, 1998). 252 of these patients had undergone prior surgery by another surgeon, with the author revising 2.9% of his patients during the same period. Puncture of the dura by a spinal needle without post-operative CSF rhinorrhea was the only major complication.

Building on this experience, Schaefer, Li and Branovan reported their recent **CAPS** experience in 2,344 patients (*Laryngoscope*, 2006). In this updated series, one patient had intraoperative CSF rhinorrhea while removing a mucocele from the dura and another intraoperative subperiosteal orbital hemorrhage from the anterior ethmoidal artery. Both problems were successfully treated at the time of the initial surgery and had no postoperative sequelae. This major complication rate of 0.1% compares very favorably to other recent reports in smaller numbers of patients citing a 5.6 to 6.6% major complications (*Otolaryngolog Head Neck Surg*, 2006). These unusually good results demonstrate “how safe is safe in sinus surgery.” The best answer is that results improve with the surgeon’s experience, patient selection (revision surgery being more difficult) and the complexity of the disease process. **CAPS** has allowed sinus surgery to be performed on even the most complex cases with infrequent complications and safely.

Prepared by Steven D. Schaefer, MD

The State of Biofilm

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characterize biofilm. Before that, little can be said about the true incidence of the phenomenon, let alone its significance in sinus diseases. Effort should be directed to clarify this in future research.

Prepared by Brett Z. Wu, MD

¹Potera C. Forging a link between biofilms and disease. *Science* 1999;283:1837-9.

²Post J. Direct evidence of bacterial biofilms in otitis media. *Laryngoscope* 2001;111:2083-94.

³Perloff JR, Palmer JN. Evidence of bacterial biofilms on frontal recess stents in patients with chronic rhinosinusitis. *Am J Rhinol* 2004;18(6):377-80.

⁴Van Den Hoogen F, Oudes M, Hombergen G, et al. The Groningen, Nijdam and Provox voice prostheses: a prospective clinical comparison based on 845 replacements. *Acta Otolaryngol* 1996;116:119-124

⁵Ramadan HH, Sanclement JA, Thomas JG. Chronic rhinosinusitis and biofilms. *Otolaryngol Head Neck Surg* 2005;132:414-7.

⁶Sanclement JA, Webster P, Thomas J, et al. Bacterial biofilms in surgical specimens of patients with chronic rhinosinusitis. *Laryngoscope* 2005;115:578-82.

⁷Sanderson AR, Leid JG, Hunsaker D. Bacterial biofilms on the sinus mucosa of human subjects with chronic rhinosinusitis. *Laryngoscope* 2006;116:1121-6.

⁸Psaltis AJ, Ha KR, Beule AG, et al. Confocal Scanning laser microscopy evidence of biofilms in patients with chronic rhinosinusitis. *Laryngoscope* 2007;117:1302-6.

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