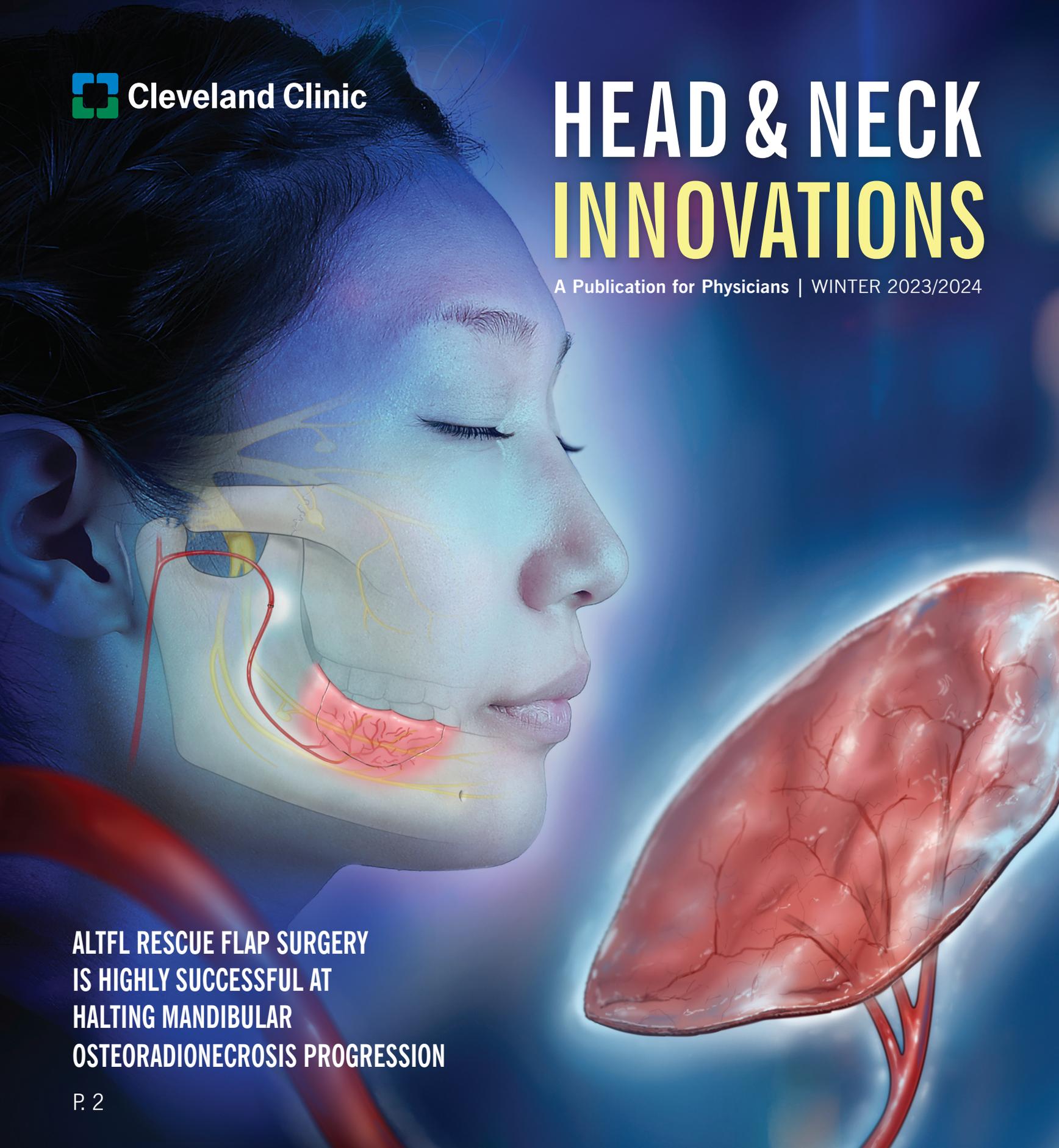


HEAD & NECK INNOVATIONS

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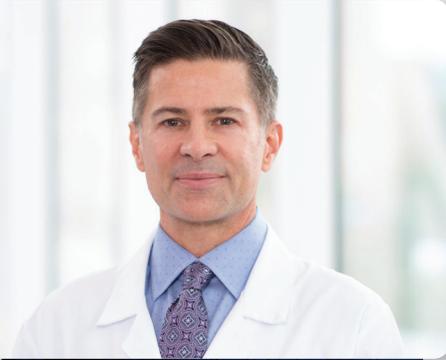


ALNFL RESCUE FLAP SURGERY IS HIGHLY SUCCESSFUL AT HALTING MANDIBULAR OSTEORADIONECROSIS PROGRESSION

P. 2

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Dear Colleagues,

It is once again a privilege to share the annual issue of *Head & Neck Innovations*. As we reflect on 2023, I am inspired by the significant impact our team continues to make in the lives of our patients.

When I first arrived, one of my charges was to recognize opportunities for improvement. This includes the number of lives we touch clinically and the impact we make through our academic activity. The natural assumption in healthcare is that the goal of growing clinical activity is at odds with expanding academic activity and contribution, but our accomplishments have shown us this is not always a zero-sum game.

I believe there is still significant opportunity to run our practices better and more efficiently. We want to take steps toward transformational change, and we can accomplish this by focusing on two distinct areas. The first is operations, which we want to relentlessly improve, and the second is future projects. We must also transform our ability to affect our patients, our specialties and our teams through innovation and research.

The articles in this publication reflect the focus on growth and innovation that we've championed the past few years, as well as the sense of responsibility to improve patients' lives that our staff has championed since long before I arrived.

Our cover article with Michael Fritz, MD, discusses how a novel surgical technique is a game changer for patients with mandibular osteoradionecrosis. Also on the surgery side, I discuss the challenges of nasal reconstruction as evidenced by two distinct cases. Sagar Khanna, BDS, DDS, from our Dentistry & Oral Surgery team weighs in on a case that highlights the importance of oral hygiene during hospital stays.

Another case study from Julie Honaker, PhD, and Evalena Behr, AuD, shows the importance of giving patients with hearing loss a comprehensive vestibular test to ensure they receive appropriate treatment. Rachel Georgopoulos, MD, uses a pediatric otolaryngology case to illustrate the importance of multidisciplinary collaboration while treating a young patient with aggressive juvenile angiofibroma.

On the research side, we have been busy to say the least. This year, Joseph Scharpf, MD, published data from Cleveland Clinic's 21-year experience treating anaplastic thyroid cancers that provides reasons for optimism in the current era of targeted and immune therapies. In our speech-language pathology department, Martin Brodsky, PhD, ScM, CCC-SLP, compares the modified barium swallow study with the flexible endoscopic evaluation of swallowing when diagnosing dysphagia. Subglottic stenosis is a rare condition that can be particularly dangerous for pregnant patients, and Paul Bryson, MD, MBA, reviews some of the findings from a retrospective study on the efficacy of various procedures to optimize respiratory outcomes and encourage safe delivery of the fetus.

Finally, Mohamad Chaaban, MD, shares a new research effort that will investigate the impact of obesity on chronic rhinosinusitis. This effort will be our department's first foray into the newly constructed BioRepository building — a 22,000-square-foot facility storing biological samples that can be used by investigators from multiple disciplines across Cleveland Clinic.

Once again, I am pleased to share a small portion of what we accomplish here every day in the Otolaryngology - Head & Neck Surgery Department. I hope you find this issue informative, and please do not hesitate to contact me or my colleagues with any feedback.



Patrick J. Byrne, MD, MBA

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President-Elect, American Academy of Facial Plastic and Reconstructive Surgery

STUDY EXPLORES IMPACT OF OBESITY ON CHRONIC RHINOSINUSITIS USING NEW BIOREPOSITORY

After receiving the 2023 BioRepository Award, otolaryngologists have begun working in the newly constructed BioRepository building to explore connections between obesity and chronic rhinosinusitis

A research effort, spearheaded by Mohamad Chaaban, MD, Vice Chair of Research will investigate the impact of obesity on chronic rhinosinusitis (CRS) — a common sinus condition that affects approximately 31 million in the U.S. and has an estimated annual cost of \$6 billion.

Dr. Chaaban and colleagues recently received Cleveland Clinic's 2023 BioRepository Award for their proposal "Influence of Obesity on Chronic Rhinosinusitis."

This is the first time Otolaryngology-Head and Neck Surgery will be part of the newly constructed BioRepository building. Opened in 2021, this 22,000-square-foot facility stores biological samples that can be used by investigators from multiple disciplines across the Cleveland Clinic enterprise and nationwide.

As leaders in the field of sinus research and treatment, the researchers will have a dedicated biorepository to assist with consent, tissue handling and processing. Head & Neck samples will be available for interdisciplinary researchers, including pulmonary, allergy and inflammatory diseases related to chronic sinusitis.

"The BioRepository is the future of precision medicine," notes Dr. Chaaban. "It is invaluable because it leverages the collaborative work between different disciplines. If you look at this particular project — and other projects — there are a number of specialties involved. The BioRepository promotes innovation and discovery. In the case of our study, it allows us to work together to gain a better understanding of the influence of obesity on chronic rhinosinusitis."

While the evidence has shown that obesity is a major disease modifier among children and adults with asthma, its impact on chronic rhinosinusitis remains unclear. Recognizing this, Dr. Chaaban is leading research aimed at improving our comprehension of this link.

"Obesity-related asthma is well characterized, but the association between obesity and chronic rhinosinusitis has been limited to a few retrospective studies," he explains.

Obesity is a public health concern that affects multiple comorbid conditions, emphasizes Dr. Chaaban. "In the otolaryngology community, for instance, obese patients have increased sleep apnea, severe asthma and increased risk of spontaneous cerebrospinal fluid leak," he says. "My current work takes a closer look at obesity's impact on chronic rhinosinusitis — one part of a bigger puzzle."

He continues, "With our grant, we are able to collect all sinonasal tissue from sinus surgeries for chronic rhinosinusitis performed by our Head & Neck Specialists. We will also be able to collect normal sphenoid sinus epithelium that is currently being removed and wasted during pituitary surgery and use it for the control samples. Patients will be recruited during their surgical consent." Dr. Chaaban adds that patients will be asked to complete a sinonasal quality of life questionnaire, including a validated sinonasal outcome test (SNOT-22) preoperatively and then postoperatively at regular follow-up intervals.



Mohamad Chaaban, MD,
Vice Chair of Research



Dr. Chaaban in a lab at Cleveland Clinic Lerner Research Institute

ALTFL RESCUE FLAP SURGERY IS HIGHLY SUCCESSFUL AT HALTING MANDIBULAR OSTEORADIONECROSIS PROGRESSION WITH LOW ASSOCIATED MORBIDITY

Newly published research shows how the surgical technique is a game changer for patients with ORN



Michael A. Fritz, MD, FACS
Section Head,
Facial Plastic and
Microvascular Surgery

Patients with mandibular osteoradionecrosis (ORN) may finally have a highly effective, low-morbidity alternative to end-stage reconstruction, according to recently published research in *JAMA Otolaryngology – Head & Neck Surgery*. The retrospective chart review — the largest to date — tracked long-term outcomes of more than 40 patients who were treated with anterolateral thigh fascia lata (ALTFL) rescue flap. The technique was found to be safe and highly effective in arresting mandibular ORN over the long term in nearly all patients with partial-thickness disease.

“Traditionally, there hasn’t been a good solution for patients with ORN other than at the end stage of the disease where we do full-thickness resection of the jaw and reconstruction with a bone flap from the fibula,” says Michael Fritz, MD, FACS, Section Head, Facial Plastic and Microvascular Surgery and the senior author of the paper. “That procedure works well, but it’s a huge operation fraught with morbidity to the patient, and it usually takes them about a year to fully recover. About 10 years ago, we began doing these smaller rescue flap operations and saw a good response in our patients.”

The ALTFL rescue flap technique

The procedure involves taking the fascia lata from the thigh with blood supply, and vascular access is obtained through small (3-4 cm) incisions at the inferior mandible border, preauricular crease or nasolabial fold. The necrotic bone is filed down, leaving just the healthy bone. In more extensive debridement, to ensure long-term mandibular stability, an iliac crest bone graft (also obtained through a small incision) is added. The free flap pedicle is passed from the intraoral defect to the vessel access site, and microvascular anastomosis is performed. The ALTFL is then trimmed, set into the healthy mucosa, and folded and imbricated into the defect to fill the space with vascularized tissue. The fascia mucosalizes over time.

“The average hospital stay after the procedure is just a couple of days,” says Dr. Fritz. “A lot of patients leave on post-op day one, and the surgery is about four to five hours long. Patients are walking the next day. It’s a whole different animal compared to the segmental resection and fibula reconstruction option. Although we have them on a soft diet for several weeks, patients can eat right away.”



“We believe this surgical technique is a true game changer for patients with ORN. Not only have we had an extremely high success rate, but the associated morbidity is low. We expect that this will become the new standard of care for ORN.” — Michael A. Fritz, MD, FACS

The findings

The new research includes data from patients who were appropriate candidates for ALTFL for mandibular ORN between 2011 and 2022. A total of 43 patients comprising 51 cases of mandibular ORN were identified. The mean age of patients was 66 years (range, 47-80 years), and the majority of patients were male (24, or 55.8%). Eight patients had either simultaneous or asynchronous bilateral disease, requiring separate subsite reconstructions.

All included patients had preoperative imaging workups, including a CT scan of the face, mandible, or neck (74.5%) or panoramic X-ray (80.8%). Using Notani’s approach for staging ORN preoperatively, 23.9% of patients had stage I ORN, 45.7% had stage II and 30.4% had stage III. Iliac crest bone grafting was performed during ALTFL rescue flap surgery in nine cases (17.3%) where nearly full-thickness resection was required, and the mean mandibular defect area was 20.9 cm². Of the 43 patients, just two required subsequent fibular free flap reconstruction. Successful ORN arrest was noted both clinically and radiographically in 96.2% of cases.

Successful ORN arrest was noted both clinically and radiographically in **96.2%** of cases.

“We defined success by stabilization of the process clinically and radiographically,” explains Dr. Fritz. “So, we looked at imaging and reported lack of symptoms, i.e., no infection, no pain or anything that brought a patient back into the hospital or the clinic. We had 96% control with this technique.”

He continues, “What was interesting is that this success was independent of the depth of the bone that was involved. People who were candidates for this procedure did not have full-thickness disease, meaning their mandible wasn’t broken all the way through. But even if [the ORN] was almost to the bottom and there was just a little rim of good bone left, we used an iliac crest bone graft and supplemented it, and the area just grew new bone and stabilized the mandible. This can be seen in our data — regardless of [patients’ preoperative] Notani stage, we still saw that 96% success rate. It’s also important to note that the use of rescue flaps in this surgery does not preclude

or at all impair a patient’s candidacy for subsequent fibula free flap reconstruction should further steps be necessary.”

Implications

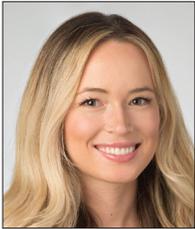
Prior to the ALTFL technique, patients with mandibular osteoradionecrosis had few treatment options. Segmental resection and reconstruction is such an invasive, morbid and expensive operation that it is often delayed until absolutely necessary. The rescue flap provides an effective early intervention for those individuals who present with extensive disease or who fail conservative management. Current medical management includes debridement, antibiotics and pentoxifylline/tocopherol (PENTO). Over the past decade, PENTO has gained favor as an early ORN treatment that can help heal superficial disease. Prior to pentoxifylline, hyperbaric oxygen therapy (HBO) was used, but its efficacy has come into question in recent years.

“The biggest downside to HBO is there are no studies that have shown it works,” says Dr. Fritz. “I don’t know what other disease we treat in medicine with a technique that’s not established as being effective, let alone something that costs as much as HBO. It’s very expensive, both from a cost perspective and from a time perspective. It’s 30 days out of peoples’ lives, and it can cause several unpleasant side effects including vision and balance problems.”

Dr. Fritz anticipates that the traditional watch-and-wait method for ORN will soon become a thing of the past. In patients who fail conservative measures and whose symptoms and disease continue to progress, early surgical intervention will become commonplace. “When you tell patients, ‘We can just stop this for you with a 95+ % chance [of success] with a small operation and you go home in a day and you don’t have to think about this for the rest of your life,’ a lot of them just want to go ahead so they don’t have to worry about it anymore. We believe this surgical technique is a true game changer for patients with ORN. Not only have we had an extremely high success rate, but the associated morbidity is low. We expect that this will become the new standard of care for ORN.”

CASE STUDY: THE IMPORTANCE OF THE VESTIBULAR TEST BATTERY EVALUATION

When a patient with sudden unilateral hearing loss and vertigo did not improve with physical therapy, a comprehensive vestibular test helped identify the dysfunction



Evalena Behr, AuD
Cleveland Clinic
Vestibular Audiologist

A 59-year-old female presented to the Otolaryngology - Head & Neck Surgery Department for a vestibular test battery (VTB) evaluation. She had a history of sudden left-sided hearing loss with associated room-spinning vertigo lasting two days. She completed an audiologic evaluation, which revealed left ear hearing sensitivity within normal limits through 3,000 Hz, after which sensitivity drops dramatically, indicating severe sensorineural hearing loss; right ear hearing sensitivity was within normal limits (Figure 1). Word recognition abilities were considered good bilaterally. Tympanometry revealed normal tympanic membrane mobility bilaterally.



Julie Honaker, PhD
Section Head,
Audiology; Director,
Vestibular and
Balance Disorders
Program

Six months after the initial onset, she was referred for a vestibular evaluation as her symptoms had not resolved despite medical management (multiple intratympanic steroid injections) and vestibular physical therapy. Vestibular testing was completed by vestibular audiologist Evalena Behr, AuD. The exam was unremarkable apart from one test finding: The video head impulse test (vHIT) revealed left posterior semicircular canal (P-SCC) dysfunction with all other semicircular canals spared.

A look at the novel tool that is improving care

The vHIT isolates and measures the three semicircular canals (SCCs) in the vestibular labyrinth – the superior, horizontal and posterior canals – which encode angular acceleration across the roll, pitch and yaw planes. The test was integrated into the clinical setting around 2016, which is perhaps why clinical trends are now emerging.

“When I investigated the medical literature regarding this clinical profile, a few articles suggested the presence of isolated P-SCC involvement could be a prognostic factor for hearing recovery in patients with sudden sensorineural hearing loss. The presence of isolated posterior canal involvement may suggest poor hearing recovery, which helps referring providers better understand hearing prognosis in this patient demographic,” explains Dr. Behr.

The patient’s sudden sensorineural hearing loss from 4,000 – 8,000 Hz may be due to an insult at the vestibulocochlear artery, which supplies the basal portion of the cochlea where high-frequency sound is encoded. The vestibulocochlear artery also exclusively supplies the P-SCC. The superior and horizontal canals receive blood from the

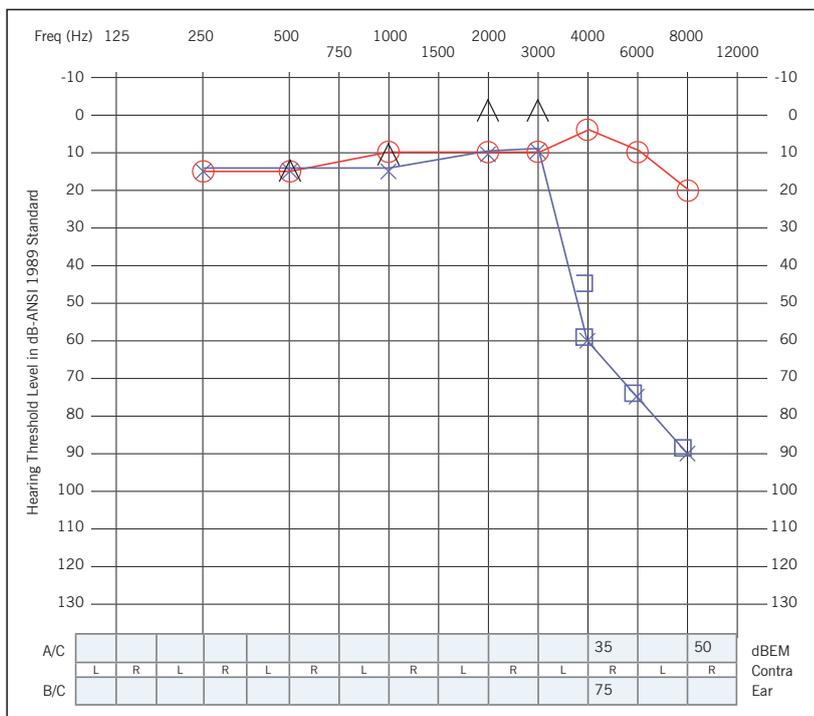


Figure 1. The patient’s hearing sensitivity following a vertigo episode. The y axis represents sound intensity measured in decibels (dB HL). Soft sounds are found at the top of the graph (-10 dB HL), with louder sounds at the bottom (130 dB HL). The x axis represents sound frequency measured in hertz (Hz). Low-frequency sound is near the left portion of the graph, and the highest frequencies are at the right. The red circles represent right ear hearing, while the blue Xs represent the left ear. Based on normative data, this patient has normal hearing in the right ear. The left ear hearing sensitivity is normal through 3,000 Hz and then drops drastically, indicating severe sensorineural hearing loss.



The patient completes vestibular rehabilitation (physical therapy) with targeted exercises to improve vestibular function.

anterior vestibular artery, which would explain why the hearing loss was present only at the high frequencies and only the P-SCC was impacted.

“We are seeing a unique clinical pattern of abnormal posterior canal function with normal function of all other SCCs. This pattern is often observed in patients with sudden hearing loss, suggesting a mechanistic link possibly supported by the proximity of inner ear neural and vascular structures,” states Dr. Behr.

However, more research is necessary to fully understand these observations.

“We currently have an open prospective clinical study to help us better understand the association between unilateral and bilateral posterior canal dysfunction and hearing loss and increased age,” says Julie Honaker, PhD, Section Head of Audiology.

Takeaways

This patient completed four sessions of vestibular rehabilitation (physical therapy) without resolution of symptoms before receiving a comprehensive vestibular evaluation.



The physical therapist is completing a maneuver to assess the function of the right posterior canal.

In this case, the VTB provided crucial information to help guide physical therapy (PT) with appropriate treatment. For vestibular compensation (adaptation) to take place at the level of the cerebellum and brainstem after a vestibular lesion, head and body movement is necessary for the plane corresponding to the impaired SCC. The posterior canal decodes motion in the roll and pitch plane, and the patient was completing exercises in the horizontal planes, which is likely why the patient was not progressing through PT as expected.

After completing the VTB, the patient returned to PT with vestibular physical therapist Tod Kokensparger. The patient’s treatment regimen was altered to include vertical head movements to facilitate vestibular compensation of the posterior canal. Following a PT program based on information obtained from the VTB, the patient continued to progress toward meeting her PT goals.

This case demonstrates the importance of patients receiving a VTB — especially if symptoms persist despite multiple sessions of PT — and the value of a comprehensive vestibular evaluation.

CASE STUDY: PRE-ADOLESCENT MALE WITH AGGRESSIVE JUVENILE ANGIOFIBROMA

Collaboration critical to a successful resection



Rachel Georgopoulos, MD
Director, Thyroid Head & Neck Oncology and Pediatric Endocrine Center

In April 2022, a 12-year-old male presented to the Cleveland Clinic Emergency Department with the following symptoms: one to two weeks of blurry vision when blowing his nose and one day of complete vision loss in the right eye. He had a bump in his mouth, had been having headaches and nausea for two weeks, and had a long history of nasal congestion and rhinorrhea. At prior visits to urgent care centers, his nasal congestion was diagnosed as allergies.

The exam found a large tumor in his mouth, an afferent pupillary defect in his right eye, a pulsatile mass obstructing the right nasal cavity and completely deviating the septum to the left, and an extension of the tumor through the right hard palate.

After inpatient admission, the patient had a T1 MRI (Figure 1), which revealed a very large nasal mass abutting the internal carotid arteries and right orbital apex, erosion of the clivus on the floor of the anterior cranial fossa cribriform and involvement of the right pterygoid plates. Unfortunately, given the duration of vision loss in the right eye, return of vision was not possible.

Because the tumor was so aggressive, a biopsy was performed, which confirmed a diagnosis of juvenile angiofibroma, a benign vascular nasal cavity tumor found exclusively in adolescent males; it often originates from the sphenopalatine foramen. The vascular source is commonly the internal maxillary artery, ascending pharyngeal artery, and/or internal and external carotid arteries. Hormones have been theorized as a possible trigger for tumor growth and angiogenesis; however, the precise mechanism has not yet been elucidated.

“It was the largest and most aggressive angiofibroma I’ve seen reported. We see cases of juvenile angiofibroma, but this was a unique presentation,” says Rachel Georgopoulos, MD, a pediatric otolaryngologist and Director, Thyroid Head and Neck Oncology and Pediatric Endocrine Center.

Team performs highly complex procedure

To prepare for surgical resection, interventional neurology performed an embolization of the bilateral internal maxillary arteries. Due to the tumor’s large size and penetration into surrounding tissue, which is seen more often in adults, the surgical team included two surgeons from the adult service: neurosurgeon Varun Kshetry, MD and rhinologist and skull-

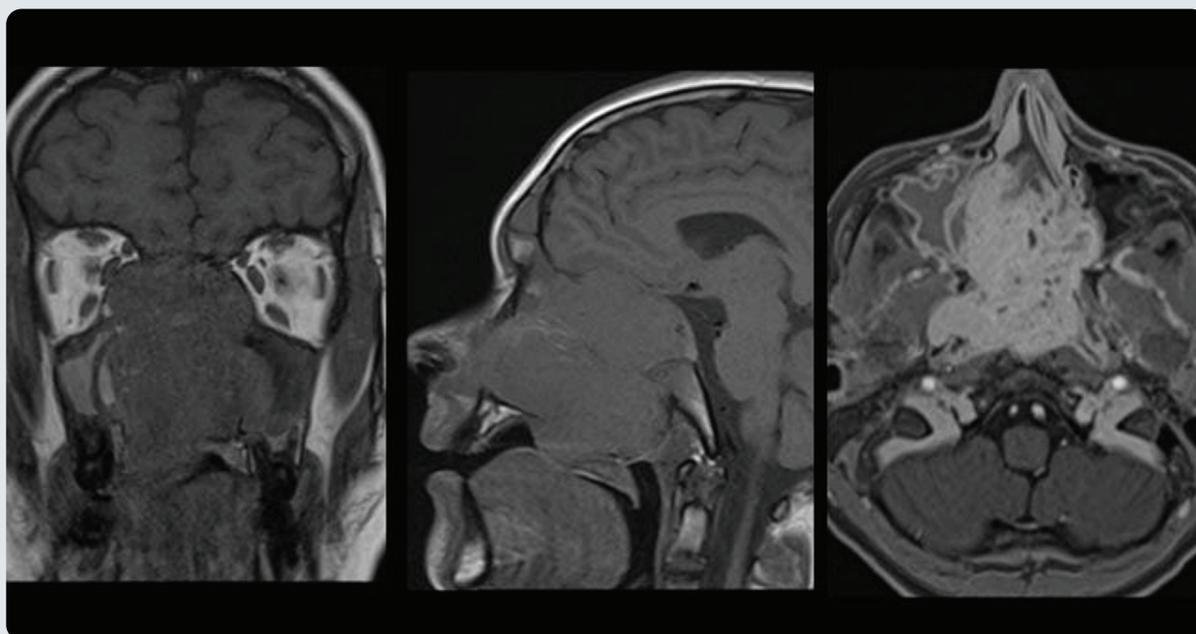


Figure 1. **Left.** Coronal T1 MRI shows a very large nasal mass abutting the internal carotid arteries and right orbital apex. **Center.** Sagittal view shows the erosion of the clivus the floor of the anterior cranial fossa cribriform. **Right.** Axial T1 shows the involvement of the right pterygoid plates.

base surgeon Raj Sindwani, MD, who have more experience operating on tumors at the skull base. In case a flap was needed to repair a fistula in the oral cavity, adult head and neck surgeon Brandon Prendes, MD, was ready to assist.

“Juvenile angiofibroma isn’t usually life-threatening, but this one could have been since the tumor abutted major vessels, nerves and arteries. At Cleveland Clinic, we can provide resources that might not be possible at a medical center that doesn’t have both pediatric and adult services that handle such complex cases,” says Dr. Georgopoulos.

Together, the surgical team performed an endonasal resection that included an early septectomy to allow for bimanual access through both sides of the nose, extensive tumor debulking with a coblator and clipping of the bilateral sphenopalatine arteries. The tumor was dissected from the nasal floor and palate, leaving the palate intact; also dissected were the right pterygoids. The team used a high-speed drill to take down the medial pterygoid plate and performed a coblation of the mass medial to the lateral pterygoid plate, which allowed the tumor to be delivered through the patient’s mouth. Also needed was a planum reconstruction with a free mucosal graft. Fortunately, the dura was intact. Due to the extensive bleeding during surgery, the patient required seven units of blood.

Close monitoring detects regrowth

The patient was discharged on postoperative day four, and his headaches and nasal congestion resolved.

Postoperatively the patient had a small residual tumor, which required repeat embolization and a second procedure performed by the same surgical team. He was discharged after three days with minimal symptoms. His most recent MRI showed gross total resection with minimal enhancement of the right carotid canal, which will be closely monitored. “What makes this case remarkable is the successful, seamless collaboration across multiple institutes in both the pediatric and adult service lines,” says Dr. Georgopoulos.

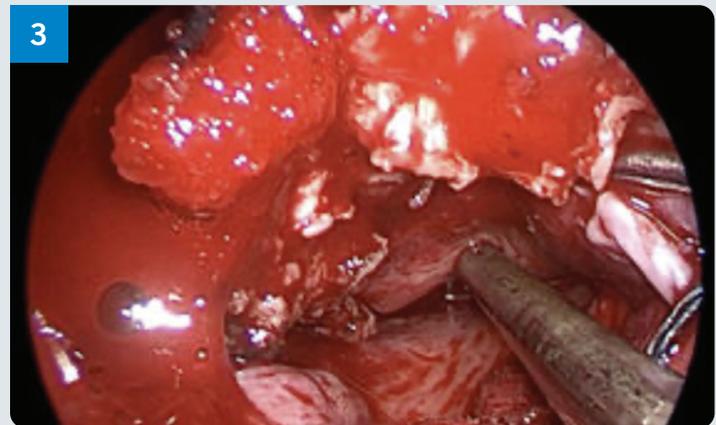


Figure 2. Extension of mass to bilateral nasal cavities, sinuses, nasopharynx, R PPF, cribriform and planum

Figure 3. Dissection of tumor from nasal floor and palate; known expansile site of hard palate identified

Figure 4. Planum reconstruction with free mucosal graft; dura intact

CASE STUDIES: THE CHALLENGES OF NASAL RECONSTRUCTION

Two cases — tremendously different in their level of complexity — illustrate the core principles of nasal reconstruction



Patrick J. Byrne, MD, MBA
Chair, Otolaryngology-Head and Neck Surgery

Patients may require nasal reconstruction for a variety of reasons, and the complexity can vary tremendously from case to case. The following two case studies are representations of both ends of the spectrum. While both complex, the first reconstruction case is a bit more straightforward, and the second is an extraordinarily challenging one. However, both cases require similar consideration of the reconstruction approach, technique and challenges. Patrick Byrne, MD, MBA, Chair, Otolaryngology-Head and Neck Surgery was the lead surgeon in both cases.

First case presentation

Patient A was a middle-aged woman with concerns about a growth on her nose. Several years prior, the patient had an instance of squamous cell carcinoma (SCC) on her eyelid, which required removal by a dermatologist. Dr. Byrne helped reconstruct the eyelid and eventually did a cosmetic eyelift and facelift as well.

For the subsequent growth on her nose, the patient's local dermatologist was unconcerned, but the patient convinced the dermatologist to perform a biopsy because of her skin cancer history. The biopsy came back positive for SCC. The patient decided to have Mohs surgery to remove the cancer and wanted a place where the reconstructive surgery would incorporate a team approach. This led her to Cleveland Clinic.



Patient A before and after

Allison Vidimos, MD, performed the Mohs surgery, which produced two defects on her nose. Dr. Byrne and his team had to devise a repair that would both close those holes and preserve the aesthetic structure of the nose.

“What made this case particularly challenging is that the skin requiring removal was on the nose,” says Dr. Byrne. “The nose is really the central feature of the face, and unfortunately, unlike almost anything else on the body, we can't camouflage or cover it in any way. It is unforgiving in that any tension on closure can distort the shape and position of the nose. It's three-dimensional and complex, and even very small asymmetries are easily visible to observers. In some cases, the surgeon may have to remove much more than just the skin and remove the deeper structures as well. This becomes much more complex. However, I have learned to have great respect even for small skin defects. If you are not really careful, these can leave patients deformed for life.”

Case takeaways

Taking skin cancer seriously is always important — and especially so when a patient has a history of such. Cleveland Clinic supports a multidisciplinary approach where patients with skin cancers on their faces are treated by highly specialized experts, including dermatologists, Mohs surgeons and facial plastic surgeons.

Mohs surgery is a valuable technique for dermatologists, and it's one of the most effective treatments for patients with cancer on their face. Not only does it remove the cancer, but it also leaves as much skin as possible, which makes the next steps easier for the reconstructive surgeon.

Mohs surgery for skin cancer on the nose removes skin in all cases. Sometimes the deeper structures require removal (an example of the reconstructive surgery strategy for more complex defects is presented below).

Skin defects (or “holes”) on the nose are managed in one of three ways. Smaller defects can often be managed with what

we call local flaps, or adjacent tissue transfer. This involves moving the surrounding nasal skin and stretching it to cover the defect. There are ingenious designs to do so without causing undue tension that avoid distorting the nasal shape and make the resulting scars less obvious. The great advantage of local flap closures is that since the defect is closed with nasal skin, the skin is a perfect match.

However, there are times when the defect is so large that there just isn't enough nasal skin to close it without causing a significant secondary deformity: a distorted or twisted nose. A common cutoff for this decision is a skin defect size between 1 and 2 cm. In those cases, skin must be brought to the nose from another site. This can be done via a skin graft (a free piece of skin transplanted onto the nose to cover the defect) or via an interpolated flap. Interpolated flaps involve a multistage procedure in which skin is brought down from the forehead or over from the cheek to cover the defect. It is left attached to its site of origin for several weeks. Then, once a new blood supply has been established in the nose, the connection to its original donor site is severed and the nose and donor sites are closed with stitches.

"The patient is doing terrific now — she says you can't even tell she had anything done, and that's really the goal with skin cancer patients," says Dr. Byrne. "I want to get them to the point where other people no longer notice anything and the patient is no longer thinking about it either. I would say that in at least 85% of cases, regardless of the size of the defect, we can get patients to that point."

Second case presentation

Patient B was a young man who suffered a traumatic amputation of, essentially, his entire nose. The accident occurred several years prior to presenting at Cleveland Clinic. After meeting with Dr. Byrne, reconstruction efforts began.



Patient B before and after

The nose needed to be built almost entirely from scratch using the patient's own tissue — cartilage from his rib cage, cartilage and skin from his ear, and tissue from his forehead for the external skin. Over several surgeries, Dr. Byrne and his team created an aesthetic and functional nose for the patient.

The nose typically is reconstructed in three layers. The internal layer needs to be thin and vascular. The middle layer, which is the structural layer, is composed of cartilage and bone. This layer, which is often referred to as the subsurface framework, essentially needs to be a three-dimensional sculpture that looks like a nose — but slightly miniaturized. The third layer is the external layer of skin — often this skin is taken from the forehead because it's an excellent match in terms of tissue color and characteristics in most patients. "While there is no such thing as a simple nasal reconstruction, the larger the defect, typically the more complicated the case is, and total nasal reconstruction such as this case probably is as difficult an endeavor as any in plastic surgery," says Dr. Byrne.

In this case, the patient's journey was even more difficult than usual. The patient suffered

postoperative complications due primarily to infection. The infection resulted in resorption of much of the patient's subsurface cartilaginous framework. "This can turn an initially good result into a complete disaster," says Dr. Byrne. "I've learned over the years to take these early complications very seriously and act quickly whenever possible. Ultimately, we had to resort to the extraordinary measure of doing a second forehead flap to achieve an acceptable outcome."

Eventually, the patient and the surgical team were able to get to the point where the nose is fully functional and aesthetically acceptable.

Case takeaways

The psychological impact of both the traumatic injury to the nose and the challenging reconstruction cannot be understated. Having a facial feature partially or completely removed is psychologically devastating. This type of injury radically changes a person's appearance overnight. In this case, it was a traumatic injury, but more commonly, these result from cancer, as illustrated in the first case.

"We are usually able to re-create a relatively normal-looking nose and rehabilitate patients

continued on p 16

WHAT IS THE ‘RIGHT’ DIAGNOSTIC APPROACH FOR DYSPHAGIA? AN EXPERT WEIGHS IN

Modified barium swallow study and flexible endoscopic evaluation of swallowing can both be used to diagnose dysphagia, but it's important to understand their advantages and disadvantages



**Martin Brodsky, PhD,
ScM, CCC-SLP**
Section Head,
Speech-Language
Pathology

Dysphagia, or difficulty swallowing, is a common clinical challenge that can have significant implications for an individual's health. Determining the best method to diagnose the cause of this condition has been an ongoing topic of discussion.

There are two standard approaches for the evaluation and diagnosis of dysphagia: the modified barium swallow study (MBSS) and the flexible endoscopic evaluation of swallowing (FEES). While both evaluations are considered gold standards, it's important to recognize and understand the differences between the two so that each can be applied correctly and appropriately.

“Every provider wants the best care for their patients,” says Martin Brodsky, PhD, ScM, CCC-SLP, Section Head of Speech-Language Pathology, Otolaryngology-Head and Neck Surgery, Cleveland Clinic. “And that begins with finding the exam that meets their unique needs and will benefit them the most.

“MBSS and FEES come with their own advantages and disadvantages, and whereas one isn't necessarily ‘better’ than the other, there are cases where one may be the preferred approach,” he explains. “Making this decision requires a clear understanding of both techniques and how they fit into clinical care.”

Below, Dr. Brodsky discusses the pros and cons of each option as well as how to determine the best approach and optimize each technique in clinical practice.

MBSS vs. FEES

MBSS is one of two reference standards for the diagnosis of dysphagia, according to Dr. Brodsky. “It is a real-time fluoroscopic motion study used to assess swallowing physiology and airway protection,” he explains, noting that in the ideal scenario, it is performed by a speech-language pathologist (SLP) alongside a radiologist — and assisted by a radiologic technologist — to effectively evaluate anatomy

and swallowing physiology. The need to limit radiation exposure requires that MBSS typically be performed in less than five minutes.

Comparatively, FEES uses a flexible endoscope that is passed transnasally to view the pharynx and larynx during the swallowing process. This procedure allows the SLP to assess the anatomy and physiology of the nasopharynx, pharynx, base of tongue, larynx and opening of the esophagus at rest, while the patient is breathing and speaking, and while the patient is eating and drinking. Unlike MBSS, there are no associated time constraints — the duration of a FEES exam is limited only by the time available for the evaluation and the patient's ability to tolerate the procedure, and most patients do very well.

“Both tests are conducted in real time, but there are key differences,” says Dr. Brodsky. “FEES uses a full-color camera while MBSS uses X-ray and therefore is done in black and white. Additionally, FEES involves normal liquids and foods whereas MBSS uses barium.”

“With FEES, you are looking exclusively at the nasopharynx, pharynx and larynx. You aren't looking at the oral cavity or the esophagus,” he adds. “MBSS allows us to examine all of those areas and the esophagus all the way down to and including the stomach.”

MBSS, like other X-ray studies, is not sensitive to soft tissues, according to Dr. Brodsky. “Compare that to what FEES is capable of, you can see the vocal cords and all the surrounding tissue. You can see where surgical incisions and sutures are as well as areas that have been scarred by radiation,” he explains. “You can see — a little bit easier or at least differently than with MBSS — where nasal, pharyngeal and laryngeal structures have been removed or surgically altered.”

Given the increased sensitivity associated with FEES, it may be the preferred approach for patients who have

diagnoses involving the soft tissue, such as head and neck cancer, vocal cord disorders, or airway issues.

Conversely, FEES would not be appropriate for a patient with esophageal concerns because the scope does not reach this area, notes Dr. Brodsky. Another example is glossectomy or resection of part of the tongue. “In these cases, FEES isn’t going to be the best option. It allows you to see what’s happening in the pharynx, but if you want to see the synthesis of how the bolus is prepared, manipulated and moved out of the mouth and into the pharynx following the glossectomy, then MBSS is the better study.

“It is important to emphasize that while these two exams overlap, they are not interchangeable,” explains Dr. Brodsky. “You cannot simply use one if the other is not available. Determining which exam to use depends on the clinical question and which approach is going to answer that clinical question best.”

When it comes to making diagnoses following these tests, Dr. Brodsky notes that FEES is not a standardized procedure in terms of its scoring or the protocols used to complete the exam. “As a result, diagnoses can vary from clinician to clinician, even within the same institution, and certainly across facilities,” he says. “However, the basic principles remain the same. We are making observations based on what we see during the evaluation and making clinical decisions based on the information gathered.”

In comparison, there is currently only one standard for the MBSS, according to Dr. Brodsky, which is the Modified Barium Swallow Impairment Profile, or MBSImP. This

is a standardized approach for the instruction, assessment and reporting of the physiologic components of swallowing.

FEES in the ICU

Another area where Dr. Brodsky believes FEES is particularly beneficial — and should be used more frequently — is critical care, specifically among patients in the ICU who have been weaned from oral or nasal intubation with mechanical ventilation.

One of the biggest advantages of FEES for this patient population is its portability. “It can be performed in the ICU patient’s room, eliminating delays as well as the need for a potentially difficult patient transport,” says Dr. Brodsky, who has conducted extensive research using this procedure in the ICU.

“This is where FEES shines,” he emphasizes. “Not only do you avoid the risks associated with moving a critically ill patient, but also the increased sensitivity of this test allows for the

assessment of voice and laryngeal function after extubation when an injury is expected.”

It is also more convenient and cost-effective since the evaluation can be scheduled directly with the SLP and does not involve multiple departments. Additionally, FEES can be performed more frequently than MBSS — provided the patient tolerates it well. The test is safe to complete, even in infants, including infants who are breastfeeding.

“This is not to say that the patient won’t require an MBSS, depending on the findings. But in the immediate time frame, there will be more than enough information to make some clinical decisions,” says Dr. Brodsky. “FEES allows you to move forward without delay and addresses the issues of swallowing, airway and voice.”

Complementary approaches

Although FEES is the newer evaluation of the two, Dr. Brodsky notes that he does not

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A speech-language pathologist with a patient.

MASS UNDER THE LIP

Case highlights the importance of oral hygiene in hospital and outpatient settings

Note: This article is reprinted from the *Cleveland Clinic Journal of Medicine* (2023;90[3]:145-146)



Sagar Khanna, BDS, DDS
Staff, Dentistry and Oral Surgery

A 60-year-old man was referred by his primary care physician to the oral and maxillofacial surgery clinic with a mass under the upper lip. The mass had grown slowly over the preceding two to three weeks while the patient was in rehabilitation after a stroke that had occurred three months earlier. He reported no symptoms other than minor bleeding of the gums after brushing his teeth. He was not a smoker. His oral hygiene during his hospitalization and rehabilitation had been poor.

On physical examination, a large, firm, nontender, sessile mass was visible on the gingiva of the upper incisors (see below). The surface was erythematous and smooth with no ulceration. Excisional biopsy of the entire mass was



performed under local anesthesia. Histopathology revealed a fibroma with fibrous strand proliferation and no dysplastic changes, suggesting a diagnosis of benign fibroma. No additional treatment was necessary.

The patient was instructed on the importance of maintaining oral hygiene. At a two-week follow-up visit, the gingiva had healed with restoration of its contour. The patient had no bleeding gums or other symptoms.

Differential diagnosis of gingival mass

The differential diagnosis of a gingival mass includes peripheral ossifying fibroma, peripheral giant cell granuloma and pyogenic granuloma.¹ Fibromas are benign growths that occur most commonly along the buccal mucosa secondary to accidental biting of the cheek.² Due to their slow growth, they typically have a subacute onset.

The gingival fibroma in our patient stemmed from poor oral hygiene resulting in plaque with a calculus deposit acting as an irritant. This is histologically different from a cutaneous fibrous neoplasm, which is rarely seen in the mucosal tissue in the head and neck.³ Excisional biopsy is diagnostic and curative. Laser removal has been described in the literature.⁴ Recurrence is prevented with attention to good oral hygiene.⁵

The development of the oral mass in this patient illustrates the importance of oral health, which is often overlooked in the hospital and outpatient settings. Patients at risk include those with prolonged stays in the hospital and in rehabilitation facilities. Patient education and attention to oral hygiene can prevent oral infections and will improve the overall health of patients.

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DATA POINT TO PROGRESS IN TREATING ANAPLASTIC THYROID CANCER

New research provides clinical insight into prognostic factors

Anaplastic thyroid carcinomas (ATCs) remain among the most highly lethal of all cancers, but newly published data from Cleveland Clinic's 21-year experience provide reasons for optimism in the current era of targeted and immune therapies.¹

Patients with the rare, aggressive, undifferentiated tumors have a median survival of four to nine months after diagnosis and a one-year survival rate of just 20%. Response rates to standard multimodal surgery, radiation and systemic chemotherapy typically have been less than 15%. But the picture has shifted since the 2017 publication of a phase 2, open-label trial of the targeted therapies dabrafenib and trametinib in 16 patients with *BRAF* V600E ATC, which resulted in a 69% overall response rate.²

This led to rapid approval by the U.S. Food and Drug Administration and, in 2021, updated guidelines from the American Thyroid Association establishing the use of dabrafenib and trametinib as standard of care for ATC treatment in patients with the targeted mutations.³

The new retrospective case series of 97 patients with ATC treated at Cleveland Clinic between 2000 and 2021 shows that the ability to receive definitive or adjuvant radiation therapy, younger age, the presence of other tumor types and absence of distant metastases all predicted better overall survival. And, as anticipated, survival was also prolonged among eligible patients who received targeted therapy and/or immunotherapy.

"It was an important study because we have one of the largest single institutional experiences with anaplastic cancer and there have been significant changes in treatment now with targeted therapies, particularly if people have *BRAF* mutations where the standard of care has changed," says lead investigator Joseph Scharpf, MD, Professor of Otolaryngology-Head and Neck Surgery, Cleveland Clinic Lerner College of Medicine and Director of Head and Neck Endocrine Surgery.

Longer survival in modern era

The goal of the review, Dr. Scharpf says, "was to give us a perspective of the results we've had for patients and to allow us to compare and see how we're doing with the new targeted treatment."

The 97 patients with biopsy-proven ATC had a median age of 70 years at diagnosis. Two-thirds were female and the majority white. *BRAF* variation status was assessed in 38 of the patients using immunohistochemistry testing, next-generation sequencing of tissue and liquid specimens, or a thyroid-specific variation panel. Of those, 18 had a *BRAF* V600E variation, and 20 had a *BRAF* wild-type variation.

Treatments included surgery in 44 patients, chemotherapy in 41, definitive or adjuvant radiation therapy in 34 and targeted therapy in 28.

Overall survival for the entire group was 6.5 months. In multivariate analysis, factors significantly associated with longer survival were surgery versus no surgery (hazard ratio [HR] 2.12), receipt of chemotherapy (HR 3.28), and receipt of definitive or adjuvant radiation (HR 2.47). Moreover, survival also lengthened beginning in 2014, when broad use of *BRAF* variation testing and administration of targeted therapies began (HR 3.28 versus prior to 2014).

Among four patients who received immunotherapy as part of their treatment in combination with other targeted therapies, overall survival ranged from 7.4 to 42.0 months.

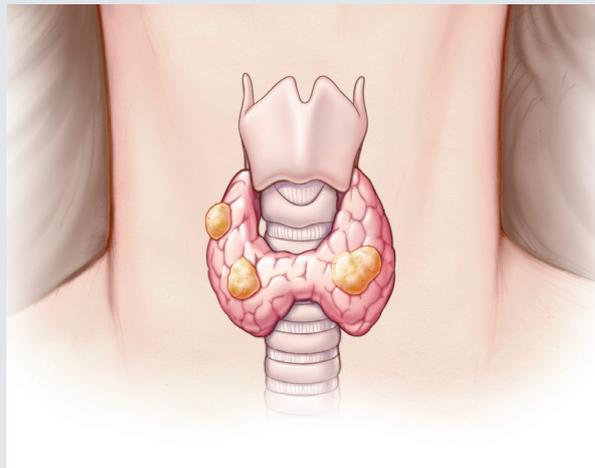
Of the total 28 who received targeted therapies, five had to discontinue them due to toxic effects.

"The level of detail in the current report is a first for ATC treatment," Dr. Scharpf says. "No other institution has looked at this with the granularity that we have."

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Joseph Scharpf, MD
Director, Head and Neck Endocrine Surgery



NEW REVIEW INDICATES THAT AIRWAY STENOSIS TREATMENT DURING PREGNANCY IS SAFE AND EFFECTIVE

Endoscopic balloon dilation during pregnancy appears to be an effective way to optimize respiratory outcomes for the mother and promote safe delivery of the fetus



Paul Bryson, MD, MBA
Director, Cleveland
Clinic Voice Center,
and Section Head,
Laryngology

Subglottic stenosis is a rare but life-threatening condition that can be particularly dangerous among pregnant patients. The condition, often associated with cough, progressive hoarseness and dyspnea, can be misdiagnosed due to its symptomatic similarity to asthma. But for a patient who is struggling to breathe during labor, the increased fatigue can weaken the patient and cause trouble with delivering the fetus. However, when the condition is diagnosed early in pregnancy, there is a tendency toward surgical intervention to ensure that the mother can labor safely.

While there is not presently an official recommendation for airway stenosis management in pregnant patients, new research appearing in *The Laryngoscope* looked at the current approaches for surgical management. The researchers examined the various surgical options, surgical considerations to optimize maternal and fetal care, and the outcomes of patients who underwent surgical management.

Study methods

“In our study, we looked at 15 articles and a total of 27 patients who had received surgical intervention for subglottic stenosis during pregnancy,” explains Paul Bryson, MD, MBA, Director of the Cleveland Clinic Voice Center, Section Head, Laryngology and senior author on the article. “The associated symptoms of subglottic stenosis are often progressive and relatively slow in manifesting, so we had an interest in trying to determine which procedures can be safely done and when during a pregnancy.”

Also involved with the study were Katherine M. Miller, MD; Kevin Y. Liang, MD; Neil Nero, MLIS; Michael S. Benninger, MD; Rebecca C. Nelson, MD; William S. Tierney, MD; and Robert R. Lorenz, MD, MBA.

The 15 included articles were published between 1963 and 2022, and they came from five countries. The 27 participants from the 15 studies had a median age of 29 years (range, 20-40 years), a median gestation age intervention of 28 weeks and an average Cotton-Myer grade of III. The Cotton-Myer classification system is a tool to evaluate the severity of subglottic stenosis, with grade I being the least obstructed and grade IV being completely obstructed. Among the participants,

the most common etiologies of airway stenosis were idiopathic (11), autoimmune (4), iatrogenic (1) and rheumatologic (1).

The researchers noted that the most common procedure for treating subglottic stenosis in the cases reviewed was direct laryngoscopy and balloon dilation with or without lysis of scar tissue (85.1% dilation vs. 14.9% other). Dilation was held between 20 and 60 seconds and was repeated up to five times. In patients where lysis was performed, laser was the most common modality, and a CO₂ laser was used in 11 cases. Other options for lysis included microlaryngeal scissors and electrocautery knife. In three patients, tracheostomy was performed, and it was the primary means of primary management in two cases. The majority of patients required only one surgical intervention during their pregnancy. The median length of time for the surgical procedures was 25 minutes (range, 13-90 minutes).

“The most common technique in managing subglottic stenosis is the mucosal sparing technique, which is a relatively less invasive approach that involves radial incisions and light dilatation. But since we included articles from 1963, there were a few techniques that have since fallen out favor, such as the Nd:YAG laser and electrocautery knife,” says Dr. Bryson. “One technique that is still widely used with these procedures is the injection of steroids into the lesion. There have not been any studies that specifically examined the outcomes of intralesional steroid injection of the larynx in pregnant persons, but the use of intralesional steroid to the breast is a known practice used in pregnant women with idiopathic granulomatous mastitis.”

Findings

All but one of the 15 studies reported methods of ventilation during their respective interventions. Fourteen patients were managed with jet ventilation, and nine patients were managed with transnasal humidified rapid-insufflation ventilatory exchange (THRIVE). Both ventilation methods were used without incident, and none of the studies reported the need to change ventilation methods or loss of airway during the procedure. In the studies that reported positioning, the left lateral position with 30

degree reverse Trendelenburg was most commonly used. The studies also reported 21 fetuses were monitored intraoperatively using fetal heart monitoring (FHM). In the six cases where FHM was not used, it was because of the pre-birth viability of the fetus. Sonograms were not used during any of the procedures.

In regard to maternal-fetal outcomes, 14 births were vaginal, and the other eight were cesarean section. All but three of the infants were delivered at term. The median time from last procedure to delivery was 10.3 weeks (5 days to 31 weeks). Infant health was reported for 16 of the patients. Three infants required admission to the neonatal intensive care unit after birth.

Some maternal pregnancy-related complications were also reported. There was one instance of post-laser laryngeal edema in a patient with granulomatosis with polyangiitis who underwent a laser resection at 30 weeks. The patient was hospitalized for monitoring and ultimately developed preeclampsia at 32 weeks, which required an emergency cesarean section. Another patient with dyspnea had to return to the operating room for debridement of laryngeal crusting after undergoing direct laryngoscopy with CO₂ laser lysis of a scar band and balloon dilation at 15 weeks. In regard to timing, the review indicated that the second and third trimesters actually appear to be safe for airway intervention, and the researchers noted that very few patients needed repeat interventions.

Takeaways

“We felt this retrospective study was important because of the hesitancy

associated with performing procedures on pregnant persons,” explains Dr. Bryson. “This hesitancy means there aren’t very many strong prospective or retrospective studies, which limited the number of patients and studies we could include. However, the American College of Obstetricians and Gynecologists (ACOG) released guidelines to help clinicians with their decision making when it comes to performing surgeries.”

The organization points to evidence that shows in utero exposure to anaesthetic or sedative drugs doesn’t have any teratogenic or neurologic impact as long as exposure is less than three hours. With the longest procedure lasting 90 minutes, laryngeal and tracheal surgeries can be viewed as safe according to these guidelines. Additionally, ACOG also recommends using fetal heart monitoring and positioning the mother in a left lateral recumbent position when possible.

“While our review suggests that endoscopic balloon dilation during pregnancy is safe and effective, it’s important for clinicians to communicate with their patients to facilitate more informed decisions for both patients and providers,” says Dr. Bryson. “Early consultation and communication with anesthesiology and maternal-fetal medicine colleagues is also important. Because of the small number of published trials on the topic and otolaryngologic descriptions of procedures, our review did have some limitations. Therefore, more research is needed to fully determine the safety and effectiveness of subglottic stenosis airway management during pregnancy.”

Head & Neck Innovations

WINTER 2023/2024

Head & Neck Innovations offers information from Cleveland Clinic otolaryngologists, speech-language pathologists, facial plastic and reconstructive surgeons, audiologists and dental specialists about new and emerging medical, surgical and rehabilitative techniques. It is written for physicians and should be relied on for medical education purposes only. It does not provide a complete overview of topics covered and should not replace the independent judgment of a physician about the appropriateness or risks of a procedure for a given patient.

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CASE STUDIES: THE CHALLENGES OF NASAL RECONSTRUCTION continued from p 9

back to their normal lives. This helps them rebuild their confidence,” says Dr. Byrne. “However, this is invariably a long journey, requiring multiple procedures. Most people do not develop complications, but when they do, such as in this patient, one’s resolve is severely tested. I’ve learned over the years that success in reconstructive surgery is as much a function of skill and experience as it is of dogged determination. We’ve learned that with meticulous planning, attention to detail, patience and persistence, over time we can usually create something beautiful and functional out of the worst starting point.”

WHAT IS THE ‘RIGHT’ DIAGNOSTIC APPROACH FOR DYSPHAGIA? AN EXPERT WEIGHS IN continued from p 11

envision a scenario where it replaces MBSS. Rather, he argues, the two diagnostic tools are complementary and each has an important role to play.

“It’s important to remember that certain patient populations may benefit from one versus the other,” says Dr. Brodsky, while emphasizing the importance of selecting the best approach based on individual patient needs. “Also, just because you opt for one method doesn’t mean you can’t use the other if clinically relevant questions remain unanswered. While these exams are most often conducted in isolation, MBSS and FEES are not mutually exclusive.”

Both procedures are currently performed at Cleveland Clinic and, according to Dr. Brodsky, there has been an eightfold increase in the number of FEES exams conducted during his tenure—a trend he expects to continue. “I can confidently say we offer both procedures—inpatient and outpatient,” he notes while recognizing that this might not be the case at every facility.

“Access can be an issue. Ultimately, the decision to choose one approach over the other depends on availability as well as the clinical questions that need to be answered,” Dr. Brodsky concludes. “Ongoing development of and training for these procedures will be beneficial for all involved, ensuring clinicians have the necessary tools at their disposal to provide comprehensive patient care.”

DATA POINT TO PROGRESS IN TREATING ANAPLASTIC THYROID CANCER continued from p 13

Some will examine national cancer databases to draw conclusions. But you can’t get the degree of detail you can get from a single institution’s data about individual patients. This is unique.”

It takes a multidisciplinary team

When a patient is diagnosed with ATC at Cleveland Clinic, a multidisciplinary team is immediately assembled for their care, including clinicians from surgical oncology, radiation oncology and medical oncology.

The patient is evaluated for airway patency and physical findings and undergoes imaging and also molecular testing for *BRAF*. This is done in-house due to the need for rapid assessment as to whether they’re eligible for targeted treatment. Those results usually are available within 24 hours. Tissue samples are also sent out for next-generation sequencing, which typically takes longer.

Clinical coordinating nurses assess patient eligibility for ongoing clinical trials. For patients who aren’t *BRAF* positive, the team will investigate other best treatment options and any targets that can be used.

“There are some other rare mutations. That’s why we send out the tissue for molecular testing, to see if there’s something we can focus on. If we find a different or unique mutation, that could be a game changer for an individual patient if that mutation can be targeted with some kind of medicine,” Dr. Scharpf explains.

Cleveland Clinic is one of the study sites for a new phase 2 clinical trial investigating whether the addition of the immunotherapy pembrolizumab to dabrafenib and trametinib before surgery further improves survival for patients with *BRAF* V600E-mutated ATC.⁴ “These are highly immunogenic tumors, so we hope the new drug will improve outcomes,” says Dr. Scharpf.

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Brandon Hopkins, MD

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Jamie Ku, MD

Director, Head and Neck Robotic Surgery Program



Joseph Scharpf, MD

Vice Chair, Education



Raj Sindwani, MD

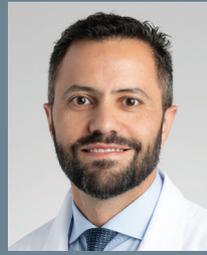
Vice Chair, Head and Neck Operations



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Section Head, Rhinology, Sinus and Skull Base Surgery;
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