Oropharyngeal and Oral Cancers: Rethinking the Causes

By Brian B. Burkey, MD, FACS

Over the past decade, clinicians and researchers involved in the treatment of squamous cell carcinoma (SCC) of the upper aerodigestive tract have noted a significant increase in the incidence of these cancers in the oropharynx. In fact, more than 7,000 new cases of oropharyngeal SCC are being diagnosed each year, many of them in men with a minimal history of tobacco use. Cleveland Clinic’s Head & Neck Institute is conducting several ongoing studies to assess various aspects of this disease entity.

Oropharyngeal Cancers: The Etiology Goes Viral

Most SCCs of the oropharynx are now being attributed to the effects of human papillomavirus (HPV) infection. HPV integrates into the cellular DNA and facilitates the development of neoplastic cells and eventually cancer. Even aside from its association with oropharyngeal cancers, HPV is a major health problem in the United States. It has become the most common sexually transmitted disease, and at least half of all sexually active people will be exposed to this virus.

Of the more than 100 strains of HPV, two — HPV-16 and HPV-18 — are associated with an increased risk of oropharyngeal cancer. These are the same two strains that are linked to cervical cancer in women. It is surmised that the connection between the two manifestations is that they are both spread by direct mucosal contact. The increase in HPV infection among men, and hence the risk of oropharyngeal cancer, appears to be related to the performance of oral sex upon infected women.

Some Good News for Patients

The HPV-related oropharyngeal cancers are distinct from the base-of-tongue and tonsillar cancers that historically have been seen in older populations of patients with a history of tobacco and alcohol abuse, who are usually HPV-negative. We are now finding that HPV-related oropharyngeal cancers are occurring in younger patients in whom tobacco abuse is much less common. These patients present with a more advanced stage of disease, and their cancers are more poorly differentiated than are HPV-negative tumors.

The good news is that HPV-related oropharyngeal cancers respond better to treatment than do the tobacco- and alcohol-related oropharyngeal cancers. As many as 80 to 90 percent of HPV-related cancers can be cured with combined-modality treatment — either chemoradiation therapy or surgery and...
From the Chairman

DEAR COLLEAGUE:

One of the many rewards of practicing in Cleveland Clinic’s Head & Neck Institute is that we are always encouraging ourselves to recognize and act on emerging trends. One new development we have responded to is a change in the etiology — and hence the demographics — of oropharyngeal cancers.

In the cover story of this issue of Advances in Otolaryngology & Dentistry, Dr. Brian Burkey explains how most of these cancers are now caused by human papilloma-virus (HPV) infection and are generally being seen in younger patients who don’t smoke. Compared with patients who fit the traditional patient profile (older, positive smoking history, HPV-negative), these younger patients are presenting at a more advanced stage of disease. The good news is that the HPV-positive patients respond better to treatment. Dr. Burkey’s article shares his research team’s insights into why this is so, along with their emerging findings that suggest a bacterial origin for many oral cancers.

Another rewarding aspect of practicing in the Head & Neck Institute is that sometimes we are able to put a smile on a patient’s face — literally as well as figuratively. In his contribution to this issue, Dr. Joseph Krajekian (p. 14) illustrates the remarkable work that our oral and maxillofacial surgery team is accomplishing in prosthetic correction of facial deformities. We are among the leading practitioners of virtual surgical planning based on three-dimensional computer imaging, which results in better outcomes than what we usually see with traditional techniques.

Saving face in another sense is the mission of our plastic and reconstructive surgery team, which is collaborating with other Cleveland Clinic departments to restore the cosmetic appearance of patients undergoing surgery for massive and complex head and neck tumors. In a departure from the norm, we’ve developed a means of performing Mohs surgery to clear surgical margins during the excision itself, as described by Dr. Michael Fritz (p. 8). The result is that patients achieve a satisfactory appearance much more quickly than with the traditional approach.

Elsewhere, our commitment to innovation is being put to good use in numerous ways, such as applying advancements in endoscopic repair of cerebrospinal fluid leaks and skull base defects (p. 4); broadening the base of patients eligible for cochlear implants (p. 6); treating the rare but debilitating semicircular canal dehiscence (p. 10); expanding the laryngeal applications of Coblation® therapy (p. 12); quickly restoring speech in total laryngectomy patients (p. 16); maximizing cost-effectiveness in audiology (p. 18); and helping define the applications of endoscopic dacryocystorhinostomy in pediatric patients (p. 20). And since the proof is in the patient, we’ve included a few sidebars to share some of our patients’ thoughts on these advances as well.

I believe this commitment to innovation was an important factor in Cleveland Clinic’s ranking as one of the top 2 ear, nose and throat programs in the country in U.S. News & World Report’s 2012 “America’s Best Hospitals” survey. In addition to this recognition for our program, a number of our staff members have achieved national recognition over the past year (p. 22).

We hope you find this issue beneficial for you and your patients. I urge you to share any comments and feedback you may have.

Respectfully,

Michael S. Benninger, MD
Chairman, Cleveland Clinic Head & Neck Institute
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Probability of survival

Negative
Positive − nonsmoker
Positive − smoker

0 1 2 3 4 5 6 7 8 9 10 11 12

Months from treatment

P = 0.01

Oropharyngeal and Oral Cancers (continued from p. 1)

radiation therapy. These cure rates are twice as high as those for HPV-negative tumors.

One of the current studies under way in the Head & Neck Institute, in partnership with Cleveland Clinic’s Taussig Cancer Institute, is an investigation of the prevalence of HPV in SCCs of the cervical lymph nodes in which the primary site is unknown. Our goal is to correlate HPV status with treatment outcomes. The complete genesis of these cancers remains controversial, but many clinicians believe they originate in small nests in the oropharynx. Our findings suggest that the improvement in survival in patients with HPV-positive oropharyngeal cancers is also seen in those with HPV-positive SCC without a known primary site, regardless of the type of treatment. We presented our preliminary findings in July at the 8th International Conference on Head and Neck Cancer (Figure).

Oral Cancers: A Bacterial Culprit

We are also working with researchers in Cleveland Clinic’s Genomic Medicine Institute to investigate factors that promote oral cancers. Most cancers of the oral cavity are SCCs. Many of them may be related to the bacterial flora that is present in the patient’s mouth. We are currently conducting an NIH-funded study that correlates certain bacterial populations in the mouth and their association with oral cancers. Our early findings suggest that further investigation of bacterial populations in oral cancers is warranted in order to improve cancer diagnosis, treatment and prognosis. Our results also suggest a potential role for salivary screening as a measure of risk for oral cancers. The complete study will be published in *Human Molecular Genetics*.

Two Databases Play Pivotal Role

The two studies mentioned above, as well as others that are ongoing in the Head & Neck Institute, relied greatly on the availability of two databases that we developed.

One database, which was started in 1994, contains potentially useful demographic information about patients with tumors of the upper aerodigestive tract. We hope these data may yield clues to the development of these cancers.

The other database, which was started in 2009, is a tissue repository where we save tumor tissue, saliva, blood and normal tissue obtained from patients with head and neck SCCs and retrieve this material for use in studies. The tissue repository is key to the future investigation of cancers, which will become increasingly sophisticated as the roles of genetics and microbiology move to the forefront of cancer research. The repository was developed with the help of Cleveland Clinic’s Genomic Medicine Institute and Department of Plastic Surgery. This multidisciplinary approach to research in head and neck cancer allows Cleveland Clinic to remain on the leading edge of head and neck cancer research, teaching and patient care.

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Brian B. Burkey, MD, FACS

Figure. Survival over time among patients with an unknown primary SCC of the upper aerodigestive tract. Graph compares HPV-negative patients, HPV-positive non-smokers and HPV-positive smokers. Note the substantially greater survival among both HPV-positive groups compared with the HPV-negative group. All differences among groups are statistically significant.
New Developments in Endoscopic CSF Leak Repair and Skull Base Reconstruction

By Raj Sindwani, MD

Surgical repair of cerebrospinal fluid (CSF) fistulae of the skull base and associated meningoencephaloceles is recommended to prevent intracranial infections. Traditionally, sinonasal CSF leaks were repaired via craniotomy approaches that are associated with significant morbidity, including external incisions, cerebral edema related to brain retraction, hemorrhage and anosmia. More recently, endoscopic management of CSF leaks and meningoencephaloceles has gained significant favor, with several studies demonstrating excellent success rates and markedly reduced morbidity.

Over the past few years, we in the Section of Rhinology, Sinus and Skull Base Surgery have taken advantage of significant advances in surgical techniques and technology to successfully manage CSF leaks and associated skull base lesions. We have also taken part in a notable evolution in the evaluation strategy and perioperative management of these complex cases.

Reconstruction Techniques

For most patients with a CSF leak, with or without a minor breach of the skull base, successful reconstruction can be easily accomplished by using mucosal grafts in an overlay fashion. Free mucosal grafts are much simpler to work with than are pedicled grafts, and they are readily harvested from the septum or turbinates. Generally, a multilayered repair is recommended for larger defects in which a significant amount of bone is missing. This allows placement of tissues intracranially in an underlay fashion between the dura and the intracranial aspect of the skull base. Rigid tissues (bone and cartilage) are often used to reconstruct the bony defects encountered in the setting of associated meningoencephaloceles after the herniated intracranial contents are resected. A second layer of material is then placed on the nasal side of the skull base as an overlay graft to complete the “sandwich” repair (Figure). Grafts can be secured in place with a tissue sealant (fibrin glue) and supported with absorbable and nonabsorbable nasal dressings. Consideration is given to lumbar drain placement, particularly in more complex cases.

We routinely measure opening intracranial pressure at the start of all CSF leak repairs, and we modify our surgical technique and postoperative management strategy in all patients whose pressure is high.

A variety of materials can be used for grafting. It is interesting that for most CSF leaks, all of the available options in terms of materials and techniques that have been used for repairs have been shown to be successful. Specifically, no differences have been seen between pedicled and free grafts and between underlay and overlay techniques. Even alloplastic materials work well. In our practice, the more robust pedicled intranasal flaps (e.g., the posteriorly based septal flap and the inferior turbinate flap) are usually reserved for larger defects and for high-flow or recurrent CSF leaks. Remote donor sites (e.g., the fascia lata and temporalis fascia) are also sometimes considered for harvesting tissues for extensive skull base repairs, depending on the availability and suitability of intranasal graft sources.

Controlling Bleeding

Our ability to manage CSF leaks and associated skull base pathology has been significantly augmented by technological innovations that enhance our ability to control bleeding at the skull base. Achieving hemostasis during endoscopic skull base procedures is of paramount importance, as persistent bleeding interferes with visualization of the surgical field and can lead to serious consequences. Special considerations in achieving hemostasis include the varying geometry of the anterior skull base and the relative contraindication to the use of monopolar cautery.

The ergonomics of bipolar instruments modified for endoscopic use has improved significantly over the past several years, and a few other exciting tools have recently been introduced. For example, our surgeons have gained significant experience with a novel bipolar microdebrider (PK diego®; Gyrus ACMI, ENT Division; Bartlett, Tenn.) that can actually control bleeding while it performs its shaving and suctioning functions. A variety of bipolar-energy blades are available to facilitate access to different areas of the skull base.
Another exciting advance is the application of the Coblator® (ArthroCare ENT; Austin, Texas) to ablate benign disease at the skull base and achieve hemostasis with bipolar energy. The major advantage of this instrument in skull base procedures is that the malleable wand permits near-bloodless tissue removal. Two limitations of this technology in sinus and skull base surgery are that (1) it is not very effective at taking down bone and (2) no tissue specimen is captured for pathologic examination. These innovations have begun to exert a significant impact in the field of minimally invasive skull base surgery, and we now use them routinely.

A New Trend in Perioperative Management

The presence of elevated intracranial pressure (ICP) has been shown to be a key factor that can determine the success or failure of CSF leak repair, and more attention is being paid to this complicating issue. An elevated ICP is defined as a sustained pressure of more than 20 cm H₂O. When discovered in the setting of an active CSF leak, an elevated ICP is now routinely treated aggressively with pharmacotherapy or shunting. An elevated ICP should be specifically ruled out in all patients with a spontaneous CSF leak, recurrent or multiple leaks, or empty sella syndrome. We now routinely measure opening pressure at the start of all CSF leak repairs, and we specifically modify our surgical technique and postoperative management strategy in all patients whose ICP is high. We believe that this more tailored and aggressive approach has translated into better outcomes in this more complicated subset of patients. 

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Expanding the Number of Potential Recipients of Cochlear Implants: Too Many Candidates Are Being Missed

By Sarah Sydlowski, AuD, PhD

When it comes to cochlear implants, the disappointing truth is that only 8.9 percent of Americans who are candidates for these devices have actually received them. According to the National Institute on Deafness and Other Communication Disorders, at least 750,000 Americans have severe to profound hearing loss, but only 67,000 of these individuals (41,500 adults and 25,500 children) have undergone implantation. Worldwide, about 188,000 patients have received a cochlear implant. In the Hearing Implant Program at Cleveland Clinic, we are taking steps to identify suitable candidates for cochlear implantation who may have previously gone unrecognized.

Improving Postimplantation Outcomes

A critical factor in reaching possible implantation candidates is recognizing that the criteria for referral for cochlear implantation have changed. Several preimplantation factors have been identified that challenge historical guidelines for implantation, but they may improve postimplantation outcomes for postlingually deafened adults. These baseline characteristics include a shorter duration of deafness, consistent and appropriate amplification of the ear to be implanted, greater residual hearing, higher word recognition scores and the possibility of binaural hearing post-implantation. Most of these factors are associated with better spiral ganglia survival, which highlights the importance of intact and abundant neural fibers in achieving successful electrical stimulation.

More recently, advances in technology such as new electrode array designs have introduced the possibility of actually preserving cochlear structures and residual acoustic hearing. Research has demonstrated the myriad benefits of usable acoustic hearing in combination with cochlear implantation in a variety of listening modes, including bimodal (a cochlear implant in one ear and a hearing aid in the other) and combined (both a cochlear implant and a hearing aid in the same ear). These benefits include improved localization ability, better speech recognition in noise and an enhanced appreciation of music. Anecdotally, patients report that sound is richer, fuller and more balanced.

Broadening the Base of Potential Candidates

In 2011, a new Minimum Speech Test Battery for Adult Cochlear Implant Users (MSTB) was introduced to broaden the base of possible cochlear implantation candidates, including those with substantial residual hearing. The new MSTB contains more challenging materials (AzBio Sentences, CNC Words and the BKB SIN test) that are designed to better reflect the real-world experiences of patients with hearing loss (see first sidebar). These tools are designed to assess speech understanding in different listening environments (in quiet and in background noise) and in high and low context (words and sentences). While the indications for cochlear implantation (see second sidebar) have not changed, the MSTB identifies potential candidates who might have been missed previously when less challenging evaluation materials were used. Additionally, because the unimplanted ear may have no worse than a moderate hearing loss, implanted patients may be able to benefit from bimodal stimulation, which results in improved speech recognition in both quiet and noise.

A recent review of cochlear implant recipients in our Hearing Implant Program suggested that bimodal recipients with greater residual hearing preimplantation who may have previously not been considered cochlear implantation candidates could outperform unilateral and bilateral recipients with poorer preoperative residual hearing. Although unilateral and bilateral cochlear implant recipients were more typical of recipients implanted using historical candidacy guidelines, our results suggest that earlier implantation may result in very positive outcomes. Specifically, bimodal recipients achieved higher scores on harder tasks (the new MSTB) than unilateral and bilateral recipients did on easier tasks (the old MSTB). Our findings illustrate that
The new test battery contains more challenging materials that are designed to better reflect the real-world experiences of patients with hearing loss.

patients with greater residual hearing at the time of implantation demonstrate greater improvements in speech recognition, and they do so more quickly. They are also better equipped to handle the more challenging test materials than are patients with less residual hearing at the time of implantation.

The compelling benefits of bimodal hearing suggest that better outcomes can be achieved by earlier referral for cochlear implantation than by waiting until hearing deteriorates to the point where hearing aids provide little or no benefit, as has traditionally been the norm. Our Hearing Implant Program routinely evaluates patients who may have previously been considered borderline cochlear implantation candidates. These patients consistently surpass their preoperative, bilaterally aided speech understanding ability postoperatively when listening in the bimodal condition. It is important to note that we do not focus solely on pure-tone thresholds but rather use the new MSTB to comprehensively and longitudinally evaluate a candidate’s current communication status to optimize postoperative success. Our outcomes confirm the value of referring, evaluating and implanting earlier, while patients are still able to benefit from residual acoustic hearing in combination with electrical stimulation.

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### A Real-World Example of MSTB Success

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<td></td>
<td>(two hearing aids)</td>
<td>(two hearing aids)</td>
<td>(cochlear implant and hearing aid)</td>
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<td>Former MSTB</td>
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<td>Current MSTB</td>
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| Sentences in quiet       | 88%             | 54%             | 99%             |
| Words in quiet           | Did not test    | 4%              | 92%             |
| Sentences in noise       | Did not test    | Severe difficulty | Mild difficulty |

A 54-year-old woman presented to Cleveland Clinic’s Hearing Implant Program with a moderate (40 dB HL at 125 Hz) sloping to profound sensorineural hearing loss. She reported a 12-year history of progressive, appropriately amplified sensorineural hearing loss. She had been previously disqualified for cochlear implantation after she had scored 88 percent on the HINT sentences test of the previous MSTB.

Feeling continually frustrated by her communication difficulties, the woman came to the Hearing Implant Program and was evaluated with the new MSTB. The more rigorous testing definitively exposed and documented the seriousness of her substantial communication difficulties, and she was approved for unilateral cochlear implantation with continued use of the contralateral hearing aid. Following implantation, her speech understanding dramatically increased, as summarized in the table above.

### FDA Hearing Loss Criteria for Cochlear Implantation Candidacy

Labeling varies by manufacturer, but generalized criteria include:

- Moderate to profound sensorineural hearing loss
- Speech recognition on open-set sentence materials while optimally fit with appropriate hearing aids:
  - ≤50 percent* in the ear to be implanted
  - ≤60 percent* in the contralateral ear and bilaterally

* These values are based on aided speech recognition on complex sentence materials, not unaided word recognition.
A Better Option for Patients with Advanced Cutaneous Malignancies: Simultaneous Intraoperative Mohs Clearance and Reconstruction

By Michael A. Fritz, MD

A new collaborative approach to the management of complex and massive cutaneous tumors of the head and neck has been developed at Cleveland Clinic. This method involves the routine use of Mohs micrographic surgery (MMS) to clear surgical margins during the excision of large, advanced tumors under general anesthesia. The addition of “intraoperative MMS” provides patients with far more reliable tumor clearance, and this allows complex reconstruction to proceed simultaneously without a high risk of concealing recurrent disease.

Traditional Approach Can Be Counterproductive

Skin cancer is the most commonly encountered malignancy, with most cases occurring in the head and neck region. MMS is well-established as the optimal mode of management for small and medium-sized head and neck basal cell carcinomas (BCCs) and squamous cell carcinomas (SCCs) that are removed in the outpatient setting under local anesthesia. Compared with other approaches, MMS is associated with better margin control and hence lower recurrence rates. The improved cure rates with MMS are a reflection of the pathologist’s ability to assess 100 percent of the surgical margin. By contrast, it has been estimated that with traditional pathologic techniques such as intraoperative frozen-section analysis and postoperative permanent histologic sectioning, less than 5 percent of the actual tumor margin is assessed.

MMS is the first choice for tumors amenable to outpatient procedures performed using local anesthesia, but large and recurrent skin cancers pose a particular challenge in that the magnitude and complexity of resection and reconstruction typically require that surgery be performed with general anesthesia. Traditionally, these cases have been managed with wide resection and intraoperative frozen-section analysis of margins. Ironically, the traditional approach has relegated those patients at highest risk for recurrence to inferior margin analysis. As a consequence, many patients are subjected to an extended period of observation to ensure tumor clearance before they can undergo reconstruction. The result is that these patients must endure several months to years of severe facial deformity and significant physical, social and emotional dysfunction.

While intraoperative MMS for tumor clearance has been described in the past, only small case series have been reported, and no center has regularly used this technique. The barriers to the use of intraoperative Mohs clearance have included concerns about (1) prolonged operative times due to numerous tissue reads and (2) the need for coordination among multiple surgical subspecialties, including ablative and reconstructive teams and Mohs dermatologic surgeons.

A Unique Collaborative Approach

Seeking a way to improve patient outcomes and streamline surgical management, the author (Dr. Michael Fritz), representing the Section of Facial Plastic and Reconstructive Surgery in the Head & Neck Institute, partnered with Allison Vidimos, MD, Chairman of the Department of Dermatology and Section Head of Dermatologic Surgery and Cutaneous Oncology, to spearhead development of a routine collaborative approach that fuses intraoperative MMS with both tumor resection and reconstruction in the same operative setting.

The Head & Neck Institute is fortunate to have one of the largest and most efficient Mohs teams in the country, and this allows for rapid and facile management of very large tumor specimens. In addition, Cleveland Clinic traditionally promotes a spirit of collaboration that allows physicians to deliver the best care possible. It is not uncommon for three or even four of our surgeons to be involved in the same case in order to capture all the expertise necessary to manage these massive cancers.

Documented Efficacy

A three-year experience with 26 such patients was recently published in *Archives of Facial Plastic Surgery*.1 In that series, we treated a total of 29 advanced cutaneous malignancies (48 percent BCCs, 34 percent SCCs) with simultaneous MMS and reconstructive surgery. All patients had a large facial lesion, and the mean surface area of the resection was greater than 60 cm². Most of these tumors (66 percent) were recurrent, and many (41 percent) exhibited evidence of perineural invasion (see sidebar). Despite the size and complexity of the resections, pending margin reads had no effect on the completion of surgery. This was in large part due to the fact that the margin tissue was being processed and analyzed while the surgeon was performing ancillary extirpative procedures and reconstruction. To expedite tissue processing, two technical teams were often reserved for this purpose.
Following tumor resection, all patients underwent immediate reconstruction, which involved microvascular free-tissue transfer in nearly one-third of cases. Postoperative radiation therapy was employed in only three of 26 patients; this low rate can be attributed to the great amount of confidence in margin control. With a mean follow-up of more than 17 months, four of 26 patients experienced a recurrence.

**Implications for Postoperative Management**

The keys to successful outcomes are careful communication, patient selection and the ability to confidently perform immediate reconstruction following tumor removal. Increased confidence in achieving tumor-free margins has two very important implications for postoperative management:

- First, because definitive reconstruction can be initiated immediately, it is no longer necessary for the patient to undergo a prolonged period of postoperative observation with a significant facial deformity. Instead, complex reconstructions can be undertaken immediately with fewer concerns about margin observation.

- Second, postoperative radiation therapy can often be avoided. This is particularly advantageous for patients with BCCs, which carry little risk of regional spread. The first goal is obviously to make sure these high-risk cancers do not return. But we also want patients to be able to return to their lives without a significant deformity. While the latter can be a daunting task, it can usually be accomplished with aggressive reconstructive techniques and careful revision.

The cancers are resected with margins that are wider than those obtained with typical Mohs surgery in order to accomplish clearance more rapidly. Reconstruction typically requires the harvesting of various grafts (e.g., rib or ear cartilage) and often free vascularized tissue or large locoregional flaps. In addition, proper tumor management may require additional procedures such as parotidectomy, maxillectomy or neck dissection. These procedures can be performed without distorting tissue margins, and they are completed while the Mohs read is ongoing. As a result, this coordinated undertaking can be accomplished without extending the time the patient is under anesthesia.

**Other Innovations**

Our success in managing very large and complex head and neck cutaneous tumors has spurred further developments in facial reconstruction. Two of these innovations are the use of thin vascularized anterolateral thigh (ALT) fascia lata flaps for nasal lining in subtotal and total nasal reconstruction and the use of free-tissue transfer in a short-stay and outpatient setting.

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**Case Study**

A 53-year-old woman presented with a large recurrent BCC involving the right cheek, nasal sidewall and lateral nasal wall. MRI was suspicious for infraorbital nerve invasion. **A and B:** The patient underwent a subtotal rhinectomy, anterior and medial maxillectomy, resection of the medial half of the cheek skin and soft tissue, and infraorbital nerve clearance to the skull base. **C:** The face was reconstructed with a large cervicofacial flap, an eyelid myocutaneous flap, cartilage grafts, a septal mucosal flap and a paramedian forehead flap. **D:** Postoperatively, a right cheek contour defect was apparent. **E:** The patient eventually underwent further facial contouring with a short-stay minimal-access adipofascial ALT free flap. She is currently disease-free four years following surgery.

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**Reference**


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Semicircular Canal Dehiscence: Diagnostic Innovation and Treatment Choices

By Judith White, MD, PhD; Thomas Haberkamp, MD; and Erika Woodson, MD

The diagnosis of semicircular canal dehiscence (SCD) begins with a high index of suspicion because a patient's complaints may be myriad and nonspecific. Patients' tolerance for their symptoms can be as varied as the symptoms themselves. Presenting manifestations may include unilateral ear fullness, hearing loss, pulsatile tinnitus, and distortion or echo that affects sound perception. Also, disequilibrium upon hearing loud sounds such as school bells, church organ music and fire alarms has been reported. Sensitivity to pressure changes during scuba diving, aircraft flight and working in high-rise buildings occasionally prompts evaluation. Patients may report unusual auditory sensitivity to hair brushing, eye movement or vibratory stimuli (Figure 1).

An Award-Winning Approach to Diagnosis

Cleveland Clinic’s Section of Vestibular and Balance Disorders is fully equipped to establish the diagnosis of SCD. Indeed, the staff of our diagnostic vestibular laboratory developed a convenient and sensitive office-based method of recognizing SCD by eliciting prominent torsion or vertical nystagmus with suboccipital vibration (Figure 2). This inventiveness earned Cleveland Clinic the Nicholas Torok Vestibular Award for innovative vestibular research, which is conferred by the American Neurotology Society.

In our laboratory, vertigo or imbalance during weightlifting, bending or positional change can be objectively measured. Persistent positional vertigo that is unresponsive to repositioning maneuvers may prompt structural evaluation with CT scanning of the temporal bones (Figure 3).

Treatment: The Option of Two Surgical Approaches

The treatment of SCD can take several forms. Many patients with SCD do not require invasive treatment. Vestibular therapy may be sufficient for some with positional symptoms and disequilibrium. But for patients with severe auditory disturbances or vertigo that prevents them from engaging in normal activities, surgical solutions exist. Surgical intervention for SCD has been described by numerous surgeons from multiple institutions. At Cleveland Clinic, two interventions are commonly employed: the middle cranial fossa (MCF) approach and the transmastoid approach. Each has its advantages.

MCF approach. The advantages of the MCF approach are numerous. First, it is the approach with which neurotologists are most familiar. Second, it allows for complete visualization of the
SCD and better access to it. Thus, the MCF approach provides for a thorough examination and correction of other problems associated with a thin or deficient tegmen tympani, such as a spontaneous encephalocele or meningocele. Finally, the MCF approach allows for superior canal occlusion, which has been associated with better long-term symptom control than resurfacing alone. On the other hand, the MCF approach does involve a temporal lobe craniotomy and brain retraction. Therefore, it may not be the preferred technique for older individuals or for the treatment of SCD in a patient with seizure disorder.

**Transmastoid approach.** In the transmastoid approach, a labyrinthotomy is created proximal and distal to the dehiscence, and the semicircular canal is then obliterated on each side of the dehiscence. The overall risk to the inner ear is similar to that posed by the MCF approach, but the risks of craniotomy are avoided. Therefore, the transmastoid approach may be better suited for older patients; success has already been reported in pediatric cases. Moreover, this approach can be used in patients with the more unusual variations of SCD (e.g., posterior SCD, where the dehiscence is located in the jugular bulb) and in cases where the superior canal is dehiscent at the superior petrosal sinus. Since the vascular anatomy prevents direct approaches to the dehiscence, the transmastoid approach allows for isolation of the dehiscent area.

*Continued on next page*
Coblation therapy has been described as an acceptable alternative to the CO\textsubscript{2} laser for several laryngeal procedures. We have used it to treat Teflon granulomas, selected cases of recurrent respiratory papillomatosis, large suprastomal tracheal granulomas, and granulomas and granulomatous masses of the intrinsic larynx. Coblation therapy is also a quick and effective means of managing laryngeal, subglottic and tracheal stenosis, and it is a very good tool for removing some masses, including neurofibromas and arteriovenous malformations. Additionally, it has been valuable for debulking large, obstructing laryngeal cancers prior to definitive treatment.

**Advantages over Laser Procedures**
Among the many advantages that the Coblator\textsuperscript{®} has over the laser (see sidebar) is a shorter setup time (as there is no need for laser precautions) and less overall operating time. Moreover, because the Coblator functions at a low temperature, it prevents significant lateral heat distribution into the tissue. Also, with its bipolar cautery capability, the Coblator provides adequate hemostasis. Finally, the device’s independent and sturdy wand allows surgeons to use it with standard suspension microlaryngoscopy, with a Hopkins rod and with flexible laryngoscopy to visualize the lesion. This is particularly advantageous when direct laryngoscopic exposure is difficult or limited.

**A New Use: Airway Management in Vocal Fold Immobility**
Over the past year, members of Cleveland Clinic’s Voice Center and the Section of Laryngotracheal Reconstruction have begun using the laryngeal Coblator for airway surgery secondary to bilateral vocal fold immobility as an alternative to traditional endoscopic CO\textsubscript{2} laser-assisted vocal cordotomy and medial partial arytenoidectomy. We have thus far documented its utility in...
In our early experience with the Coblator for bilateral vocal fold immobility, operating time and healing time have been reduced relative to our experience with laser procedures.

a group of 12 patients who had been diagnosed with bilateral vocal fold immobility. Their diagnoses were established on the basis of a thorough history and physical exam, as well as findings on flexible laryngoscopy (Figure) and videostroboscopy. The etiology of their vocal fold immobility included prolonged intubation (n = 4), thyroidectomy (n = 4), trauma (n = 2), progressive degenerating cerebellar ataxia (n = 1) and an unknown cause (n = 1).

All patients underwent suspension microlaryngoscopy with either an initial or a revision vocal cordotomy; four patients underwent a concomitant partial arytenoidectomy as part of airway management. The Coblator’s power level was set to 7. No patient required a tracheotomy with this procedure; two patients who underwent revision surgery had required previous tracheotomy during their initial procedure, but they were decannulated at the time of the revision procedure.

Promising Early Results
On routine postoperative follow-up (range, 1 day to 6 months), wound healing was documented by high-resolution videolaryngoscopy (Figure). All patients experienced an improvement in glottic airway patency, and their stridor was alleviated. In addition, the formation of granulation tissue at the cordotomy site was minimal.

Overall, our early experience with the use of the Coblator for bilateral vocal fold immobility significantly reduced both operating time and healing time relative to our experience with the laser. We will continue to gather longer-term data on using Coblation technology for this indication and other laryngeal and airway pathologies.

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Dr. Benninger is Chairman of the Head & Neck Institute. He can be reached at 216.444.6686 or benninm@ccf.org.

Key Advantages of Coblation

Our initial experience with endoscopic Coblation indicates that it offers several advantages over laser procedures:

• Less setup and operating time
• Greater protection of surrounding tissue
• Since it is used in a saline medium, no obvious risk of operating room fire
• No need for more expensive laser endotracheal tube
• Unlikely to require tracheotomy
• Provides for hemostasis
• Minimal granulation tissue
• Apparent shorter healing time
Virtual Surgical Planning in Oral and Maxillofacial Surgery

By Joseph Krajekian, DMD, MD

Virtual interactive surgical planning is becoming an integral part of oral and maxillofacial surgery at Cleveland Clinic’s Head & Neck Institute. This innovative technological advancement plays an important role in dentoalveolar surgery, implant surgery, orthognathic surgery and more.

How It Works
This computer-aided surgical simulation is typically developed in four phases:

- Data acquisition phase: clinical evaluation, clinical photos, facial analysis, dental models, radiographic assessment and anything else specific to the surgical case
- Planning phase: importation of three-dimensional (3D) CT data into proprietary virtual planning software; the planning phase is achieved with the assistance of a computer engineer
- Surgical phase: translation of the virtual plan to patients with the use of surgical splints and templates
- Assessment phase: comparison of the surgical accuracy with virtual planning

Dentoalveolar/Dental Implant Surgery
The ability to manipulate CT scans and other data for dental use has increased exponentially. Among the exciting advances is the ability to fuse multiple data sets (e.g., CT scans and dental casts) to create a comprehensive and accurate 3D model of the patient. This merging of data has significantly improved accuracy in comprehensive oral rehabilitation.

The goal of dental implant treatment is to provide patients with accurate and predictable restoration of dental health. The challenge has always been to achieve appropriate and accurate dental implant placement guided by restorative treatment options. With the introduction of 3D diagnostic and interactive treatment planning technologies, physicians are able to create a fail-safe system that is predictable (Figures 1 and 2).

Orthognathic Surgery
Computer-aided surgical planning has provided surgeons with the ability to create 3D visualization and analysis of facial bone and soft tissue. This process drastically improves the outcome predictability of orthognathic surgery. The four-step process is implemented as follows:
The accuracy of virtual surgical planning is superior to that of the traditional analytical model of surgery with stone casts.

- The first step is to create a digital composite skull model with superimposed digitally scanned dental casts.
- The second step is to analyze the deformity with cephalometric analysis and virtual anthropometric measurements.
- The third step is virtual surgical manipulation of bony segments with computer software; surgeons are then able to simulate movement of the maxilla or mandible in three different planes and to correlate with soft-tissue change.
- The fourth step is to transfer the virtually planned operation into clinical application via surgical splints and templates.

Virtual planning also aids in surgical splint fabrication, which is required whenever two-jaw surgery is planned. Additionally, osteotomy guides can be generated on any skeletal landmark, bone or teeth (Figure 3).

The accuracy of virtual surgical planning has been studied, and it is proving to be superior to the traditional analytical model of surgery with stone casts, which carries a much greater risk of human error.

**Conclusion**

Advances in 3D medical imaging and virtual interactive surgical software have enabled a breakthrough that improves the predictability of surgical outcomes. This emerging technology and its utility extend to many other specialties, such as facial plastic surgery and otolaryngology.

At the Head & Neck Institute, we have combined the most advanced technology with our interdisciplinary approach to deliver the best possible outcome for all our patients.

**Dr. Krajekian is an oral and maxillofacial surgeon in the Head & Neck Institute. He can be reached at 216.444.6398 or krajekj@ccf.org.**
A new approach to voice prosthesis placement has been adopted by surgeons in Cleveland Clinic’s Head & Neck Institute that allows for rapid restoration of voice function in patients who undergo total laryngectomy. Since March 2011, our surgeons have been placing a voice prosthesis intraoperatively, soon after the tracheoesophageal puncture (TEP) has been made. Thus far we have treated nine patients with intraoperative prosthesis placement, and all nine quickly enjoyed restored speech with few or no complications (see patient testimonials on opposite page).

We initiated the new approach, which was pioneered by Dr. Frans Hilgers of the Netherlands Cancer Institute, in an effort not only to restore speech quickly but also to improve patient comfort. No catheter stenting is used in the newly created puncture. Instead, the first prosthesis is placed as part of the primary surgical procedure. During the postoperative period, patients are fed via transnasal alimentation. Once an oral diet can be resumed, speech can begin.

The nine patients who received their voice prosthesis intraoperatively in the Head & Neck Institute began speaking at their first outpatient follow-up session. Neither stoma healing issues nor pain interfered with their speaking, and the need for emergency room visits during the early postoperative period was virtually eliminated.

The Mechanics of Vocalized Speech After Total Laryngectomy
Once the silicone voice prosthesis is placed into the tracheoesophageal wall, it shunts exhaled air into the pharyngoesophagus, which allows for sound production. The vibratory segment has classically been identified at the cricopharyngeus muscle, but it also includes the middle and inferior constrictor muscles. Patients learn to speak by occluding their stoma with a finger or hands-free valve. Exhaled air passes through the prosthesis and into the pharyngoesophagus, and sound for speech is generated.

TEP has been the standard approach to facilitating voice restoration following total laryngectomy since the early 1980s. Historically, total laryngectomy has been performed either (1) as a single procedure, (2) in conjunction with pharyngectomy or (3) with adjuvant chemoradiotherapy. Advances in pharyngeal reconstruction have improved not only wound healing and swallowing, but also the function of the vibratory segment that facilitates voice fluency and quality.

The Choice Between Primary and Secondary TEP
While the choice between performing a primary or secondary TEP has been driven in part by surgical advances (e.g., better methods of pharyngeal closure and reconstruction and improvements in the creation of the TEP itself), another consideration is the need to develop cost-effective and timely speech rehabilitation.

When TEP is performed as a secondary procedure, the puncture is made endoscopically and stented with a rubber catheter. Some three to five days later, the patient undergoes an outpatient fitting for a voice prosthesis. Patients who require postlaryngectomy radiation therapy might have their secondary TEP postponed for as long as three months after the radiation therapy has been completed.

When TEP is performed as a primary procedure, the catheter-stented puncture can also provide access for tube feeding, thus obviating the need for a transnasal feeding tube. Patients are fitted with their first voice prosthesis once they can resume an oral diet, usually within three weeks. Only then can the stenting catheter be removed. Radiation therapy might also be under way during the process of prosthesis fitting and speech training.

Since the mid-1990s, primary TEP has been the standard practice for most patients undergoing total laryngectomy at Cleveland Clinic. Surgically, it is easier to create the puncture immediately following laryngeal dissection and preparation of the pharynx. Secondary TEP often involves months of delay, requires another surgery and postpones speech rehabilitation. However, primary TEP often presents challenges of its own. For example, prolonged catheter stenting during postoperative healing can:

• Interfere with proper cleaning of the new airway
• Cause added postoperative edema at the TEP site
• Shift the direction of the puncture

The initial voice prosthesis needs to be quite long in order to accommodate the elongated puncture, and frequent, often painful refittings become necessary during the first three or four months to adjust its length. Such a labor-intensive process to properly fit the prosthesis often compromises voice quality and fluency, and it can delay attempts at initiating hands-free speech for six months or even longer. Patients can grow anxious and even depressed by their inability to resume normal social and work activities.

Ancillary Advantages of the New Approach
With our new intraoperative approach, speech rehabilitation no longer involves painful refittings, and stomas stay cleaner and heal faster. Patients develop their new laryngeal speech in the first therapy session about three weeks postoperatively. They may even advance to a hands-free speaking system around the same time.

Ms. Kmieciik and Ms. Hohman (sidebar author) are clinical speech-language pathologists in the Section of Speech-Language Pathology. Ms. Kmieciik can be reached at 216.445.8458 or kmieciikj@ccf.org, and Ms. Hohman at 216.445.9178 or hohmanb@ccf.org.
“Prior to my laryngectomy, I was very concerned about how it would affect my quality of life. In fact, I considered not having it at all. But at the time, I had to use a stomach tube to eat. When you are unable to eat food at a table, you realize how important the breaking of bread with loved ones and friends is. It’s such a wonderful aspect of human interaction and bonding. Now that I’ve had the surgery, I’m able to eat solid foods again. Yes, there certainly are challenges to overcome with this type of surgery, but it has vastly improved my quality of life. I’m back up to my normal weight, I’m playing golf again, and I’m back to being me. Best of all, I don’t have that feeding tube anymore!”

— Pat Carano, 58
Retired City Economic Development Director, Tallmadge, Ohio

“Loss can be difficult. Each year, 3,000 men and women lose their larynx to cancer, and with it their primary means of communicating. It is vital for these patients to fully understand the process of obtaining a new voice. At Cleveland Clinic, this is accomplished through a team approach.

To give patients hope for both a new voice and the start of a new life, the Section of Speech-Language Pathology works closely with the Head & Neck Institute’s surgical teams to educate and advise patients pre- and postoperatively. Our speech-language pathologists are proud to be partnered with local chapters of the Lost Chord Club, the support group for patients who have undergone total laryngectomy. She hasn’t stopped.

“I want to pay it forward,” Linda explains. “It’s important that people know not to give up. There is hope for us. I represent hope. Together, we can beat this.”

Tom Connar and his wife, Yvonne, are among the beneficiaries of the work of club volunteers like Linda, who met with them in February 2012 after Tom had undergone a total laryngectomy and a primary tracheoesophageal puncture with voice prosthesis placement. “I’m in sales, so my biggest concern was the perception others might have during meetings and phone calls,” Tom recalls. “Linda was amazing. Her esophageal speech blew me away. I was comforted and reassured that my ability to communicate in the future was bright, and that I’d be able to do my job effectively. She is a testament to anyone who doubts that they’ll be able to communicate well after such a surgery.” Tom’s advice to others is to educate themselves and to be patient with the rehabilitation process.

Yes, loss can be difficult, but Linda wants patients to know that a positive attitude and laughter will get them through, as long as they “never, ever give up.”

— Daniel Toothman, 61
Oil and Gas Consultant, Bradford, Pa.
Ensuring that patients receive the maximum benefits of evidence-based practice is one of the hallmarks of clinical care at Cleveland Clinic’s Head & Neck Institute. Given today’s economic climate, both clinically and fiscally responsible healthcare practices are important to patients, clinicians and policymakers. As part of these practices, the economic valuation of treatment outcomes has become an increasingly important part of our decision-making.

The literature shows that cost-effectiveness models have been applied to a number of audiologic and otologic services to determine their economic value in relation to treatment outcomes. Clinical activities that have been subjected to economic analyses include cochlear implantation, middle ear implantation, hearing aids, hearing screening for newborns and audiologic rehabilitation programs following the fitting of hearing aids. However, in most clinical sites throughout the country, the ongoing and routine application of cost-effectiveness models in the development of best practices has been rather limited.

Two Types of Analyses for Ensuring Best Practices

The Section of Audiology in the Head & Neck Institute has incorporated two types of standard economic analysis to help determine best practices in audiologic rehabilitation: cost-effectiveness analysis (CEA) and cost-utility analysis (CUA). We have used CEA to examine the incremental cost per unit of benefit on a standardized outcome measure that is achieved when one treatment option is chosen over another. We use CUA to capture the cost per quality-adjusted life-year (QALY) gained as a result of the chosen treatment. QALY is a measure of both the quality and quantity of life lived in relation to a particular disease burden.

CEA looks at three incremental treatment comparisons:

- Total cost of treatment (i.e., the cost of devices and follow-up services)
- The treatment’s effectiveness (i.e., the benefit to our patients as determined by pre- and post-treatment differences on a standardized outcome measure)
- The cost-effectiveness ratio between two treatment options (e.g., device A vs. device B), which represents a determination of which option provides the most benefit for a given expenditure

CUA incorporates quality-of-outcome and survival information to determine the cost per QALY gained, which is calculated according to the following formula:

\[
\text{Cost per QALY gained} = \frac{\text{Cost of treatment}}{(\text{Obtained benefit} \times \text{Life expectancy})}
\]

where Obtained benefit is derived from an outcome measure and Life expectancy is derived from an actuarial table.

Treating Tinnitus: Application of Economic Analyses

An example of the worth of CEA and CUA can be found in our Tinnitus Management Clinic. We compared the economic value of ear-level broadband noise sound generators (SGs) with that of Neuromonics Tinnitus Treatment (NTT), which involves spectrally modified music in an acoustic desensitization protocol. While the two methods provided significant and equivalent clinical benefit at six months of follow-up, CEA and CUA suggested that the SGs were more cost-effective, especially for patients with higher initial Tinnitus Handicap Inventory (THI) scores (Table). Specifically, CEA showed that for the SGs, the cost per unit of improvement (treatment utility) on the 100-point THI was $74 per point, whereas the cost for NTT was $189 per point. Moreover, CUA revealed that the overall SG treatment cost $604 per QALY gained, whereas NTT cost $1,771 per QALY gained. In short, the SGs appear to be just as effective as NTT while being much less expensive.
More Cost Comparisons in the Works

We are continuing to explore cost-effectiveness and cost-utility as we evaluate management options for single-sided deafness, including CROS hearing aids, bone-anchored implants, TransEar® bone-conduction hearing aids and the new SoundBite™ Hearing System. We expect that these data will provide our audiologists and otologists with additional information to better counsel our patients with single-sided deafness.

Clinical Considerations Remain the Priority

Certainly, economic analyses cannot be used in isolation when making clinical decisions such as the selection of hearing assistive technology and tinnitus devices. A number of patient-focused factors must be considered when developing best clinical practice guidelines in the audiologic rehabilitation arena. These include such variables as the patient’s lifestyle, manual dexterity and finances, as well as the acceptability of the auditory stimulus. We believe, however, that the application of economic valuation of intervention strategies is an essential part of clinical practice and decision-making. In view of the current economic environment, we must be able to justify our recommendations about the value of one treatment option over another in relation to observed benefit.

Reference


Dr. Newman is Section Head of Audiology in the Head & Neck Institute and Professor of Surgery at Cleveland Clinic Lerner College of Medicine. He can be reached at 216.445.8520 or newmanc@ccf.org.

Dr. Sandridge is Director of Clinical Services in Audiology and Co-Director of the Tinnitus Management Clinic and Audiology Research Lab. She can be reached at 216.445.8517 or sandridges@ccf.org.

Table. Formulas Used to Calculate Cost-Effectiveness of Sound Generators (SGs) vs. Neuromonics Tinnitus Treatment (NTT)

<table>
<thead>
<tr>
<th>Cost calculation:</th>
<th>Incremental cost of treatment = IC</th>
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<tbody>
<tr>
<td>Variables:</td>
<td>Total SG cost (i.e., cost of the devices and follow-up services) = TC₁</td>
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<td></td>
<td>Total NTT cost (i.e., cost of the device and follow-up services) = TC₂</td>
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<tr>
<td>Formula:</td>
<td>IC = TC₁ – TC₂</td>
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<th>Effectiveness calculation:</th>
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<tbody>
<tr>
<td>Incremental effectiveness of treatment (i.e., benefit of therapy as determined by the difference in Tinnitus Handicap Inventory [THI] scores pre- and postfitting) = IE</td>
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<th>Variables:</th>
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<tr>
<td>Total effectiveness of SGs (i.e., benefit of SGs based on improvements in THI score) = E₁</td>
</tr>
<tr>
<td>Total effectiveness of NTT (i.e., benefit of NTT based on improvements in THI score) = E₂</td>
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| Formula: |
| IE = E₁ – E₂ |

<table>
<thead>
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<th>Cost-effectiveness calculation:</th>
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<tr>
<td>Cost-effectiveness ratio = C/E</td>
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<th>Variables:</th>
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<tr>
<td>Incremental cost of treatment (see above) = IC</td>
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<tr>
<td>Incremental effectiveness of treatment (see above) = IE</td>
</tr>
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| Formula: |
| C/E = IC ÷ IE |
Endoscopic Dacryocystorhinostomy: Expanding the Base of Pediatric Experience

By Prashant Malhotra, MD, and Yiping Li, BS

Potential advantages include the avoidance of a cutaneous incision, complete endonasal anatomic evaluation and limited medial canthal dissection.

Epiphora, or watering of the eyes, is a very common pediatric condition, affecting 6 to 20 percent of newborn infants. While up to 96 percent of cases resolve spontaneously within the first year, persistent nasolacrimal duct obstruction or recurrent dacryocystitis (inflammation of the lacrimal sac) may require further treatment, such as probing, irrigation and stenting of the nasolacrimal duct system. When epiphora does not resolve despite these measures, surgical intervention with dacryocystorhinostomy (DCR) may be indicated.

DCR: From an External to an Endonasal Approach

DCR is a surgical procedure that involves removing a portion of the lacrimal bone and sac to create a fistula from the proximal nasolacrimal duct system into the nasal cavity. Traditional DCR employs an external approach involving an incision in the skin and achieves successful outcomes in 85 to 95 percent of patients.

In recent years, DCR in adults has evolved to take advantage of an endonasal approach using endoscopic sinus surgical techniques. This approach does not require an external incision and avoids medial canthal dissection. Outcomes of endoscopic DCR in adults are generally comparable to those with open techniques. Recent case series suggest similar benefit in children. The Pediatric Otolaryngology Section in Cleveland Clinic’s Head & Neck Institute is currently exploring and advancing this technique in children in collaboration with our ophthalmologic/oculoplastic surgery colleagues to provide optimal multidisciplinary care to our youngest patients with persistent epiphora.

Identifying Pediatric Candidates

Indications in children are evolving. Endoscopic DCR is reserved for failure of more conservative strategies, and we make our decision in conjunction with our ophthalmologic/oculoplastic surgery colleagues. It is essential to rule out dacryocystocele, very proximal lacrimal system obstruction or other pathologies that may require a different surgical procedure. Endoscopic DCR has been reportedly successful in children as young as 3 months, and our youngest patient to date was treated at age 22 months.

A history of prior canaliculitis may raise the risk of an unfavorable outcome. Our experience so far suggests that children with Down syndrome, other genetic syndromes or craniofacial abnormalities may be more prone to revision or failure. This is consistent with the published literature.
The Technique at a Glance

Surgery is usually performed on an outpatient basis with general anesthesia. We use a standard endoscopic DCR technique with an endonasal approach using 2.7- or 4-mm rigid telescopes (0 and 30 degrees) and video display. In young children, smaller spaces and relatively larger inferior turbinates may limit the size of the telescope and other instruments, which can result in a more technically challenging procedure.

An incision is made in the lateral nasal wall mucosa, anterior to the insertion of the middle turbinate. The mucosa is elevated, and part of the frontal process of the maxilla and lacrimal bone is removed to allow visualization of the sac. The sac is incised and subsequent intubation of the nasolacrimal system is performed (Figure).

Variations in technique as described in the literature include the use of lasers, a light wand, adjunctive mitomycin C and powered instrumentation. Use of stents and the duration of stenting are also variable; our practice has been to place stents.

Complications Are Uncommon

While complications associated with DCR in children are uncommon, they may include intra- and postoperative bleeding, punctual erosions from tubes (silicone), orbital fat exposure or orbital injury, conjunctival fistula formation, and intranasal adhesions.

Failure of endoscopic DCR can be attributed to various factors, many of which involve abnormalities in the sinonasal anatomy. These include a small, crowded nasal cavity; septal deviation; middle turbinate disease; and inadequate size or location of osteotomy.

Continued Evolution and Expansion Ahead

Endoscopic DCR in children is an evolving technique, but a growing body of literature suggests promising outcomes in the treatment of nasolacrimal duct obstruction. Its potential advantages include the avoidance of a cutaneous incision, complete endonasal anatomic evaluation and limited medial canthal dissection. While use of endoscopic DCR in the pediatric population is currently limited, it is a viable option in select patients, although one that requires a joint ophthalmologic and otolaryngologic approach. We are starting to incorporate it into our practice and look forward to helping to shape our collective understanding of its optimal role.

Dr. Malhotra is a pediatric otolaryngologist with appointments in the Head & Neck Institute and Pediatric Institute. He can be contacted at 216.444.0322 or malhotp@ccf.org.

Ms. Li is a fourth-year medical student with a specialty interest in otolaryngology.
Myung W. (Brian) Chang, DDS, FACP, FAAMP, joins the Head & Neck Institute as Section Head of Maxillofacial Prosthetics. He received his dental degree from the University of Southern California and completed a prosthodontic residency at Northwestern University and a maxillofacial prosthetics fellowship at Columbia University Medical Center. Most recently, he taught as a director of predoctoral prosthodontics at Harvard University School of Dental Medicine and participated in faculty group practice.

John M. Dobrowski, MD, is an otolaryngologist with board certification in both head and neck surgery and sleep medicine. He treats adult and pediatric patients, and his specialty interests include thyroid and parathyroid conditions and surgery, sleep medicine, and nasal and sinus disease. He completed a residency and internship at Walter Reed Army Medical Center after graduating from St. Louis University School of Medicine.

Toribio Flores, MD, is an adult otolaryngologist who has returned to Cleveland Clinic after a fellowship in head and neck surgery here in the early 1980s. He received his medical training at University of Santo Tomas Faculty of Medicine and Surgery in the Philippines.

Eric Lamarre, MD, a head and neck oncologic surgeon, joins the Head & Neck Institute after having completed a head and neck oncology fellowship at the University of Washington with an emphasis on microvascular reconstruction and robotics. He did his otolaryngology residency at Cleveland Clinic after graduating from the Pennsylvania State College of Medicine. His interests include surgical treatment of head and neck tumors, reconstruction of complex oncologic defects, and management of osteoradionecrosis and pharyngeal stenosis.

Matthew McDonnell, MD, is an adult and pediatric otolaryngologist with interests in thyroid and parotid masses, nasal and sinus surgery, nasal polyps and ear infections. He completed a residency in general surgery, otolaryngology, and head and neck surgery at Cleveland Clinic after graduating from the Medical College of Ohio at Toledo.

Hadie Rifai, DDS, has joined the Department of Dentistry as a clinical associate after completing a residency in general dentistry at Cleveland Clinic earlier this year. He graduated from Indiana University School of Dentistry in 2011. Dr. Rifai has a special interest in dental sleep medicine.

Jacob Z. Slepian, MD, is a general otolaryngologist who has come to Cleveland Clinic in the latest stage of a career that began with medical school at the University of Bologna, Italy. He completed his residency at Columbia Presbyterian Medical Center in New York. He was in private practice in Connecticut for many years and is retired from the U.S. Army Medical Corps as a colonel.

Sanford Timen, MD, is an adult and pediatric otolaryngologist whose interests include sinus disorders, snoring, and swallowing and voice problems. He received specialty training at the University of Pittsburgh Medical Center and Temple University Hospital after graduating from Washington University School of Medicine.

Todd Coy, DMD, has been appointed the next Section Head of Dentistry, to succeed Michael Matheis, DDS, who is retiring at the end of 2012 after 30 years of service at Cleveland Clinic. Dr. Coy most recently served as program director for the general practice residency. His specialty interests include dental management of head and neck cancer patients, obstructive sleep apnea and sports dentistry.

Michael S. Benninger, MD, is serving as president of the International Association of Phonosurgery (2011-2013) as well as a member of the board of directors and chairman of the advisory board for the Voice Foundation. He is also immediate past president and on the executive council of the American Laryngological Association.

Donald M. Goldberg, PhD, is the current president (2012-2014) of the Alexander Graham Bell Association for the Deaf and Hard of Hearing.

Craig Newman, PhD, received the 2012 Journal of the American Academy of Audiology (JAAA) Editor’s Award, given annually to one or two members of the JAAA editorial board for outstanding contributions to peer review of the journal.
Resources for Physicians

**REFERRING PHYSICIAN CENTER AND HOTLINE**  Cleveland Clinic’s Referring Physician Center has established a 24/7 hotline — **855.REFER.123 (855.733.3712)** — to streamline access to our array of medical services. Contact the Referring Physician Hotline for information on our clinical specialties and services, to schedule and confirm patient appointments, for assistance in resolving service-related issues, and to connect with Cleveland Clinic specialists.

**PHYSICIAN DIRECTORY**  View all Cleveland Clinic staff online at [clevelandclinic.org/staff](http://clevelandclinic.org/staff).

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- For STEMI (ST elevated myocardial infarction), acute stroke, ICH (intracerebral hemorrhage), SAH (subarachnoid hemorrhage) or aortic syndrome transfers, call 877.379.CODE (2633).

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**ABOUT CLEVELAND CLINIC**
Cleveland Clinic is an integrated healthcare delivery system with local, national and international reach. At Cleveland Clinic, 2,800 physicians represent 120 medical specialties and subspecialties. We are a main campus, 18 family health centers, eight community hospitals, Cleveland Clinic Florida, the Cleveland Clinic Lou Ruvo Center for Brain Health in Las Vegas, Cleveland Clinic Canada, Sheikh Khalifa Medical City, and Cleveland Clinic Abu Dhabi.

In 2012, Cleveland Clinic was ranked one of America’s top 4 hospitals in U.S. News & World Report’s annual “America’s Best Hospitals” survey. The survey ranks Cleveland Clinic among the nation’s top 10 hospitals in 14 specialty areas, and the top hospital in three of those areas.

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- **ON THE WEB AT:**  [clevelandclinic.org/refer123](http://clevelandclinic.org/refer123)

**STAY CONNECTED WITH US ON...**

Sharon Sandridge, PhD, received the American Academy of Audiology’s 2012 Presidential Award.

Erika Woodson, MD is the new chair of the Women of Otolaryngology Communications Committee of the American Academy of Otolaryngology – Head and Neck Surgery.

The following Head & Neck Institute physicians have been recognized in Castle Connolly’s *America’s Top Doctors®* (11th ed.) and/or *Cleveland Magazine*’s “Best Doctors 2012,” which is produced in partnership with national physician peer ratings from Best Doctors Inc.*:*

- Tom Abelson, MD – Best Doctors 2012
- Daniel Alam, MD – *America’s Top Doctors*
- Michael S. Benninger, MD – *America’s Top Doctors* and Best Doctors 2012
- Brian Burkey, MD – *America’s Top Doctors* and Best Doctors 2012
- Edward Fine, MD, PhD – Best Doctors 2012
- Richard Freeman, MD, PhD – Best Doctors 2012
- Catherine Henry, MD – Best Doctors 2012
- Raj Sindwani, MD – Best Doctors 2012
- Benjamin Wood, MD – Best Doctors 2012
CME from the Head & Neck Institute

Friday, Oct. 19, 2012

Contemporary Multidisciplinary Care of the Head and Neck Cancer Patient: Focus on Laryngeal Malignancy

7:30 a.m. to 5:00 p.m.

Cleveland Clinic Lerner Research Institute (NA5-08 Auditorium), Cleveland, Ohio

The third annual offering of this comprehensive full-day course features expert faculty from Cleveland Clinic and other leading national medical centers. Through a mix of lectures, case presentations and panel discussions, faculty will update healthcare providers on the latest management strategies for head and neck cancer, emphasizing multidisciplinary approaches. This year’s particular focus is on laryngeal malignancy.

Register today at www.ccfcme.org/headneck12.
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