

minnesota
MEDICINE

A CANCER GONE

VIRAL

The rise of HPV-associated
oropharyngeal cancer

ALSO INSIDE:

The First New
Otologic Disorder
in a Century

Musicians and
Hearing Injury

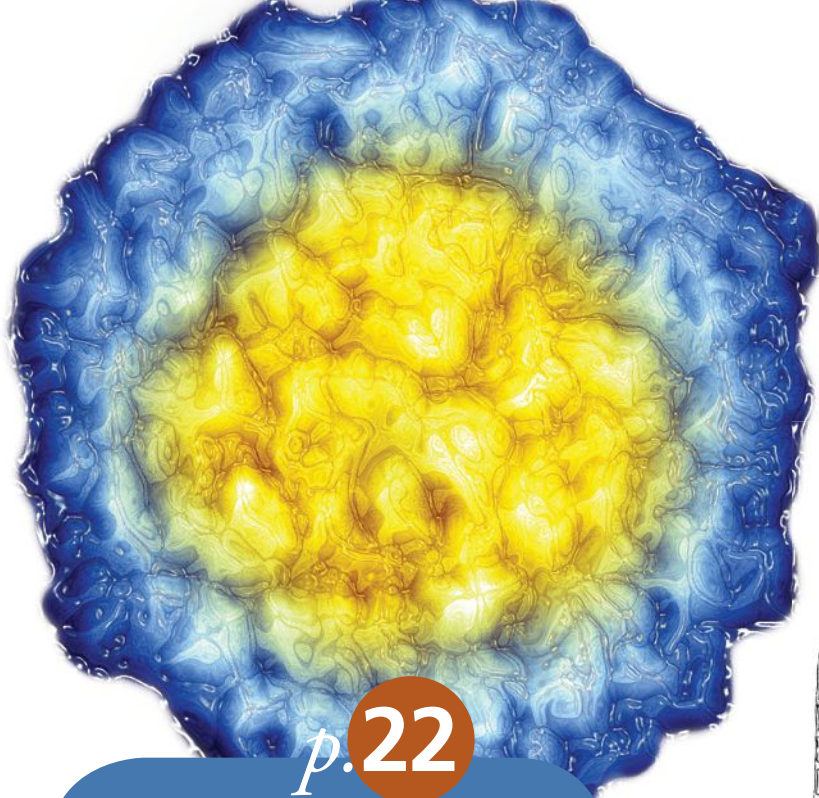
A New Look at
Tonsillectomy



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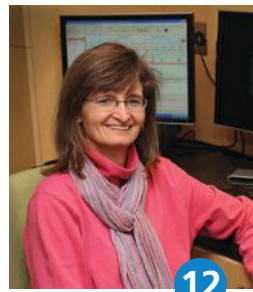
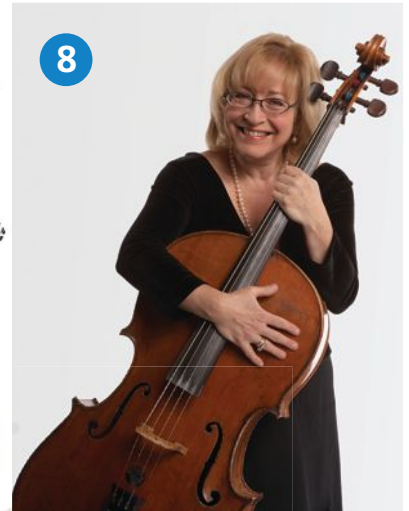
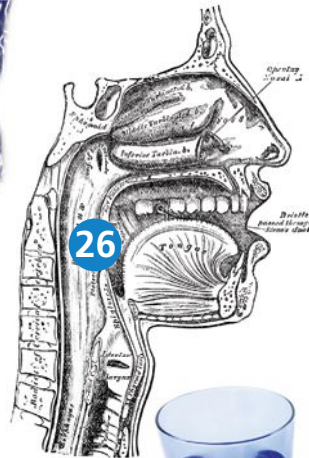
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To Submit an Article

Contact Carmen Peota at cpeota@mnmed.org.

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Photo by Scott Walker

The Mysteries of the Head and Neck

When I studied anatomy in medical school, the head and neck always seemed like a mysterious house. Obscure holes in the skull led to room-like fossae hidden from view. The petrous ridge of the temporal bone was a porch from which you could imagine viewing the cavernous expanse of the skull's interior. The sinuses were secret hideaways. As you rotated the skull, every angle revealed a new detail that you couldn't see before. The intact head and neck had a welter of muscles, nerves, and vessels that demanded meticulous dissection. And every encounter with our cadaver's head and neck became a magical journey.

In clinical practice, the head and neck can also be a bit of a mystery. Internists look at the outside, feel for lumps and bumps, then peer into nose and ears with an otoscope and the mouth and throat with a light and tongue blade. Yet so much can lurk out of sight. Far beyond the reach of the otoscope lie the middle ear and inner ear, hidden sanctums that can disrupt hearing or balance. Bulky turbinates in the nose can shelter nefarious problems such as cancers and leaky capillaries. Vocal cords hover just below the reach of most oral/throat exams. Chasing ENT symptoms with routine office exams can be 10 percent observation and 90 percent inference.

That's why we have otolaryngologists. Ear, nose, and throat docs still use the mirror and light, which for years were almost as iconic for physicians as the black bag and stethoscope. But they now have new tools that allow them to explore the mysterious realm that is their province. Fiberoptic scopes traverse those turbinates allowing perusal of the sinuses, the posterior

pharynx, and the larynx. Surgical robots wielding cameras and cutting instruments delve into crevices and corners to carve out tumors. Otolaryngologists can even unroof the temporal bone overlying the inner ear to repair dehiscences of those obscure semicircular canals, a diagnosis only recently described. Amazing techniques to explore the maze that is the head and neck.

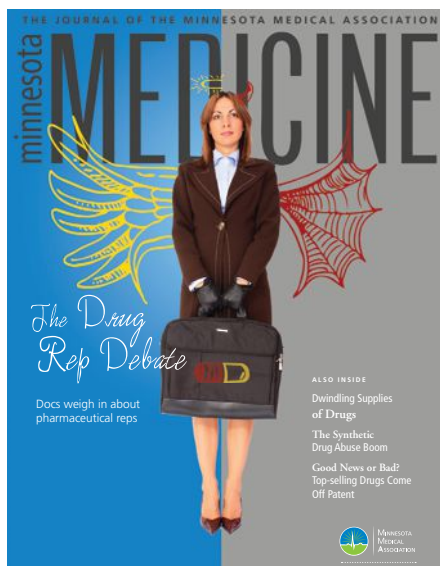
Over the years, ENT physicians have had to become schooled in other new diagnoses. When I started practice in 1977, obstructive sleep apnea didn't exist. Now it has spawned hundreds of sleep labs across the country and has been fingered as a cause of hypertension and arrhythmias. When standard treatments fail, otolaryngologists have procedures such as uvulopharyngoplasty to offer. Oral cancer, previously thought to be a disease of smokers and alcoholics, has been tied to the human papillomavirus, requiring preventive screening as well as definitive resection.

Even tonsillectomy, the bread-and-butter ENT operation, isn't the same. Gone are the days when the indications for tonsillectomy were either a sore throat and the presence of tonsils or the fact that your sister was having hers out and you wanted to be able to eat ice cream all day, too. Tonsillectomies for treating infections have become as rare as Viking victories, and now tonsils get removed to remedy obstructed breathing.

Otolaryngology has come a long way since our 1918 article described removing tonsils using instruments I had never heard of, and the nooks and crannies of that anatomical fun house have become a lot less mysterious.

.....
Charles R. Meyer, M.D., can be reached at cmeyer1@fairview.org

Chasing ENT symptoms with routine office exams can be 10 percent observation and 90 percent inference.



Out-Dated Drug-Rep Dress

I had to laugh out loud when I saw the cover of the most recent journal picturing the drug rep (October, “The Drug Rep Debate”). I took the magazine to my partner and asked him, “When was the last time you saw a female drug rep dressed like this?” In my experience, the skirts are a lot shorter and blouses are cut a lot lower. Perhaps it would have been a bit too racy or sexist to have split the image in half and have the clothing mimic the halo and horns, but doing that would have reflected the reality today.

Personally, I do not spend time in our clinic with drug reps, as I feel there are better and more efficient ways to get good drug information ... without making me blush or feel uncomfortable.

Drew Hoffmann, M.D.
Willmar

We Can Do More than Assume the Worst

The article by Dr. Bradley Hernandez in your October issue (“Don’t Assume the Worst,” p. 38) regarding the difficulty presented by patients seeking narcotic medications for the relief of what are thought to be chronic pain problems caught my attention. I have been working in urgent care for the past five years after 22 years of practicing family medicine. Although Dr. Hernandez does a nice job of outlining the conundrum of patients presenting with

pain complaints and requesting narcotic medication, I thought he missed some important issues.

He makes a passing reference to the fact that some patients use prescribed narcotics to raise money to fund an addiction to illicit drugs, but he does not mention the national concern regarding the increasing rate of death from overdose, often unintentional, from prescribed narcotics. I would submit that the stakes are higher than he suggests.

Beyond that, his proposed solution to the problem (give them the benefit of the doubt) is inadequate. I would propose that there are rational ways to approach the narcotic-seeking patient that can guide a physician in the decision process.

G. David Spoelhof, M.D.
Duluth



Home Care Can Reduce Readmissions

I read with interest the articles in your September issue, including the story about reducing hospital readmissions “Slowing the Revolving Door” (p. 24). This is my first time reading your magazine, and I salute you on the wide variety of subjects you address.

I have a comment, however, about the article. Although it presented many ways to help reduce readmissions, nowhere did it mention using home care services.

As a home care nurse, I know much can be learned from meeting these patients on their turf, so to speak, and that home care nurses can help them comply with their care plans and discharge directions. I would hope that hospital staff, including physicians, would consider this option when making discharge plans.

Susan Nelson, B.S.N., R.N.
Redwood Falls

Thanks for the Respect

I read the excellent article on chaplaincy services (“Body and Soul” p. 12) in the September issue of *Minnesota Medicine* and was delighted. I’d like to express my appreciation for how the MMA has valued and represented the role of chaplains in health care. The mutual regard and respect among our disciplines have been very evident to me as I participated in the MMA’s Physician Wellness retreat and served on the well-being task-force this year; that spirit of collegiality has been reinforced many times over, especially as represented in this most recent publication.

Rev. Bradley J. Skogen, BCC
Chaplain, Lake Region Healthcare
Fergus Falls

WHAT’S ON YOUR MIND?

Health care reform? An article you’ve read in a recent issue? A problem in your practice?

Send your thoughts to Letters at *Minnesota Medicine*,
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WE WANT TO HEAR FROM YOU!



Cellist Janet Horvath suffered a hearing injury during a performance and has become an advocate for the use of hearing protection by musicians.

■ Hearing

Music to Their Ears?

Long an occupational hazard for rock musicians, hearing injury is as much of a risk for classical musicians. | BY TROUT LOWEN

During an amplified pops concert at Orchestra Hall in 2006, cellist Janet Horvath felt a sudden and serious pain in her left ear. As she played, the pain grew, radiating down her neck and into her face, tongue, and jaw.

A long-time advocate for workplace safety for musicians, Horvath knew what was happening. She was experiencing a temporary threshold shift, hearing loss brought on by exposure to excessively loud sound. In this case, the sound was coming from an on-stage speaker situated near her chair and pointed back at the orchestra. After the performance, Horvath's ear

felt plugged, and she experienced painful spasms. She had an acoustic shock injury.

Almost everyone who has attended a blaring rock concert or thunderous sporting event has experienced tinnitus, or ringing in the ears, at one time or another. Usually, the effect is short-lived, disappearing after a several hours of quiet or a good night's sleep.

Horvath wasn't so lucky. The next morning, she was back at work, rehearsing for the orchestra's upcoming performance of *Carmen*. For the first time in her career, she says, she found the volume on stage intolerable. She needed to wear an earplug

to get through the rehearsal and the performance, and for months afterward.

Eventually, the ringing subsided, but other, more distressing symptoms continued. Her inner ear was overreacting to sound, not just on stage, but in daily life: women talking, dishes clattering, even the sound of her own voice caused Horvath's ear to spasm and send pain shooting down her neck. She was diagnosed with hyperacusis, a hearing injury that causes oversensitivity to all sound. She is currently on leave from her job with the Minnesota Orchestra because of the condition.

Horvath's situation is not unique. Although hearing damage is considered almost a given for rock musicians, there is a growing awareness that classical musicians, too, suffer hearing injury and loss. No statistics are available, but the number of classical musicians affected appears to be growing as performance schedules intensify and volumes increase. A survey of British symphony musicians published in the 2008 report "A Sound Ear II" found that 79 percent have experienced pain stemming from loud noise, and 14 percent experience it frequently.

Even so, many classical musicians are reluctant to talk about their hearing issues, Horvath says. They're afraid that coming forward might cost them their jobs. "We have come a really long way in the field of performing arts medicine," she explains. "It's now an established medical field.... But the one area that is still not out of the closet is hearing."

Horvath has done a lot herself to advance the field of performing arts medicine. After developing overuse injuries while still in college, she organized the first Playing (Less) Hurt conference in 1986 at the University of Minnesota. It brought together more than 500 musicians, physicians, and music educators to discuss the problem of occupational injuries of musicians and how to prevent them.

In 2002, she wrote an injury preven-

tion guide of the same name (it can be purchased at www.playinglessshurt.com) specifically for musicians. Now she is one of the biggest public advocates for hearing protection for musicians. The most recent edition of her guide includes a chapter on hearing-related issues. “The world has become so toxically noisy that there is never a break from noise, from sound,” Horvath notes. “Wherever you go, the decibel levels are absurd. So even if a musician is aware of the large decibels on stage, they have to take tremendous steps to protect their ears outside of the stage.”

Exposure to just one loud blast can cause temporary or permanent hearing loss or damage, as can repeated exposure to excessive sound, such as listening to music too loudly through headphones or ear buds or the noise from a lawn mower, leaf blower, or other machinery.

The Inner Ear

Although we “hear” sound, our ears actually experience sound as pressure. The louder it is, the greater the pressure exerted on the stereocilia, the tiny, hair-like structures embedded in the cochlea that transmit electrical impulses through the auditory nerve to the brain.

Stereocilia can be bent or flattened by excessively loud sound, but they usually spring back after a day or two. Over time, however, they can lose their ability to rebound. They also can break or become permanently bent or flattened.

The louder the sound, the greater the risk, says Richard Levinson, M.D., a pediatric otolaryngologist with Ear, Nose, and Throat Specialty Care of Minnesota, P.A. And the longer or more frequent the exposure and the closer the person is to the source, the more likely it is that damage will occur and be irreversible, something he learned first-hand while playing guitar in a rock band in the 1960s.

“Noise damage to the inner ear is like sun damage to your skin,” Levinson

“Noise damage to the inner ear is like sun damage to your skin. You just add to it with further successive insults.”

—Richard Levinson, M.D.

explains. “You just add to it with further successive insults. So the key is education and protecting yourself.”

That includes knowing how much sound exposure is too much and how long is too long. The federal government estimates that 30,000 people a year are exposed to excessive noise levels at work. The National Institute for Occupational Safety and Health recommends that workers be exposed to no more than 85 dBA over eight hours, and that for every additional 3 dBA, exposure time be cut by half. For example, at 100 dBA, the maximum recommended safe exposure time is less than 15 minutes per day.

“Orchestras have peaks that routinely go up to 110 dBA, even 115 dBA,” Horvath says. “There can be instantaneous hearing loss. That’s happened in our orchestra to a couple of people.”

The 15 minutes before a rehearsal, when musicians are warming up on stage, can be the loudest, she says. “It would regularly approach 110 dBA. So you already get your daily exposure before the seven-hour rehearsal even begins.”

Hearing loss isn’t the biggest problem for musicians, Horvath says. In fact, a number of studies have shown that classical musicians don’t experience hearing loss in greater numbers than the general public. The bigger problem is hearing injury, which can manifest in a variety of ways including tinnitus, recruitment (a condition in which there is a rapid increase in the perceived

loudness of sound, which can cause pain), and hyperacusis (decreased sound tolerance). Musicians with hearing injury also can have difficulty discerning pitch, intonation, and timbre, significant liabilities for those who play in a symphony.

Ellen Dinwiddie Smith, who plays the French horn, is convinced that a seating change at the Minnesota Orchestra is the cause of her Meniere’s disease. In 2003, the orchestra’s seating arrangement was altered, placing the horn section directly in front of the percussion section. That’s when Dinwiddie Smith began suffering from intermittent hearing problems and began routinely wearing earplugs.

“Your ear is literally at the same level as a snare drum,” she says. “If they’re 10 feet away from you, you can feel it in your ear. Many times, the bass drum is right behind me, and not only can I feel it in my ear, the sound will actually come up the bell of my horn and hit me in the face.”



The force can be so intense that it knocks her mouth piece away.

Dinwiddie Smith initially attributed her hearing problems to sinus trouble. "I couldn't figure out why my ears felt so stuffy. And then [the doctors] would look in there and say they were fine. That happened maybe two or three times. It wasn't until I had an absolute moment of nausea combined with that that they were really able to put it together."

Physicians don't know what causes Meniere's disease, but Dinwiddie Smith thinks her problem stems from playing while wearing earplugs, which she likens to performing an extended Valsalva maneuver. "When playing loud and high, I simply put so much pressure on my ears that it made me dizzy, caused "whooshing" sounds, loss of midrange sounds, and double vibration issues that I have now when I am having a Meniere's 'attack,'" she says.

As Dinwiddie Smith's experience illustrates, where a musician sits, the instrument he or she plays, and what instruments are nearby all matter. About half of a musician's exposure to sound comes from their own instrument. Those that produce higher sound frequencies cause more damage. According to the survey of British musicians, brass and woodwind players suffer hearing injury, particularly hyperacusis and recruitment, more frequently than other musicians.

Toning Down the Noise

There are things musicians can do to reduce their expo-

sure to noise. Horvath suggests playing with mutes, if possible; practicing more quietly or wearing earplugs while practicing; practicing in larger rooms that have surfaces that absorb sound; limiting exposure to outside noise; and avoiding noisy activities the day after a big concert in order to give their ears a rest.

In Minnesota and elsewhere, orchestras are taking steps to reduce noise exposure, supplying musicians with professional earplugs that can reduce overall volume by up to 25 dBA, changing the spacing between musicians or rotating their seat assignment, seating some musicians on risers so the sound goes over their colleagues' heads, and even using Plexiglas noise shields to redirect sound.

But the response to musicians' concerns varies from orchestra to orchestra.

Horvath says it's not just professional musicians who need to hear the message about hearing protection. People who attend concerts, music instructors, and parents of young musicians also have to understand the consequences of noise exposure. Young musicians have less control and tend to play louder, but most junior and senior high school music rooms are full of hard, noise-reflecting surfaces.

She says schools need to find ways to incorporate sound-absorbing materials such as wall hangings and carpet into practice rooms. "If the principals, the teachers, and the parents are informed that this can be dangerous to their kids' health, then we'll get some action," she says. ■



■ Chronic Sinusitis

Magic for Sinus Sufferers?

An old remedy for chronic sinusitis finds new popularity.

| BY KIM KISER

Give credit to Oprah. About five years ago, after Mehmet Oz, M.D., did a segment on her show demonstrating the use of a neti pot for sinus sufferers and sent everyone in the audience home with one, V. Stuart Cox, M.D., an otolaryngologist with Midwest Ear, Nose, and Throat Specialists in St. Paul, started hearing from patients who wanted to know more. They asked: Can pouring warm water into your nasal cavities really prevent or alleviate sinusitis?

Although the television show popularized the use of these small ceramic or plastic devices that look like Aladdin's magic lamp, this Auryvedic medicine technique, known as *jala neti*, has been practiced throughout India for centuries. Cox says references to neti pots or other forms of sinus irrigation began appearing in the medical literature about 20 years ago. "There's actually a fair amount of literature that shows it's helpful," he says.

"If you look at the meta analysis studies of nasal irrigation—salt water, saline, or hypertonic saline delivered through a sinus rinse bottle or neti pot—the universal evidence is that it decreases sinus symptoms, and there's some evidence that says it probably decreases the number of infections for people with chronic sinusitis," he says. One 2009 report out of Watergate Allergy & Asthma Center in Washington, D.C., that received considerable press contradicted the literature and suggested that daily use of saline irrigation could actually cause infections, the idea being that it may wash immunoglobulins from the sinus cavity. But Cox

says the study didn't specify whether participants had acute or chronic sinusitis.

He says the people for whom nasal irrigation is most useful are those who suffer from chronic sinusitis—that is, their symptoms persist for most of the year, rather than just during the cold and allergy seasons. He says the theories are that mechanically bathing the sinuses clears away mucus and that it also may improve ciliar function so that the cilia can more effectively remove allergens or other irritants.

"Over the last 10 years, there has been a significant advance in our understanding of chronic sinusitis," Cox says. "The new model is that it's an autoimmune disease rather than one caused by an infection, so the new treatments hinge on that understanding." He says about 20 percent of the chronic sinusitis patients in his practice undergo surgery to restore patency of their sinuses in cases where there is a blockage. They also are treated with frequent cleansings in the office and intranasal or oral steroids, as well as antibiotics when they have flare-ups.

As for where saline irrigation fits into their treatment regimen, "I tell patients if they have chronic sinusitis to use it daily," Cox says. "For people who get occasional colds, I don't recommend it. However, if they use it, it probably helps their symptoms; but it doesn't shorten the duration of their cold." ■

The Correct Solution

Most people who use a neti pot to irrigate their sinuses use a solution of one-quarter teaspoon of uniodized salt to 8 ounces of lukewarm water, according to MayoClinic.com. Some use hypertonic saline—a solution that uses two to three times the amount of salt as normal saline solution. "There's not a lot of information showing a big advantage to hypertonic," says V. Stuart Cox, M.D., an otolaryngologist with Midwest Ear, Nose, and Throat Specialists. "And I find that people tolerate normal saline better."

And what about adding grapefruit seed extract, oregano oil, or other substances to the water? "A lot of people ask about these things, thanks to the Internet," Cox says.

He says there are a few anecdotal reports about grapefruit seed extract and oregano oil having a mild antifungal effect. "But there are no big studies showing any difference over saline. In general, most studies show that it's the washing of the sinuses that's making the difference, not the oregano or grapefruit seed extract." —K.K.



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two new lungs.**
And parents who
finally feel like
**they're not holding
their breath.**



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■ Books

Good Taste

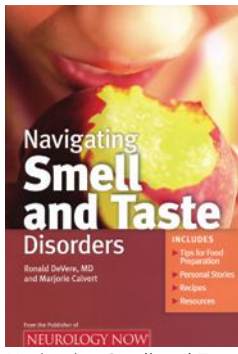
As many as 14 million Americans age 55 and older have an impaired sense of smell, and as many as half of the population between ages 65 and 80 years have trouble with both smell and taste. Ronald DeVere, M.D., an Austin, Texas, neurologist, is one of those with an impaired sense of smell. He discovered this back in 1995, when one morning, he sniffed a carton of milk before pouring it on his cereal and thought it was fine, only to taste it and discover it was sour.

DeVere's disorder turned out to be caused by a cold virus. (His sense of smell has somewhat recovered.) In addition to being associated with viral infections and allergies, smell and taste disorders have been linked to Parkinson's disease, multiple sclerosis, and certain dementias as well as diabetes, certain medications, and aging.

The experience motivated DeVere to study the disorders and open a taste and smell disorders clinic as part of his neurology practice. It also prompted him to write a book for physicians and patients, *Navigating Smell and Taste Disorders*, which was published this year by the St. Paul-based American Academy of Neurology.

The book combines education about how to diagnose and treat these disorders with stories of patients who have suffered from them. It also includes 36 patient-tested recipes customized for people with smell and taste disorders. The recipes are rated in terms of ease of preparation. The book even includes tips for preparing holiday meals.

Navigating Smell and Taste Disorders can be purchased through Amazon.com or the AAN's online store (go to www.aan.com/storefront). ■



Navigating Smell and Taste Disorders, Ronald DeVere, M.D., and Marjorie Calvert. AAN Enterprises, 2011



Photo courtesy of Gillette Children's Specialty Healthcare

■ Tonsillectomy

A New Look at an Old Standby

The tonsillectomy is back in vogue. | BY CARMEN PEOTA

Sleep medicine specialist Laurel Wills, M.D., looks intently at a grainy black-and-white video of a sleeping teenager on a monitor in a darkened room in Gillette Children's Specialty Healthcare's Sleep Health Center in St. Paul. The girl exhales, snoring loudly, then heaves and thrashes her arms while she attempts to inhale. Finally, with a gasp and gurgle, she gulps some air.

Wills points to an adjacent screen, where dozens of graphical readouts stacked on top of one another scroll by in sync with the video. The lines represent the girl's brain waves, cardiac and respiratory activity, and muscle movements, all of which are captured by the dozens of electrodes technicians had attached to her head, neck, chest, and abdomen before tucking her in bed for the night in their lab. Wills explains that the dramatic, erratic spikes in several of the lines provide additional evidence that the girl is experiencing apneic episodes that are waking her as often as every 30 seconds. It's no wonder the teen has complained of fatigue.

For the majority of pediatric patients with obstructive sleep apnea, Wills recommends that they see an otolaryngologist to explore whether tonsillectomy might remedy their sleep problem. "In upwards of 80 percent of typical cases, tonsillectomy will do the trick," she says. That was the original treatment for this patient. But tonsillectomy did not completely resolve the girl's problems, and now Wills will recommend a consultation with an oromaxillofacial surgeon.

The Fall and Rise of the Tonsillectomy

Sleep-disordered breathing, the umbrella term for maladies ranging from snoring to obstructive sleep apnea, is now one of the primary reasons children get tonsillectomies. (Because tonsillar and adenoidal tissue tend to diminish with age, they rarely are the cause of sleep apnea in adults.) Pediatric otolaryngologist

Pediatric sleep medicine expert Laurel Wills, M.D., often refers young patients with sleep apnea to otolaryngologists so that they can discuss tonsillectomy.

Barbara Malone, M.D., who practices at Midwest ENT Specialists in the Twin Cities, says two-thirds of her patients are children with obstructed breathing that affects their sleep. That wasn't the case when she started practice 23 years ago.

Nor was it the case for most of the last century, when tonsillectomy was the most frequently performed surgical procedure in the United States. Before antibiotics, the indication for tonsillectomy was simply the presence of tonsils. Even afterward, it wasn't much different. By the 1950s and '60s, tonsillectomy was done almost as a matter of course—if your brother was getting his tonsils out, you had yours out as well, Malone says.

But in the 1970s and '80s, tonsillectomy rates fell by 50 percent, as medicine moved toward evidenced-base practice. "Then they started to look at true indications," Malone says, at first focusing on strep throat and sinus and ear infections. But during the last two decades, as the specialty of sleep medicine emerged, the research on the indications for tonsillectomy has broadened to include blockage of the upper airway caused by enlarged tonsils or other lymph tissue that affects sleep.

During this time, awareness of the importance of sleep was growing among physicians, parents, and school administrators, as researchers showed that children who lacked sleep had growth problems, poor neurocognitive functioning, and behavioral problems. Eventually, sleep was linked with critical metabolic processes, including the production of insulin and other hormones that were associated with chronic diseases.

As getting a good night's sleep began to be seen as a medical necessity, performing a surgery to help children achieve that became more accepted, and the tonsillectomy rate began to tick upward toward the end of the 20th century. A 2009 study by Mayo Clinic researchers found that the overall tonsillectomy incidence

rate increased from 126 per 100,000 person-years during the years 1970 through 1974 to 153 in 2000 through 2005. The incidence rate of adenotonsillectomy rose from 243 per 100,000 person-years in 1970 through 1974 to 485 in 2000 through 2005. And they found one other thing had changed during that period: The presence of upper-airway obstruction increased from 12 percent of patients in 1970 to 77 percent in 2005.

Now parents and physicians are weighing the risks and benefits of tonsillectomy in a new light. "People are aware that sleep really affects quality of life," Malone says. "Those of us who take care of children, our tolerance for just letting kids outgrow things, when we know we can improve their quality of life, has changed."

New Guidelines

Today, sleep-disordered breathing is more likely than tonsillitis to be the reason a surgeon performs a tonsillectomy on a child. And because of that, there's now a sort of kinship between the subspecialties of pediatric sleep medicine and pediatric

Antibiotics Are Out

To many otolaryngologists, the most significant recommendation in the guideline for tonsillectomy released this year by the American Academy of Otolaryngology-Head and Neck Surgery may be the one against using antibiotics before, during, or after surgery. "I think the vast majority of us were probably using antibiotics until the guideline came out in January either postoperatively or intraoperatively, or both," says Laura Orvidas, M.D., associate professor of otolaryngology at Mayo Clinic. "The recommendation now is that you don't use them at all." She also notes that the guideline does recommend the use of intraoperative steroids, "which is what a lot of people were doing, but not everybody." —C.P.

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“Our tolerance for just letting kids outgrow things, when we know we can improve their quality of life, has changed.”

—Barbara Malone, M.D.

otolaryngology. Sleep medicine physicians such as Wills are regularly referring patients to otolaryngologists such as Malone.

That relationship was reflected in the make up of the panel that created a new clinical practice guideline for tonsillectomy released by the American Academy of Otolaryngology—Head and Neck Surgery (AAO-HNS) this year. That panel included representatives from sleep medicine, as well as experts from otolaryngology and other specialties.

The guideline sets a high bar for doing tonsillectomy for throat infec-

tions—it recommends watchful waiting for patients who have fewer than seven sore throats a year, and it says that episodes need to be documented in the medical record. The authors made a point of noting that because patients referred for tonsillectomy are rarely seen by the surgeon when they are having an acute episode, the work of documenting the infections will fall to the primary care provider. “It is therefore incumbent upon the referring clinician to accurately describe an individual episode of throat infection and to document the frequency of these events,” they wrote.

Malone says she presents the tonsillectomy option to parents of children with recurrent infections this way: “I say, this is not a life-threatening issue—it’s a quality-of-health issue. If you’re comfortable with the number of days of school missed or the rate of antibiotics used, then keep doing what you’re doing. But your child meets the indications for surgery, so it’s an option.”

The guideline does recommend that clinicians counsel parents or other caregivers of children with sleep-disordered breathing and tonsil hypertrophy about the benefits of tonsillectomy.

To Study or Not To Study

The textbook *Primary Care Otolaryngology* describes the diagnosis of obstructive sleep disorders as “straightforward” and says it should be based on history and physical examination, although a sleep study can

■ Adenoids

Why They Regrow

What causes adenoids to come back? | BY CARMEN PEOTA

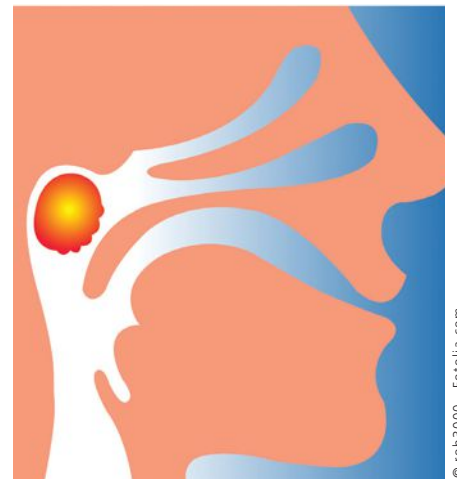
Several years ago, physicians at Mayo Clinic noticed what they thought was an increasing number of children whose adenoids had grown back after they had been removed. “We were wondering if what we were seeing was true and, if so, what were the factors that were affecting this,” says Laura Orvidas, M.D., associate professor of otolaryngology at Mayo.

Orvidas and her colleagues dug into the records of more than 8,000 patients who had undergone an adenoidectomy at Mayo during the past 30 years and found that adenoidal tissue grew back in about 2 percent of the cases. They also noticed that the rate was increasing ever so slightly.

Although they can’t explain exactly why the rate has inched up incrementally

with each decade, they were able to identify three factors associated with regrowth: the patient having surgery at a young age, the patient having gastroesophageal reflux disease (GERD), and the surgeon having less training.

Orvidas says younger patients are at greater risk for regrowth because surgeons are cautious when they work on them. “The smaller the person, the less room you have to work back there, and you don’t want to injure the surrounding structures,” she notes. She speculates that GERD may cause regrowth because it causes chronic inflammation in an area very close to the back of the nose. “If you don’t remove it [the tissue] all and it’s chronically attacked, it’s going to respond,” she says. And she thinks surgeons



Gastroesophageal reflux disease may cause regrowth of adenoidal tissue.

who have had less training may be more conservative than their more experienced peers and not take out enough tissue when performing the procedure. “We need to be diligent about paying attention to our younger surgeons and making sure they’re taking enough of the tissue out.” ■

be used as collaborative evidence. To clarify when polysomnography is warranted, the AAO-HNS issued a second guideline this year that recommends that clinicians refer children with sleep-disordered breathing for the test if they have complex medical conditions such as obesity, Down syndrome, craniofacial abnormalities, neuromuscular disorders, sickle cell disease, or mucopolysaccharidoses. It also says physicians should advocate for polysomnography prior to tonsillectomy when there is discordance between tonsillar size on physical examination and the reported severity of the sleep disturbance.

To Laura Orvidas, M.D., associate professor of otolaryngology at Mayo Clinic, this guideline, too, shows how medicine is shifting. “People have gone from saying everybody should have one [a sleep study] to prove they have it [sleep apnea] to saying nobody should have one

because you’re going to base this on parent reporting only. This is giving some guidance as to when it’s appropriate to get something that costs several thousand dollars prior to doing a routine procedure.”

The Hand-Off

On another afternoon at Children’s Hospitals and Clinics of Minnesota in St. Paul, Laurel Wills reviews polysomnography results from another patient,

The American Academy of Otolaryngology–Head and Neck Surgery’s 2011 guidelines for tonsillectomy and polysomnography are available online at www.entnet.org/Practice/clinicalPracticeguidelines.cfm.

this one a girl who has some snoring and airway resistance. The girl is obese and has trouble paying attention in school. She is often drowsy and moody. On physical exam, Wills found she had the proverbial “golf-ball-sized” tonsils. The sleep study, however, reveals that she has only mild airway obstruction and a few discrete apneic episodes.

Although Wills thinks tonsillectomy would help this patient, she won’t recommend it outright to the girl’s parents—she explains that’s not her role. Instead, she’ll discuss the available treatment options and defer to an ear, nose, and throat surgeon, who can more thoroughly review the risks and benefits of the procedure with the girl and her parents. “They are the ones who get to say ‘yay’ or ‘nay,’ ‘We do surgery,’ or not,” she says. ■

■ Hereditary Hemorrhagic Telangiectasia

Novel Approach

Researchers try sclerotherapy for nosebleeds. | BY CARMEN PEOTA

University of Minnesota assistant professor of otolaryngology Holly Boyer, M.D., is looking at using sclerotherapy, a treatment commonly used for varicose veins, to manage nosebleeds in people with a condition called hereditary hemorrhagic telangiectasia (HHT). The genetic vascular disorder, which affects about one in 5,000 people, causes blood vessels to lose their elasticity and become permanently dilated and malformed.

Although the condition affects vessels in the brain, liver, lung, and gastrointestinal tract as well the nose, it nearly always causes nosebleeds, as the fragile vessels in the nasal passages are easily damaged by dryness and nasal crusting. The lack of elasticity in the blood vessels prevents

constriction, making bleeding difficult to control. As people with HHT age, the frequency and severity of their nosebleeds often increases.

Boyer and her team got the idea for trying sclerotherapy, which involves inserting a needle into a blood vessel and injecting foamed sodium tetradecyl sulfate solution, for nosebleeds in patients with HHT after using it for large lesions in blood vessels in the larynx and pharynx. They initially tried the procedure using general anesthesia. When they found it caused only minimal bleeding, they felt confident about trying it with local anesthesia, making it feasible to do the procedure in an office setting.

In an article published in August in the *International Forum of Allergy & Rhi-*

nology, Boyer and her co-authors reported on seven patients who underwent the procedure. All of them reported having significantly less frequent and less severe nosebleeds after sclerotherapy than before it and said that they would undergo the procedure again.

Boyer and her team have received funding from the American Rhinologic Society for a clinical trial of sclerotherapy for nosebleeds related to HHT. They began enrolling patients in September and so far have three participants (they’re hoping for 38). They hope their new therapy provides an option for people that is effective, more convenient, and less expensive than other treatments, including electrical or chemical cauterization or laser treatment, which require general anesthesia. ■

To find out more about the clinical trial, contact Patricia Fernandes at 612-626-3018 or ferna079@umn.edu.



MMA in Action

■ MMA Policy Counsel Karolyn Stirewalt, J.D., is representing the MMA on a group working to protect vulnerable adults. In September, she attended a meeting hosted by Aging Services of Minnesota to discuss legislation to protect this population.



Karolyn Stirewalt

Stirewalt also recently hosted a meeting at the MMA to discuss disseminating information about Minnesota's Prescription Monitoring Program. Attending were representatives from the Minnesota Academy of Family Physicians Foundation; MAPS Medical Pain Clinics; PriCara, a division of Janssen Pharmaceuticals, Inc.; and the Minnesota Board of Pharmacy.

■ MMA Director of State and Federal Legislation Dave Renner gave a presentation about the next steps for health care reform to physicians at Essentia Health's Duluth Clinic on October 7.



Dave Renner

■ Leaders from the MMA and Twin Cities Medical Society (TCMS) recapped the 2011 legislative session and previewed the 2012 session with Southdale Pediatrics Associates' board of directors in October. The group also discussed the MMA's new

goals and efforts related to health plans and electronic medical records. Among those attending were MMA Board Chair David Thorson, M.D.; TCMS President-elect Peter Dehnel, M.D.; MMA Manager



David Thorson, M.D.

Peter Dehnel, M.D.

of State Legislative Affairs Eric Dick; and MMA Marketing Director Terry Ruane.



Kim Kiser (center) with fellow award winners.

■ *Minnesota Medicine's* Kim Kiser received the American Society of Anesthesiologists' 2011 Philip S. Weintraub Media Award for her article "Sleeper Career" (March 2011, p. 6). The article highlighted the need for anesthesiologists in rural communities and differences between rural and urban anesthesiology practices. It showcased the work of Mark Gujer, M.D., at Cuyuna Regional Medical Center in Crosby, Minnesota.

■ MMA Manager of Quality Improvement Rebecca Schierman received an award from the Minnesota Alliance for Patient Safety (MAPS) for her work to improve patient safety in Minnesota and for being a founding staff member of MAPS. In October, Schierman also gave a presentation about quality measures and pay for performance to the University of Minnesota OB/GYN faculty.

■ MMA Past President Benjamin Whitten, M.D., and MMA members Lisa Mattson, M.D., and Kenneth Crabb, M.D., spoke to University of Minnesota medical students about the value of organized medicine at a lunch-and-learn session in October. Mattson represented the Twin Cities Medical Society and Crabb represented the American Medical Association.

■ Dennis Kelly, director of the MMA Foundation, presented the MMA's Medical Student award to Shayla Wilson for her service to the MMA Medical Student Section, the MMA Minority and Cross Cultural Affairs Committee, and the MMA Ethics Committee.



Dennis Kelly presents the MMA's Medical Student award to Shayla Wilson.

Toward a Unified Profession

The MMA seeks to embrace all physicians in Minnesota and strives to be a strong advocate for our profession. As a part of our advocacy, the MMA places great emphasis on communicating about the work that is being done every day for our members as well as the benefits of membership. However, many physicians do not see a need for membership in the MMA; some may even feel that their professional goals run contrary to those of the MMA.

The effects of specialization and the commercialization of medicine have produced challenges for physicians in this regard. But increasingly, one of the most divisive factors in medicine—and one that has had an adverse effect on MMA membership—is politics.

A recent example is the American Medical Association's (AMA's) decision to support the Patient Protection and Affordable Care Act (PPACA). Many physicians were opposed to the PPACA, and this prompted some to drop their membership in the AMA. Members of the MMA were also divided on the issue, and some were angered over the MMA's decision to remain neutral on the PPACA.

When the AMA or the MMA endorses a specific candidate, a piece of legislation, or a policy action, there is the potential to alienate physicians who may respond by dropping their membership. If such a scenario is repeated over and over, membership in medical societies could dwindle to a point where they represent so few physicians that they become irrelevant.

Placing our personal views ahead of our profession when we engage in public debate about health care policy only weakens our influence.



Lyle Swenson, MD
MMA President

Photo by Steve Wewerka

Physicians have strong political beliefs, just as others do. However, we have learned that in order to care for our patients, we need to focus on the principles of our profession rather than our politics.

I think we need to adopt a similar approach with our profession. Rather than focus on our differences, we need to focus on the common principles we share.

Our individual political views will surely influence our internal discussions about formulating policy; but placing our personal views ahead of our profession when we engage in public debate about health care policy only weakens our influence. We need to be unified so that we can speak with a strong voice.

We all certainly want to have a role in developing and influencing legislation that affects our profession. But as individuals, we should not jeopardize the long-term strength of our medical society because of personal disagreements over short-term political decisions. Our profession will continue to face challenges. To remain a strong advocate for physicians, we must become—and remain—unified.

■ MMA CEO Robert Meiches, M.D., and Janet Silver-Smith, MMA director of health policy, met with Minnesota's Commissioner of Health Ed Ehlinger, M.D., and Assistant Commissioner Ellen Benavides October 17 to discuss MMA concerns with the state's provider peer grouping project and methodology.



Ed Ehlinger, M.D.

■ Representatives from the MMA and the Minnesota Council of Health Plans met October 17. Included in that meeting were MMA Board Chair David Thorson, M.D.; MMA Secretary-Treasurer, David E. Westgard, M.D.; MMA Trustee Roger Kathol, M.D.; MMA CEO Robert Meiches, M.D.; and MMA President Lyle Swenson, M.D.



David Westgard, M.D.

■ MMA CEO Robert Meiches, M.D., and Janet Silversmith, MMA director of health policy, attended the Sanford Health Policy Summit September 26-27 in Sioux Falls, South Dakota. Nearly 200 participants from South Dakota, North Dakota, and Minnesota attended the conference, which highlighted health insurance exchange development and Sanford Health initiatives.



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Medicare Cut to Cost Minnesota Physicians \$270 Million

The Medicare payment cut to physicians scheduled to take effect January 1 will result in Minnesota losing \$270 million for the care of elderly and disabled patients in 2012, according to research by the American Medical Association (AMA).

On average, the 29.5 percent cut will reduce 2012 practice revenues by \$19,000 per physician in Minnesota.

“If these cuts go forward, I am worried that clinics will have to make some difficult business decisions that may result in reduced access to care for Medicare patients,” says Lyle Swenson, M.D., MMA president.

The AMA is working with members of the Joint Committee on Deficit Reduction to include a fix to the sustainable growth rate (SGR) formula, a much-criticized calculation that determines Medicare payment rates, as part of its efforts to reduce federal government spending by \$1.5

trillion over the next 10 years.

In October, the MMA asked members of Minnesota’s Congressional delegation to sign onto a letter urging members of the committee to address SGR as part of their larger deficit reduction strategy. U.S. Reps. Keith Ellison, DFL-Minneapolis, and Tim Walz, DFL-Rochester, signed onto the letter.

Impact of the Cuts

The MMA conducted a survey in 2010 and found that 27 percent of the physicians who responded said they would close their practice to new Medicare patients if the proposed 23 percent cut planned for that year took effect, and about 12 percent said they would be forced to stop treating existing Medicare patients. Congress stopped the cut from taking place at the last minute.

Since 2001, Medicare physician payments have only increased a cumulative 5 percent; during that same period, the cost of providing care (as measured by the Medicare Economic Index) has gone up nearly 25 percent.

Minnesota has 775,930 Medicare enrollees and 64,522 Tri-Care beneficiaries (for whom payments are tied to Medicare rates).

Medicare Payments Compared with Average Private Insurance Payments in Minnesota

Service	Medicare	Private Insurance
Stitching Simple Wound	\$92	\$218
Drug Management	\$57	\$88
Benign Lesion Removal	\$137	\$163
Colonoscopy	\$380	\$592

Source: AMA research

MMA Explores the Challenges of Independent Practice

An 11-person task force has been convened by the MMA to examine the issues facing Minnesota’s independent medical practices and to develop strategies to address the needs of these groups.

The Independent Practice of Medicine Task Force met last month for the first time. Its work will include defining “independent practice” and determining the number, size, and location of independent groups in the state.

The task force is planning a special event that will bring together physicians from around the state and give them the opportunity to express their opinions and concerns and share their ideas about independent practice. Ideas generated at the event will be reviewed by the task force and presented to the MMA Board of Trustees.

Members of the task force include: Kevin Donnelly, M.D., St. Cloud Medical Group; John English, M.D., Minnesota Independent Practice Association; Thomas Flynn, M.D., Minnesota Oncology; Adam Kim, M.D., Minnesota Gastroenterology; Maria Loerzel, M.D., Family Practice Medical Center of Willmar; David Luehr, M.D., Raiter Clinic, Cloquet; Richard Morris, M.D., Allergy and Asthma Care; Jeff Shackor, HealthLink Minnesota Management Group; and T. Michael Tedford, M.D., The Ear, Nose and Throat Clinic and Hearing Center. Providing MMA staff support are MMA CEO Robert Meiches, M.D., and Terry Ruane, director of marketing and communications.

For more information contact Terry Ruane at truane@mnmed.org or 612-362-3742.

Greetings from



the Healthiest State

Let's Make it Happen

Join us for the MMA's Healthiest State Day at the Capitol

We're focusing our Day at the Capitol this year on driving Minnesota to the top of US health rankings. The day will include a white coat rally, meetings with lawmakers, networking, and a reception.

February 16, 2012 • 1:30pm • St. Paul, MN
Complimentary to MMA members. \$49 for nonmembers.

Register at mnmed.org/DAC2012



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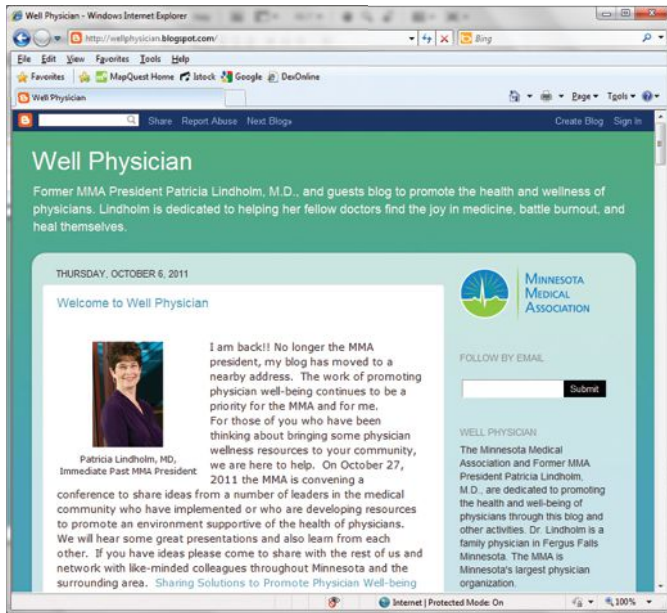
Op-Ed Presents Facts about Physician Pay

In a recent opinion piece published in the Minneapolis *Star Tribune*, MMA President Lyle Swenson, M.D., countered claims that doctors' salaries are a chief cause of rising health care costs in this country.

Swenson's letter, which was published on September 26, noted that for every dollar spent on health care in Minnesota in 2009, only about 20 cents went toward physician services. Of that 20 cents, approximately half was used to cover practice expenses such as support staff salaries, malpractice insurance, and overhead costs. He added that the other 80 cents goes toward inpatient and outpatient hospital services, prescription drugs, long-term care, and insurance companies' administrative costs and earnings.

Swenson wrote that "solving the complex problem of the high cost of health care warrants a comprehensive approach and will require multiple solutions." He suggested cost-cutting efforts supported by the MMA including:

- Implementing programs to prevent the onset of expensive, complex, chronic conditions;
- Empowering patients to better manage their health—for example, to take their prescribed medications and exercise regularly;
- Eliminating administrative waste;
- Fighting fraud and abuse;
- Providing appropriate, not unnecessary, care; and
- Supporting care-delivery models that pay for good outcomes.



MMA Launches Well Physician Blog

MMA Immediate Past President Patricia Lindholm, M.D., is going to continue blogging about the issue of physician health and well-being. Her "Well Physician" blog will include posts from other contributors as well. Read the latest post and subscribe to the Well Physician blog at <http://wellphysician.blogspot.com/>.

Doctors To Push for Further Restrictions on Tanning Bed Use

Earlier this year, California became the first state to prohibit people younger than 18 years of age from using tanning beds. The MMA will attempt to follow California's lead by introducing similar legislation in Minnesota in 2012.

One of the resolutions passed by the MMA House of Delegates at its 2011 Annual Meeting called on the MMA to support legislation that would prohibit minors from using tanning beds (R209).

Previously in California, children as young as 14 years of age were able to receive services at tanning salons if they had parental permission. Minnesota requires parental consent for minors age 16 and younger.

Although most states regulate minors' use of tanning facilities, California's recently enacted restrictions are the most stringent, according to the National Conference of State Legislatures. The California law goes into effect on January 1, 2012.

In 2009, the World Health Organization's International Agency for Research on Cancer classified UV-emitting tanning devices as "carcinogenic to humans." Reviews of more than 20 epidemiological studies found that a person's risk for skin cancer increases 75 percent if they start using a tanning device before age 30.



The MMA wants to see Minnesota follow California's lead and pass a law prohibiting minors from using tanning beds.

Annual Meeting Exhibitors

Register for FluSafe

Minnesota hospitals and nursing homes have until December 1 to join the state's 2011-2012 FluSafe campaign. The campaign recognizes facilities for having a high percentage of their employees immunized against influenza.

The MMA encourages physicians to urge their organizations to participate in FluSafe, which was implemented by the Minnesota Department of Health in the fall of 2010 to boost influenza vaccination rates among health care workers. Participating hospitals and nursing homes enter their employees' influenza vaccination data into the Minnesota Immunization Information Connection registry. The registry is used by the Department of Health to calculate influenza vaccination rates.

In its inaugural year (2010-2011), 137 organizations participated in FluSafe; of those, 27 achieved 90 percent or greater vaccination rates. The Department of Health acknowledges facilities that have a vaccination rate of 70 percent or greater by sending them a certificate and poster that can be displayed to show their commitment to patient safety. The program's goal is to achieve a 100 percent vaccination rate for all health care workers. Learn more at mnmed.org/fluSAFE.

FluSafe

Vaccinating staff, protecting patients



The MMA would like to thank the following organizations for their support of the 2011 Annual Meeting.

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Essentia Institute of Rural Health
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Ineo Technology
ineotechnology.com



M.A.P.S. Medical Pain Clinics
painphysicians.com



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merck.com



Merck Vaccines & Diseases
MerckVaccines.com



National Medical Resources, Inc.
nationalmedicalresources.com



Novo Nordisk
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Ricoh Healthcare
ricoh-usa.com/healthcare

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sanofi.us



Sterling Retirement Resources
sterlingretirement.com

Silver Level



AMA Membership
ama-assn.org



MMA Foundation
mmafoundation.org



Minnesota Board of Pharmacy
phcybrd.state.mn.us



Minnesota Department of Health,
Health Care Homes
health.state.mn.us



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A CANCER GONE VIRAL



| BY JEANNE METTNER

A rise in the incidence of oropharyngeal cancer in younger people has been linked to the human papillomavirus.

Nearly 20 years ago, dentists and otolaryngologists began noticing an intriguing phenomenon: squamous cell carcinomas of the tonsil area and at the base of the tongue showing up in populations of patients that had never before been affected by the disease. Typically, oropharyngeal cancers were seen in older patients who had a history of smoking and heavy alcohol use. This time, however, the disease was showing up in 30- to 40-year-olds, some of whom had never had a strong cocktail or cigarette in their life.

Something was amiss.

By the late 1990s, scientists were homing in on a possible culprit: the human papillomavirus (HPV). In 2000, researchers from Johns Hopkins University in Baltimore published findings in the *Journal of the National Cancer Institute* that demonstrated the presence of the virus—specifically HPV16, a strain known to be sexually transmitted and cause cervical cancers—in some of the oropharyngeal cancers they tested. By the late 2000s, investigators from several other institutions had substantiated these findings, and in 2007, the World Health Organization's International Agency for Research Against Cancer formally recognized HPV as a risk factor for oropharyngeal cancer.

Since then, the evidence for HPV being the cause of the cancers showing up in these patients has become even more compelling. An article published in the October 3, 2011, *Journal of Clinical Oncology* reported that 16.3 percent of oropharyngeal cancer tumor samples collected between 1984 and 1989 tested positive for HPV, compared with 71.7 percent of samples collected between 2000 and 2004. The Ohio State University researchers who conducted the study found that the incidence rate of HPV-associated oropharyngeal cancers had increased from about 0.8 cancers per 100,000 population in the late 1980s to 2.6 per 100,000 in 2004.

What's behind this phenomenon?

Although there have been no formal studies looking into why the incidence rate of HPV-associated oropharyngeal cancer is increasing, the speculation within the medical community is that it may be associated with an increase in oral sex practices. According to Eric Moore, M.D., a head and neck surgeon at Mayo Clinic, the cervix of the vaginal opening and the back of the oral cavity have

similarities that may make them welcoming environments for HPV. "HPV does not have a role in vaginal cancer or uterine cancer," he notes, "but there is a real predilection for cervical cancer and HPV." And the same thing is happening with HPV and oropharyngeal cancer. Says Moore: "The HPV-related cancers are not happening in the gums or the front part of the tongue, the major salivary glands, or the floor of mouth; they're happening in the tongue base and tonsils."

One Name, Two Diseases

Some, including the authors of the *Journal of Clinical Oncology* article, now suspect that oropharyngeal cancer may actually be two different diseases—one caused by exposure to tobacco and alcohol and the other caused by the sexually transmitted virus. A number of things suggest this. One is the age difference between those who get HPV-related cancer and those who get the cancer caused by tobacco and alcohol exposure, which tends to affect people in their 60s, 70s, and even their 80s. "There is this really long latency period between the time someone is exposed to smoking and the time the smoking-associated cancer develops—the end result being that it takes a number of hits for affected cells to become cancerous," says John Soler, senior epidemiologist with the Minnesota Department of Health's Minnesota Cancer Surveillance System. That system tracked a dramatic increase in the age-adjusted rates of HPV-associated cancer in certain parts of the oropharynx among 20- to 44-year-olds between the 1988 and late 2008 and a decrease in the age-adjusted rates of non-HPV-related cancers of the oral cavity among older people during the same period. Human papillomavirus-associated oropharyngeal cancer is believed to affect people at a younger age because HPV-associated cancer cells mutate faster than non-HPV cancer cells. "So being able to calculate the incidence of oropharyngeal cancers in these younger populations tends to be a 'purer' measure of the HPV-oropharyngeal cancer connection because less time elapses between exposure and development of the disease," Soler says.

Another indication that HPV-related and non-HPV-related oropharyngeal cancers may be two diseases is the fact that patients with tobacco-associated disease present with symptoms that are different from those of HPV-associated cancer. "The patients who were older tended to come in with a sore throat, painful swallowing, and referred pain in the ears. You would do an exam and see signs of tonsillar cancer," says Ronald Hanson, M.D., an otolaryngologist with St. Cloud Ear, Nose, and Throat—Head and Neck Clinic, who spoke on the topic at a recent meeting of the Minnesota Cancer Registrars Association. Patients with HPV-

associated cancers tend to present with swelling or a lump in the neck, which may be discovered during a routine dental exam. “In the course of our evaluations, we may find a very small lesion in their tonsil that ends up being HPV-related tonsillar cancer,” Hanson says.

Scientists now can implicate HPV in an oropharyngeal cancer case by isolating DNA from the tumor specimen and then testing for the presence of HPV within that tumor-specific DNA. “If the patient is not a smoker or drinker, we see HPV in the biopsy almost 100 percent of the time,” Moore says.

Same Treatment, Better Response

If there is good news to be had, it's that most patients with HPV-associated cancer have a good prognosis. The Johns Hopkins researchers who published findings on HPV-related oropharyngeal cancer also found that patients with HPV-positive tumors had significantly better survival rates than those with HPV-negative lesions—even after adjusting for age, lymph node status, and alcohol use.

“Ten years ago, we would prescribe treatment for the patient who was a heavy smoker and drinker who had tonsil cancer with positive lymph nodes in their neck and know that there was a 50 percent chance that it would recur,” Moore says. “With HPV tumors, we see patients at the same advanced stage, and they have about a 90 percent chance of being cured.”

Most clinicians are using the same therapeutic regimen for both types of cancer; it involves surgery to remove the tumor, then radiation concomitant with chemotherapy. In a recent study involving more than 100 patients at Mayo Clinic with HPV-positive oropharyngeal cancer, Moore and his team found a 92 percent cure rate, which they defined as having no evidence of carcinoma two years after completing treatment.

Studies are underway to determine why HPV-positive patients respond better to treatment than those whose tumors are negative for HPV. Investigators are looking at a number of theories. One is that because those patients are younger, they tend to have better health, a better host immune response to the HPV-positive form of cancer, better resistance to the spread of cancer, and better tolerance of treatment. Another is that the patient's

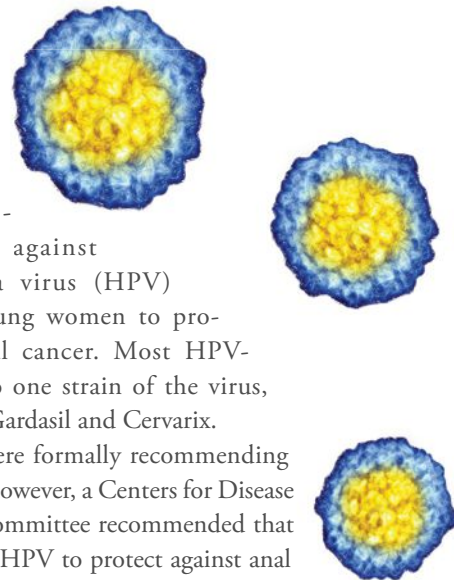
The HPV Vaccine Preventive Tool or Shot in the Dark?

In many countries, including the United States, vaccines against some types of the human papilloma virus (HPV) are being administered to girls and young women to protect them against HPV-related cervical cancer. Most HPV-related oropharyngeal cancer is linked to one strain of the virus, HPV16, which is targeted by the vaccines Gardasil and Cervarix.

Until last month, no organizations were formally recommending the HPV vaccine for boys. In late October, however, a Centers for Disease Control and Prevention (CDC) advisory committee recommended that boys and young men be vaccinated against HPV to protect against anal and throat cancers that can result from sexual activity. The recommendations are subject to approval by the CDC.

Clinicians who work with patients who are getting HPV-related cancers have long advocated for such a move. “I can't speak for all in my specialty, but I would support vaccination for both males and females,” says Nelson Rhodus, M.D., director of oral medicine/diagnosis at the University of Minnesota School of Dentistry and a faculty member in the department of otolaryngology.

Before the CDC committee announced its decision, Bevan Yueh, M.D., professor and chair of the University of Minnesota's department of otolaryngology/head and neck surgery, stated: “If we are going to make inroads with prevention of HPV-related oropharyngeal cancer, we are going to need to start vaccinating young males as well as females.”—J.M.



“If the patient is not a smoker or drinker, we see HPV in the biopsy almost 100 percent of the time.”

—Eric Moore, M.D.

immune response to HPV helps promote an aggressive response to the tumor. Yet another is that HPV-associated tumors may spread less aggressively and cause less DNA damage than tumors not associated with the virus.

In addition, researchers are looking at the absence of what

could be considered the “genetic programming” of cancer in these patients. “Most people who have [non-HPV] oral cancers have altered gene mutations or polymorphisms that make them susceptible,” says Nelson Rhodus, D.M.D., M.P.H., director of oral medicine/diagnosis at the University of Minnesota School of Dentistry and a faculty member in the university’s department of otolaryngology. With HPV-associated oropharyngeal cancer, the development of lesions is more directly related to the virus, which may mean that the chemotherapy or radiation therapy kills the virus as well as the cancer cells. “So the person’s overall systemic susceptibility to the cancer isn’t as strong molecularly or immunologically,” he says. “Simply speaking, people who have HPV-related oropharyngeal cancer may not be as genetically programmed to continue having it as those with other types of oral cancer.”

Researchers are also beginning to look at whether patients with HPV-related cancers need to be treated the same as patients with other oral cancers. According to Bevan Yueh, M.D., professor and chair of the University of Minnesota’s department of otolaryngology/head and neck surgery, the current chemotherapy regimen, which involves three agents instead of one, presents risks that HPV-positive patients may not need to face. “We’re dealing with toxicity now that we didn’t have 15 or 20 years ago, and with a significant portion of the oropharyngeal cancer population having HPV, some of us have begun to wonder whether we have to subject these patients to the same amount of toxicity that we need to give for the smoking-related cancers,” he says. This month, Yueh will attend a National Cancer Institute meeting to address these concerns and work on plans for multi-institutional trials of less-toxic treatments.

Prevention and Screening

As more research unfolds to determine the best protocols for treating HPV-related oropharyngeal cancer, otolaryngologists and dentists are continuing to push for early screening and prevention. Yueh and his colleagues conduct inservices to increase providers’ awareness of oropharyngeal cancers including those linked to HPV. Rhodus makes dozens of presentations annually across the country, educating dentists and primary care providers about how to check for HPV-associated oropharyngeal tumors (palpate the neck and look for swelling or a firm, marble-like nodule). “The increased awareness of what can put these patients at risk could lead to heightened surveillance,” he says.

In the meantime, Rhodus and his team are investigating new ways to screen for the disease. Currently, they are exploring whether a saliva test might detect its presence. Until such a test becomes available, educating patients about HPV-related cancer and how to prevent it and educating physicians about how to detect it is the key to keeping it from taking lives. **MM**

Jeanne Mettner is a freelance writer in Minneapolis and a frequent contributor to *Minnesota Medicine*.

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coming our way...”**

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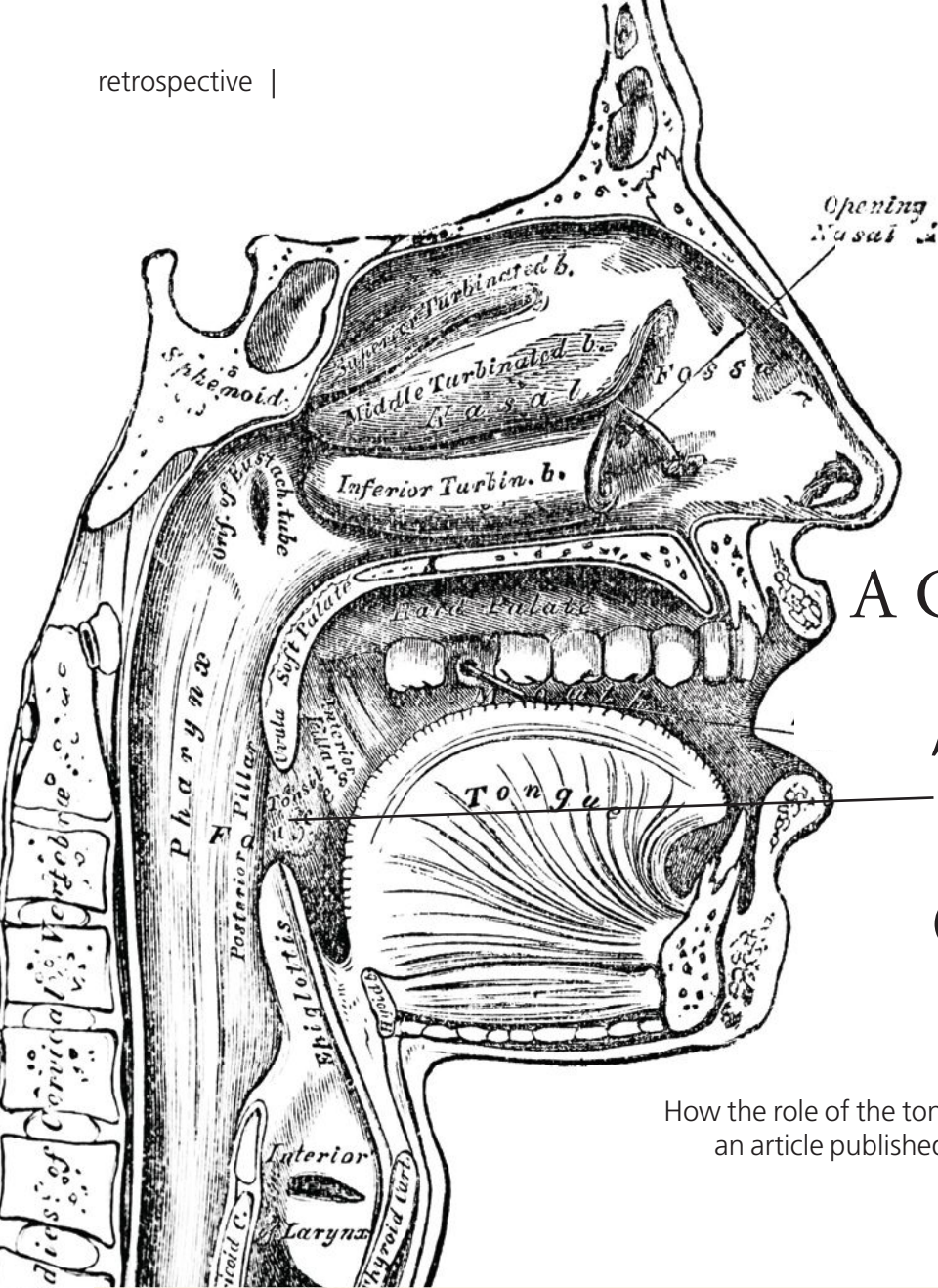


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A CONSIDERATION OF THE *Tonsil* QUESTION

By Norven H. Gillespie, M.D.

How the role of the tonsils was viewed in 1918. An excerpt from an article published in the first issue of *Minnesota Medicine*.

Editor's Note

The procedure that we know today as tonsillectomy was conceived and described in the first years of the 20th century.¹ Its popularity peaked in the United States in the 1940s and '50s, with 1.4 million tonsillectomies performed in 1959.² Although the procedure is no longer the rite of passage it once was for children, it has survived many changes in thinking about infection and disease process.

Tonsillectomy was a topic of discussion at the annual meeting of the Minnesota State Medical Association in St. Paul on October 11 and 12, 1917. Physicians expressed a range of opinions about what the surgery accomplished and why, and their presentations were recorded and published in the first issue of *Minnesota Medicine*, dated January 1918. The following is an excerpt from an article from that issue that provides insight into the beliefs about the tonsils and the accepted way of removing them at that time.

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The faucial tonsils have no function, as this term is ordinarily used—one should speak of them in their relation to the process of immunity and infection. The tonsils are lymph nodes or modified lymph glands, so constituted as to be especially liable to the invasion of bacteria. All food passes between them, and impurities from the air, gases, etc., have access to them.

Bacteria and foreign substances pass through the tonsil crypts; this is definitely proven; even primary tuberculosis of the tonsil is not so rare as usually believed. This is due to the inability of the tonsil epithelium to hold the tubercle bacilli, allowing them to pass into the deeper lymph glands of the neck. The rapidity and measure of invasion is in proportion to the depth of penetration and severity of insult to the

tonsil. For example, crypts that have been cuffed, punctured, or interfered with surgically offer a favorable avenue for organisms to pass through the injured and less-resisting epithelium into glands beyond. Surface epithelium is tolerant and has a selective action to dust and organisms; it becomes tolerant by habitual environment. This tolerance is lost in the deep portion of the gland. The *Streptococcus* is com-

monly found in the tonsil crypts of patients, both in health and disease. In most instances, in order to induce an attack of tonsillitis, auto-infection is necessary, together with a sort of molecular disturbance of the sympathetic induced by fatigue, exposure, and some systemic disorder.

The most convincing evidence we have that the tonsils are among the most important of the primary foci of systemic infection is derived from the postoperative results of tonsillectomy. Joint, heart, kidney, goiter, and glandular conditions show such marked improvement after tonsillectomy as to leave no doubt whatever as to the source of infection. Not alone where the attention is called to tonsillar symptoms, but also when the tonsils are small and without demonstrative lesions; in these cases, the clinician is often unable to say with certainty that the fault lies in the tonsils. But if cryptic retention and chronic toxemia, associated with general malaise, anemia and loss of weight, are manifest, without other definite localized lesion, the tonsils should be condemned.

The infection may be divided into two groups: that due to a chronic condition in the tonsil itself; and that reaching the tonsil from without, through the medium of water, milk, and other articles of food.

It is my opinion that the various forms of septic sore throat looked upon as different diseases, are in reality identical—merely

Since vicious organisms may pass from tonsils so readily into the lymph stream, it is not difficult to understand the present prominence given to focal infections in the causation of many internal maladies.

representing degrees of virulence of the same process. During the epidemics of this disease in Boston and Albany, Drs. Smily and Smith isolated a variety of *Streptococcus* common in all the cases, calling it the *Streptococcus* of Smith. The *Streptococcus pyogenes* group is usually associated with septicemia, erysipelas, etc., while the *Streptococcus angiosus* group is associated with endocarditis, adenitis, otitis, etc. In all the epidem-

ics of septic sore throat occurring in Boston, Albany, Illinois, and Wisconsin in the past few years, milk was the most common carrier favoring the development of the *Streptococcus* and giving it added pathogenic power.

Since vicious organisms may pass from tonsils so readily into the lymph stream, it is not difficult to understand the present prominence given to focal infections in the causation of many internal maladies. Dr. Frank Billings, in a study of 70 cases of arthritis, found the center of infection was most frequently a *Streptococcus* focus from the faucial tonsils. A hemolytic *Streptococcus* was found in most of the cases.

In the Toronto Hospital for Sick Children, it is reported from a large number of tonsillectomies that 4 percent of the children showed albumen in the urine, and 2 percent albumen and tube casts, which conditions cleared up after tonsillectomy. Dr. Charles Mayo reports, in reviewing several thousand operations on the thyroid gland, that the beginning of thyroid hypertrophy may be a defensive effort of the organism to resist toxic invasion.

In experiments conducted by Roseneau, the *Streptococcus viridans* was found in the tonsils of a large percentage of his cases of endocarditis. In Roseneau's reports on poliomyelitis cases, the tonsils and nasopharynx supposedly contain the active-producing organism for a long time after convalescence; and in cases where

temperature was high and paralysis progressive, improvement was noted after tonsils were removed.

In rheumatic conditions, especially of long-standing, where the joints have been sensitized by a primary focus, a very slight additional infection is necessary to produce a recurrence of the joint symp-

toms; and when results are not satisfactory following removal of the tonsils, it may be explained by the infection having passed to the deeper lymphatics, or to the presence of some overlooked focus elsewhere.

In the majority of cases in adults where removal of tonsils is indicated, the question is usually not one of local annoyance to the patient but of systemic poisoning.

Apart from the active varieties of bacteria, many nonpathogenic ones are found; they as a rule are not active, but their toxins are positive in their production of blood changes. It is the slow, constant absorption of these toxins that is injurious. We are indebted to Billings, Roseneau, Pynchun, Ballenger, and Slueder for brilliant contributions to the store of knowledge on the tonsil question. As to the indications for the operation of tonsillectomy, whether children or adults, with but few exceptions every tonsil is better out than in, and I have no knowledge of a single instance where a patient was made worse by a properly performed tonsillectomy.

An exquisite tonsillectomy is not beneath the dignity of the most highly gifted surgeon; in fact, with so much respect does he hold the operation that he refers the work to a laryngologist to do. Following the example or inherited instinct of a few of his older confrères, the young operator of today feels perfectly confident to perform an enucleation of the tonsils as one of his first surgical triumphs. Consequently, much poor work is being done. Many cases come up for re-operation two and three times. Appalling postoperative conditions are found, and as a result tonsil surgery does not occupy the rank it deserves. Those familiar with after-results will agree with me that the operator requires a special skill and training to perform it acceptably. This is not to be wondered at, as although we have what might be called a standard operation in instrumental dissection, we are by no means agreed how it should be done. When we can agree upon a tech-

As to the indications for the operation of tonsillectomy, whether children or adults, with but few exceptions every tonsil is better out than in.

nique which completely removes the tonsil in its capsule, does not open or wound fibers or the aponeurosis of the superior constrictor muscle, does not injure the palatoglossus or palatopharyngeus muscles, which conserves every bit of membrane over the tonsil, prevents fusion of the muscles named, and

leaves a linear scar in a rudimentary fossa, with the movements of the tongue and the voice unimpaired, we will have achieved the ideal, in the light of present knowledge.

I will give you briefly the technic of a simple dissection operation....

Besides a mouth gag, two other instruments only are used: a long dressing forceps as a dissector and a blunt tonsil punch as a tractor or a volcellum. If the operation is done with general anesthesia the patient should have the usual surgical preparation with a liberal hypodermic of morphine and atropine. The anesthetist should be one constantly familiar with every detail of the work. The anesthesia should be deep, beyond any murmurs and resistance of the patient.

The operative technic is as follows: The protruding portion of the tonsil is grasped by the tractor at the supratonsillar fossa and pulled forward. At this point, the anterior pillar is picked up by the forceps and stripped outward, exposing the white, smooth surface of the capsule. The point of the forceps is inserted along the outer margin, and with a firm stroke downward, the anterior pillar is separated off. Starting at the point of insertion again, the forceps is worked around the upper lobe and down the inside, separating off the posterior pillar.

The tonsils, now being free, are grasped high up and as far back as possible on the upper lobe, and pulled and stripped down to the base of the tongue. The body of the tonsil is then grasped firmly in the tractor and, with the aid of the dissecting forceps, is forcibly pulled and stripped off the side of the tongue, taking with it a portion of the capsular attachment known as the lingual tag. When this operation is carefully done, every portion of the tonsil is removed, with slight disturbance to the muscles; and as the dissector follows the line of the capsule, the vessels are broken up in their small divisions, with minimum loss of blood. **MM**

Norven Gillespie practiced medicine in Duluth.

The First New Otologic Disorder in a Century

Superior Canal Dehiscence Syndrome

By Meredith E. Adams, M.D., and Samuel C. Levine, M.D.

■ Superior canal dehiscence syndrome is a recently described vestibular and hearing condition caused by an absence of bone over the arc of the superior semicircular canal. Patients with the condition present with a variety of perplexing symptoms including conductive hearing loss, hyperacusis, vertigo, autophony, and eye movement in response to sound. This article presents the case of a patient with the condition, discusses how it is distinct from other vestibular and hearing disorders, and describes how patients with this disorder can be diagnosed and treated.

A 58-year-old man first presented to his primary care physician after being in a car accident. He complained that his hearing had changed “in a very odd way.” The patient described the accident in which his car had been struck by an oncoming ambulance and explained that he suffered only minor bumps and bruises. A few weeks later, he started to notice changes in his hearing as well as his sense of balance. He began to abnormally hear himself talk, chew, and breathe. If it were quiet enough, he could even hear his heart beating. These symptoms increased if he held his breath.

The man also noticed increased fatigue throughout the day and found that if he held the phone to his right ear and heard a loud sound through the receiver, or if he just pressed on the opening of his right ear canal (tragal compression), he experienced brief dizziness and a peculiar sensation of his eyes moving. He also described a feeling of imbalance at times when walking. After the sound of falling tools almost caused him to lose his balance while on a ladder, he stopped working

as an electrician.

A head CT and a brain MRI performed after the accident looked normal, and his primary care physician and a neurologist diagnosed him as having post-concussive syndrome. The patient was enrolled in intensive vestibular rehabilitation therapy for several months. But when his symptoms did not improve and he was unable to safely return to work after a year, his insurance company indicated that they thought he was malingering. He was then referred for a neurotology evaluation at the University of Minnesota.

When the patient presented to us, we learned that he had no other otologic history—no ear surgery or significant ear infections as a child or adult. He denied having any other symptoms such as otorrhea, ear pain, aural fullness, vertigo, or hearing loss.

His examination was normal except for a few unusual findings. One was his response to the Weber tuning fork test. He heard sound only in his right ear. And although he appeared somewhat confused during the Rinne test, which compares the perception of sound transmitted by bone conduction to that transmitted by air conduction, it appeared he had negative results on the right side (bone conduction louder than air conduction) and positive results on the left side, suggesting a conductive hearing loss in his right ear. Surprisingly, no matter where the tuning fork was placed—even on his ankle—he heard it better in his right ear. His audiogram confirmed a mild right conductive loss; but he actually had better-than-normal bone conduction thresholds. He also had some high-frequency sensorineural hearing loss that was symmetric bilaterally. ↪

A new set of fine-cut temporal bone CT images was obtained and reformatted in the plane of the superior semicircular canal, revealing an absence of bone over the arc of the superior semicircular canal. Further specialized electrodiagnostic testing confirmed that the patient had superior semicircular canal dehiscence syndrome (SCDS).

The patient was shocked to learn that there was such a condition and that his doctors thought he needed a craniotomy to resolve it. Had he walked through our clinic doors a dozen years earlier, that wouldn't have been the case. That's because the disorder, which may arise spontaneously or after head trauma, was only recently discovered.

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A New Condition

In 1998, Lloyd Minor at Johns Hopkins University published an article on a series of eight patients with a distinct syndrome of sound- and pressure-induced vertigo (an illusory sense of motion) and better-than-normal bone-conduction thresholds.¹ When one of those patients heard a loud sound in the affected ear, his or her eyes were observed to deviate. He or she developed nystagmus (spontaneous compensatory eye movement) with a rotatory component. This finding of eye movement in response to sound is known as Tullio phenomenon. Similarly, when negative pressure was applied to the ear canal (a fistula test), the patients showed Hennebert sign, which features symptoms of nystagmus and vertigo.

What was causing these signs, which once were strongly associated with advanced syphilitic bone disease in the skull base but had rarely been seen since the advent of penicillin?² Meniere's disease could cause similar signs; but Minor's patients lacked the characteristic fluctuating hearing loss, tinnitus, ear fullness, and hours of spontaneous vertigo commonly experienced by those with Meniere's.³ Tullio phenomenon and Hennebert sign had been observed in patients with fistulas in the inner ear—whether from injury, chronic inflammation, or eroding cholesteatomas—suggesting that an abnormal hole in the labyrinth allowed sound and pressure energy to stimulate the vestibular system instead of the cochlea alone.^{4,6} But Minor's patients did not have evidence of any of these conditions.

The key to understanding this perplexing syndrome was Minor's careful examination of the eye movements using testing known as electronystagmography or ENG, which assesses the function of the semicircular canals. The three fluid-filled canals (superior, posterior, and lateral) are the inner ear's rotation sensors. Normally, in response to angular acceleration such as head turning, fluid movement inside the canals deflects specialized sensory cells at the dilated end of each arc (the ampulla). The vestibular nerve signal is relayed to nuclei controlling eye movements. As the head turns, our eyes reflexively turn almost equally in the opposite direction, so our visual field remains stationary and we maintain balance. The canals are at right angles to one another, arranged in X, Y, and Z planes, so that they can detect head movement. When one set of canals is stimulated, the corresponding

canals in the opposite ear are inhibited. Vertigo and nystagmus occur when asymmetric stimulation of one inner ear occurs.

When Minor's patients heard certain sounds or felt pressure, they exhibited nystagmus, with both vertical and rotatory eye movements. The pattern was what one would expect if the superior canal alone was activated. Minor postulated that there was a fistula in the superior canal, and that the hole in the bone allowing the fluid movement was inside the skull rather than in the mastoid. No one had been looking for holes in the superior canal because its location high and deep in the temporal bone, abutting the dura of the temporal lobe, makes it more immune to erosion from middle-ear and mastoid disease. But careful inspection of fine-cut temporal bone CT scans revealed that all of Minor's patients lacked the bony covering over the superior semicircular canal in the affected ear. Surgical occlusion of the affected canal led to complete symptom resolution, further bolstering the idea that the superior canal was causing the symptoms. Superior semicircular canal dehiscence syndrome, the first new otologic disorder in a century or more, had been discovered.

Although the incidence rate for SCDS has not been estimated systematically, a study of 1,000 postmortem temporal bone specimens demonstrated a 0.5% prevalence of complete dehiscence of the bone overlying the superior semicircular canal. In an additional 1.4% of specimens, the thickness of overlying bone was 0.1 mm or less.⁷ Although less common, dehiscences in the absence of inflammatory disease have been identified in the posterior semicircular canal and are associated with similar symptoms and signs.⁸ Patients may become symptomatic at any time in their life; but most diagnoses have been made in adults.⁹ The cause of these dehiscences and the time between their development and symptom onset remain unknown; but predisposing conditions that have been proposed include developmental abnormalities, head trauma, and increased intracranial pressure.^{9,10}

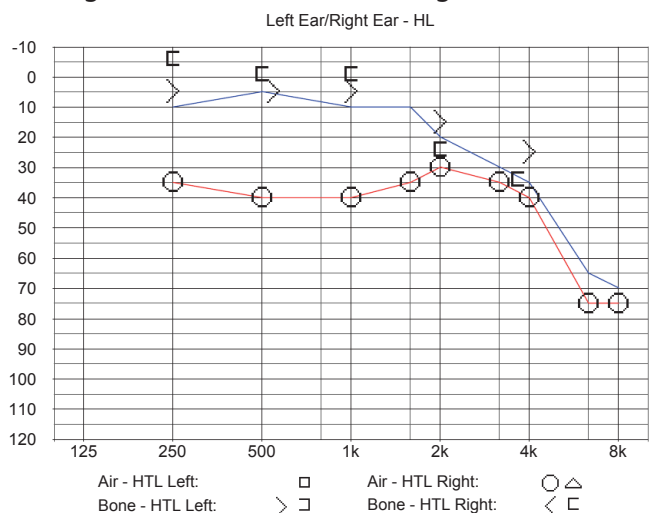
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The Approach to the Patient

As with all cases in which patients complain of dizziness and balance problems, taking a complete clinical history is the most important part of the diagnostic evaluation. Patients with SCDS may report vestibular symptoms, auditory symptoms, or both. But because the symptoms of SCDS can be quite unusual, patients do not always volunteer them without prompting. Thus, it is important to ask about a number of symptoms specifically. Vestibular symptoms include vertigo, disequilibrium, and oscillopsia (the illusion that stationary objects are moving in the visual field). In 90% of patients with SCDS, oscillopsia occurs in response to loud sound; in 73% of patients, it occurs as the result of pressure changes in the middle ear.⁹ Middle-ear and intracranial pressure changes can be induced by sneezing, coughing, straining, or squatting. Other patients may complain of unsteadiness, generalized fatigue, and difficulty multitasking, likely because they are expending considerable mental energy to maintain balance.

Physicians should ask about several characteristic auditory symptoms. One is autophony or the bothersome perception of

Figure 1

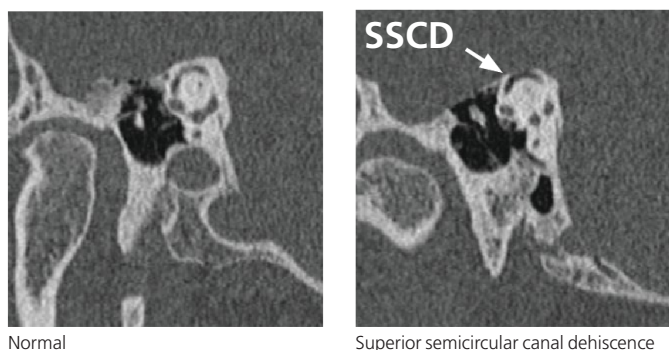
Audiogram from a Patient with Right SCDS



Audiogram shows right low-frequency conductive hearing loss with supranormal bone conduction thresholds. Both ears have high-frequency sensorineural hearing loss. The testing frequency in Hz is plotted on the X axis, and the threshold in decibels is plotted on the Y axis. The circles and X's indicate air conduction thresholds for the right and left ears, respectively. The symbol "I" indicates bone conduction thresholds in the right ear. Note the (-)5 dB and 0 dB thresholds for right ear bone conduction in the low frequencies.

Figure 2

Temporal Bone CT Images



Temporal bone CT images reformatted in the plane parallel to the superior semicircular canal (Poschl view), right ears. The bone over the superior canal is intact in the normal image (left) and is absent in the image from the index patient (right).

internal noises such as the sound of one's own voice, breathing, and chewing. It should be noted that autophony can result from Eustachian tube dysfunction, middle-ear effusion, or an abnormally patent Eustachian tube as well as SCDS. More than half of patients with SCDS (52%) also have an unusual sensitivity to bone-conducted noises (hyperacusis).⁹ Patients may report hearing their eyes move, feet striking on a hard surface, and pulse in the affected ear.¹¹¹ The reasons for conductive hyperacusis in SCDS patients are not fully known; but the phenomenon can be triggered by placing a 512 Hz tuning fork on the medial malleolus. Patients with SCDS will often hear the tone in the affected ear.

An audiogram should then be obtained. Patients with SCDS typically have a low-frequency conductive hearing loss (Figure 1).

The audiogram will look similar to those seen with middle-ear pathologies such as otosclerosis and chronic ear disease. In fact, it is now recognized that many patients who have "failed" stapes operations for otosclerosis actually had SCDS. Unlike hearing loss caused by otosclerosis, however, the hearing loss associated with SCDS is not the result of middle-ear pathology. Instead, SCDS hearing loss is the result of sound energy dissipating away from the cochlea toward the dehiscence. In other words, the sound wave reaches the inner ear because the ear drum and ossicles are working normally, but then some of the energy takes the path of least resistance created by the dehiscence. So what looks like hearing loss related to a middle-ear source is, in fact, a disorder of the inner ear. Additionally, hyperacusis results in abnormally low bone-conduction thresholds, resulting in an air-bone gap. It is not uncommon to see thresholds of 0 or even (-)10 dB at 250 and 500 Hz,¹² which show that bone-conducted hearing at the lowest-tested frequencies is far better than the established averages for persons with normal hearing. Unlike other causes of conductive hearing loss, an inner-ear conductive loss is associated with an intact acoustic stapedial reflex.⁹

High-resolution CT imaging of the temporal bone is ordered for patients suspected of having SCDS. The key finding is an absence of bone anywhere over the arc of the superior canal (Figure 2). During the last decade, we have learned that traditional coronal CT images significantly overestimate the prevalence of canal dehiscence because of the effects of volume averaging.¹³ To compensate for this, 0.5 mm collimated CT images are obtained and reformatted in the planes parallel and orthogonal to the superior canal (known as Stenver and Poschl views).¹⁴ The possibility of false-positive findings is much lower with this approach, but some risk of over-calling the disease remains.

Given that risk, as well as the fact that dehiscences apparent on radiography may not result in the patient having symptoms, it also is important to obtain physiologic confirmation that the superior canal dehiscence is affecting inner ear function before rendering a diagnosis of SCDS. Clinical findings that have been used for this purpose include: 1) conductive hearing loss with preserved acoustic reflexes,¹² 2) nystagmus in the plane of the affected canal in response to sound and pressure stimuli,⁹ 3) reduced thresholds for vestibular-evoked myogenic potentials (VEMPs), which represent neck muscle responses to loud sounds.¹⁵ Evoked eye movements may be observed under infrared video goggles or lenses designed to eliminate visual fixation (Frenzel lenses). A calibrated audiometer can be used to deliver high-intensity sound to one ear, and a pneumatic otoscope may deliver pressure to the external auditory canal, eliciting nystagmus in the plane of the dehiscence canal. Testing for VEMPs may be performed by specially trained audiologists. Recently, electrocochleography, a test more commonly used for Meniere's disease, has been found to yield abnormal results for patients with SCDS. Unlike the other tests, this one can be performed in the operating room, and can help a surgeon identify the dehiscence and confirm that it is satisfactorily occluded.¹⁶

For those meeting the criteria for symptomatic, electrophysiologically active SCDS, management is geared toward the patient's degree of disability. The benefits of symptom resolution must be weighed against the risk of surgical intervention. Often after years of uncertainty or previous diagnoses of psychosomatic or psychiatric illness, many patients are relieved just to receive a diagnosis. Those who are mildly affected may choose to adapt to the condition or avoid situations that exacerbate it. A sound-reducing ear plug in the affected ear can help manage sound-induced symptoms.¹¹ For some patients, pressure-induced symptoms can be improved by placing a pressure equalization tube in the tympanic membrane.¹¹

Surgical therapy is offered to patients who find their vestibular symptoms or autophony disabling and who are otherwise in good health. Early attempts to resurface the canal wall, leaving fluid flow intact, showed short-lived resolution of symptoms.^{9,17} Therefore, superior canal occlusion has become the preferred surgical treatment. Occlusion may be performed from above, through a craniotomy of the middle cranial fossa, or from behind, through the mastoid. The middle fossa craniotomy approach is currently favored, as it allows for direct visualization of the dehiscence. Through an approximately 3 x 4 cm opening in the bone of the skull above the auricle, the dura of the temporal lobe is elevated from the middle fossa floor until the superior semicircular canal dehiscence is identified. It is then plugged. The transmastoid approach involves making separate openings in front of and behind the dehiscence from below, and then occluding the canal in between.¹⁸ A variety of substances have been used to plug the canal, ranging from fascia and moistened bone dust to wax.

Successful canal occlusion results in resolution or satisfactory improvement in vestibular symptoms, autophony, and hyperacusis. A recent study found that patients who had SCDS surgery saw twice as much improvement on the Dizziness Handicap Inventory as patients who underwent surgical treatment for Meniere's disease.^{19,20} The fact that this condition responds better to surgery than Meniere's disease is important because SCDS has often been mistaken for Meniere's disease in the past. Conductive hearing loss is less consistently improved by surgery, and traditional amplification is recommended if this is the main symptom.²¹

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Summary

The index patient had a superior canal plugging procedure and is doing much better. He is back at work and can enjoy sound again without feeling sick to his stomach. Just knowing that the odd collection of symptoms were from an anatomical disorder seems to give him some comfort.

We now know that SCDS results from the absence of bone overlying the arc of the superior semicircular canal. Patients may present with unusual sound and pressure-evoked vestibular symptoms, autophony, conductive hyperacusis, and hearing loss. High-resolution CT reformatted in the plane of the superior canal is used to diagnose the anatomic abnormality. The diagnosis of SCDS is reserved for symptomatic patients with radiographically

apparent dehiscences who also have evidence of physiologically active disease, as demonstrated by audiometry, evoked nystagmus, or specialized electrophysiologic testing. Surgical occlusion of the canal can alleviate symptoms and allow disabled patients to return to work and have a good quality of life. **MM**

Meredith Adams is an assistant professor of otolaryngology and Samuel Levine is a professor of otolaryngology at the University of Minnesota.

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Meniere's Disease

New Concepts, New Treatments

By Norman T. Berlinger, M.D., Ph.D.

■ Our understanding of Meniere's disease is being revamped. For decades, the condition was thought to be caused by excessive fluid retention (hydrops) in the endolymphatic spaces of the inner ear, which led to tears or ruptures of the membranous structures that affect hearing and balance. More recently, research has shown that hydrops is not always associated with Meniere's and ought not to be considered the ultimate cause of its symptoms. New theories center on the fact that Meniere's disease may not have a single cause but may well be a common endpoint of a variety of anatomic or physiologic variables, including ischemic or even autoimmune injuries. This article describes the new thinking about Meniere's and explains why current treatment approaches, although they are based on outdated understanding, may still be valuable for alleviating symptoms in some patients.

Meniere's disease is a disorder of the inner ear that manifests with spontaneous episodic attacks of vertigo, sensorineural hearing loss, and tinnitus. In addition, patients often complain of a sensation of aural fullness. The prevalence of Meniere's disease varies around the world. The landmark study of prevalence in the United States, which originated from Mayo Clinic data from 1951 through 1980, showed a rate of 218.2 cases per 100,000 population.¹ Meniere's disease can present at any age, but most people are diagnosed in their 30s or 40s. Recently, more cases have been seen among people in their 50s and 60s. Bilateral disease may occur in up to 24% of cases and may be either synchronous or metachronous, and up to 20% of cases may be familial.

A Disease of Inference

Before the 1850s, balance and vertigo were attributed to the central nervous system, and disorders of balance were often considered psychiatric illnesses, sometimes called "apoplectic cerebral congestion."² While serving as the chief physician at the Imperial Institute for Deaf Mutes in Paris, Prosper Meniere in 1861 was the first to report that balance problems were related to the inner ear. Using autopsy studies, he asserted that

the semicircular canals provided vestibular function and that vertigo resulted when they were diseased.

The histopathology associated with Meniere's disease was first described nearly 75 years ago when Hallpike and Cairns detected dilation of the endolymphatic spaces of the inner ear with ballooning of Reissner's membrane in temporal bones obtained from patients who died after eighth-nerve surgery to relieve their vertigo.² (Figure 1 shows a photomicrograph of a normal human cochlea. Figure 2 shows a photomicrograph of the cochlea of a patient with a dilated endolymphatic space associated with Meniere's disease.) Although their work located Meniere's disease within the ear, it also led physicians and researchers to make a number of inferences that led to misconceptions. And so began the attempted scientific study of—and the misconceptions about—Meniere's disease.

Misconceptions occurred because pathogenesis was inferred only from histopathology. In 1927, Guild inferred that the endolymphatic fluid flowed primarily longitudinally, down the length of the cochlea, and was drained at the endolymphatic sac.³ Guild's and Hallpike and Cairns's theories led to the conclusion that hydrops of the endolymphatic compartment occur as a result of obstruction of the endolymphatic sac,

Figure 1

Photomicrograph of a Normal Human Cochlea



A nondilated endolymph compartment (asterisk) and a non-ballooning Reissner's membrane (arrow).

which serves as an overflow valve or absorptive structure for the endolymph system.

There was no explanation for how distension of the endolymphatic space produced the classic symptoms of Meniere's—vertigo, tinnitus, and hearing loss—until Lawrence and McCabe in the 1950s inferred that the overdistension of the endolymphatic space caused rupturing of its membranes. They suggested the resulting spillage of the potassium-rich endolymph into the relatively potassium-poor perilymph caused acute labyrinthine dysfunction by potassium “intoxication.”⁴ Release of the built-up endolymphatic pressure allowed the ruptured membranes to heal. Continued cycles of membrane rupture and repair accounted for the episodic symptoms associated with Meniere's disease.

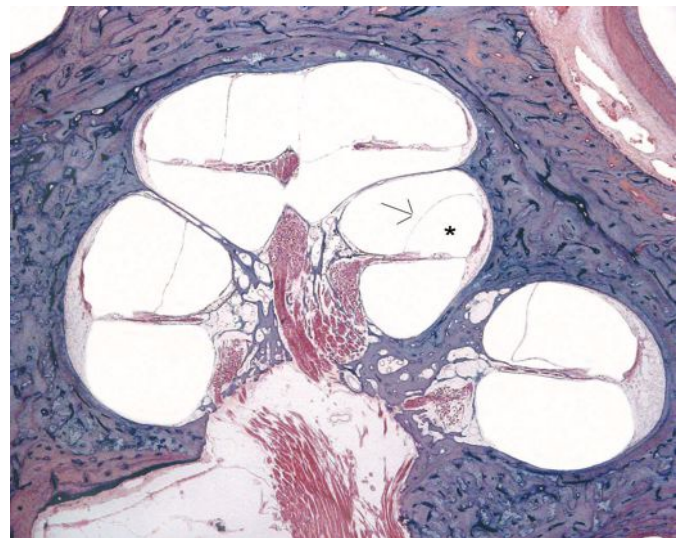
This was our understanding for the next four decades. Although this model was neat and encompassing, it was also highly speculative and was never validated by animal research. Recent clinical and scientific data call into question many of the central assumptions about our classic understanding of this disorder.

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Anatomical Studies

A number of anatomical studies have led us to question the assumption that endolymphatic hydrops is the cause of the vertigo, tinnitus, and hearing loss associated with Meniere's disease. If that were the case, then it would be reasonable to presume that all cases of Meniere's disease should show hydrops and that all cases of hydrops ought to manifest the classic symptoms. Indeed, an important temporal bone study by Rauch et al. showed evidence of hydrops in all patients who had been diagnosed with Meniere's disease. However, hydrops was also found in a large number of patients who showed none of the symptoms.⁵ Thus, we know that endolymphatic hydrops and Meniere's disease are not synonymous, and that endolymphatic hydrops almost certainly is not

Figure 2

Photomicrograph of Cochlea of Patient with Meniere's Disease



Note the dilated endolymphatic compartment with hydrops (asterisk) and the resulting ballooning of Reissner's membrane (arrow).

the cause of the specific symptom complex of vertigo, tinnitus, and fluctuating hearing loss associated with Meniere's disease.

In the early 1990s, Schuknecht discovered that fibrosis could occur at many sites within the endolymphatic duct system, not just the terminal sac, and inferred that there was a resulting obstruction of endolymph flow at various points within the system with the development of hydrops.⁶ However, Wackym et al. showed in an excellent temporal bone study that there was no difference with regard to fibrosis in the endolymphatic systems of patients with and without Meniere's disease.⁷

Physiological studies likewise have called the classic model into question. Guild's inference about the longitudinal flow of endolymph was challenged in the 1980s when Salt et al. showed in experiments with guinea pigs that the longitudinal flow of endolymph is negligible.^{8,9} Furthermore, Salt demonstrated that the regulation of endocochlear fluid volume is achieved locally by the radial flow of endolymph through the perilymph. In addition, Takeuchi et al. showed in another guinea pig model that there is no difference in the hydrostatic pressures recorded in the perilymph and endolymph despite the presence of significant hydrops.¹⁰ Thus, the notion that increases in endolymphatic pressure lead to periodic rupture of the endolymphatic membranes with resulting potassium intoxication and Meniere's symptoms has not been validated in animal studies.

Currently, some investigators claim that hydrops can exist in certain patients with Meniere's disease and cause some of the symptoms or exacerbations of those symptoms. But others consider hydrops to be merely an epiphenomenon. Clearly needed is a new understanding of the pathogenesis of Meniere's disease—one that does not rely solely on the notion of an anatomical abnormality, namely, hydrops.

New Thinking about Meniere's Disease

Many researchers now believe that the abnormality related to Meniere's symptoms may be more physiological than anatomical. That is, that Meniere's disease is the outcome of a complex cascade of pathophysiologic processes that ultimately dysregulate the ionic composition of the endolymph rather than the outcome of a simple obstructive anatomical abnormality.

Investigation into reversible hearing loss may eventually shed light on the mechanisms behind Meniere's in the coming years. For instance, we know that acoustic trauma can cause a temporary threshold shift, and even when this shift is dramatic, no morphologic abnormalities are demonstrable.¹¹ Similarly, we've learned that salicylates can cause marked reversible cochlear dysfunction in the absence of morphologic abnormalities in the cochlea. It has been suggested that inner-ear neuropathology can result from dysfunction of cellular channels and conductances. Gates has hypothesized that Meniere's disease may result from such a channelopathy.¹²

This is not to say that the answers will be found in this work, only that scientific study is reorienting our thinking. We are now considering Meniere's disease in physiologic terms and thinking of the histological changes as only one part of a very big picture. In 2010, Rauch went so far as to suggest discarding the term Meniere's disease and redefining the symptom complex as a "degenerating inner ear" or an "unstable inner ear" that has dysfunction of one or more homeostatic systems resulting in dizziness and hearing fluctuation.¹³

So if the science surrounding Meniere's disease is not quite on the mark, and our thinking about its pathophysiology is not quite correct, how does a physician treat the problem?

Interestingly enough, old treatments, even though they are based on misconceptions, do indeed have therapeutic value. Diet and lifestyle changes, which are often the first-line recommendation, can control vertigo in up to 60% of patients. Sodium restriction is one way of reducing fluid in the inner ear. Although with our current understanding it seems highly unlikely that sodium restriction alone could significantly reduce fluid within the endolymphatic compartment, many patients have benefited significantly from a low-sodium diet. Similarly, diuretics can reduce endolymph volume, and many patients benefit from this approach as well. But if hydrops can be asymptomatic or is a mere epiphenomenon, why do patients have success with these approaches?

Recently, Rauch offered an explanation for why they may work. He postulated that the unstable or degenerating Meniere's ear has lost its ability to tightly control fluid and electrolyte balance. What the unstable ear may not tolerate, he theorized, is variations in sodium levels. If that is indeed the case, a constant sodium level, rather than a low sodium level, may be crucial to controlling the vertigo associated with Meniere's disease, and the goal of sodium restriction therapy should be to even out the peaks and valleys of sodium intake.¹³ According to this line of thinking, patients find relief of their symptoms not because they

are consuming less salt but because they are consuming consistent amounts of salt. For that reason, Rauch advocates an even intake of salt throughout the day. The idea is to avoid the spikes that may trigger symptoms. This can be achieved with a diet that includes 3,000 mg of sodium per day, with a target consumption of about 1,000 mg per meal, as opposed to a low-sodium diet, which restricts intake to 1,500 or 2,000 mg per day and can be difficult for patients to comply with. Moreover, if at some point during the day the patient on a 3,000 mg per day diet decides to consume a high sodium load, the temporary indiscretion will not have as much effect because his or her baseline salt level was not extremely low.

In addition, we now suspect that the reason diuretics work for certain patients might also be different from what we once believed. Diuretics have a profound effect on ion pumps and ionic gradients in the kidneys. They also have a profound effect on the same pumps and gradients in the inner ear. Thus, it is more likely that diuretics work not by dehydrating the inner ear of endolymph, as we once thought, but rather by positively influencing inner ear fluid and electrolyte processing in an as-yet-unknown manner.

We also are thinking differently about the effects of consuming alcohol and caffeine. Our concern now is that large changes in alcohol and caffeine consumption could disturb the fragile or failing homeostatic mechanisms of the unstable inner ear. Likewise, we are thinking about how stress, allergy attacks, hormonal changes, and sleep deprivation can challenge homeostasis in the unstable Meniere's ear. Thus, the basic principle underlying treating Meniere's with lifestyle changes and diuretics is to disrupt the fluid- and electrolyte-regulating processes as little as possible.

These treatments are quite effective for managing the vertigo associated with Meniere's disease. But if they fail, there is a new and powerful nonsurgical method for addressing it: intratympanic perfusions of dexamethasone. This recently developed treatment has achieved significant control of vertigo in up to 91% of patients who do not respond to sodium restriction and diuretics.¹⁴ The procedure is quite simple: A myringotomy is performed in the office with topical phenol anesthesia. High-concentration dexamethasone is then perfused through this tiny slit into the middle ear space. The patient lies still for 15 minutes and is told not to swallow, in order to avoid opening the Eustachian tube, which may cause the steroid to drain out of the middle ear. The patient can return to normal activity after the perfusion. This treatment is repeated two more times over a two-week period. Researchers from Cleveland Clinic recently reported that 88% of patients who had failed dietary and diuretic therapy achieved significant control of their vertigo with intratympanic dexamethasone.¹⁵ The reason why intratympanic steroid perfusions appear to control vertigo is unknown. Clearly, some Meniere's disease is autoimmune in nature, and dexamethasone is a powerful immune modulator. Studies also have suggested that steroid perfusions influence sodium and fluid dynamics in the inner ear because of their mineralocorticoid properties.^{16,17}

When disabling vertigo continues despite all medical treatment, surgery is indicated. Endolymphatic sac surgery has stood the test of time—nearly 45 years—and is the procedure of choice because it is nondestructive, preserves hearing, and has a long-term success rate of about 90%.¹⁸ During this procedure, a complete mastoidectomy is performed, and the endolymphatic sac adjacent to the sigmoid sinus is decompressed. House was responsible for this surgery gaining popularity in the early 1960s,¹⁹ and Paparella made a number of important refinements in the technique, including precise surgical localization of the sac and creative ways of decompressing it.²⁰ In light of our new understanding of Meniere's disease, however, further research is necessary to elucidate the mechanism of improvement. Currently, the theories about why this surgery is successful are based on our old understanding of Meniere's disease: the simple release of external compression on the sac; promotion of neovascularization of tissue surrounding the sac to encourage the passive diffusion of endolymph; and creation of an osmotic gradient out of the sac. When we more fully understand the pathophysiology of Meniere's disease, we will better understand why this surgical procedure works so well.

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Looking Ahead

Our understanding of Meniere's disease is changing as research is shedding new light on the interplay between the body's chemical, neurologic, and physiologic processes. Although light microscopic study of human temporal bones will always be valuable, researchers now believe that improved understanding of the pathophysiology of Meniere's disease will come from molecular biology experiments involving patients with the disease. In this regard, attention is being focused on possible etiologies involving autoimmune processes, recrudescing viral infections, or cellular channelopathies. This may be the only way of finding the crucial clues we need to develop an animal model that can lead to more targeted therapies instead of the nonspecific ones we currently use for helping patients alleviate symptoms of Meniere's disease. **MM**

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Robotic Surgery for Head and Neck Cancer

By Eric J. Moore, M.D., and Daniel L. Price, M.D.

■ During the last decade, robotic surgery has evolved from a novelty to the preferred surgical method for urologic, gynecologic, thoracic, cardiothoracic, and gastrointestinal procedures. The use of robotics in head and neck surgery grew out of the success of other transoral surgical modalities used to remove head and neck tumors. This article reviews the evolution of head and neck surgery, the current capabilities of surgical robots, and anticipated future applications of this technology.

Treating patients with head and neck cancers involves controlling the tumor and preserving the form and function of the anatomy. With the recognition that traditional “open” surgical techniques sacrificed function in exchange for exposure, head and neck surgery evolved in several directions. Microvascular surgery attempted to preserve function by reconstructing surgical defects with healthy transplanted tissue. Other protocols attempted to avoid radical removal of tissue by replacing surgical resection with chemoradiation. As these methods were being developed, some surgeons began using minimally invasive techniques that took advantage of the body’s natural orifices and required only small-port incisions. They used endoscopes, coupled with high-definition cameras or microscopes, to visualize the surgical field and specially designed endoscopic instruments for retraction, cutting, and hemostasis. They also used lasers to cut tissue and seal vessels without having to

lay hands on the tissue. The motivation behind the search for less-invasive ways to surgically treat head and neck cancers has been to minimize trauma and scarring and to facilitate recovery and achieve more rapid return to activity.

Endoscopic laser surgery and transoral laser microsurgery were developed by Jako and Strong in the early 1970s as a way to ablate and remove malignant tissue in the larynx without external incisions.¹ These techniques became proven methods for removing tumors of the larynx and aerodigestive tract that could be accessed through laryngoscopes and transoral retractors.^{2,3} Although these surgeries minimized tissue trauma and facilitated recovery, they also introduced unique challenges. One limitation of transoral endoscopic surgery was the fact that the microscope lens and means of laser delivery hindered the surgeon’s ability to see and manipulate tumors “around a corner.” In addition, endoscopic laser surgery and transoral laser microsurgery required surgeons to use

instruments that did not allow for wrist articulation, eliminated tactile feedback, and complicated two-handed surgery.

Robotic surgery has evolved as an adjunct to endoscopic and transoral surgery. Surgeons have found that having the ability to control the robot’s dual camera system and tubular endoscopic arms through a single console restores some of the fundamentals that were lost in conventional transoral surgery. Specifically, the surgical robot provides a magnified three-dimensional field of view, allows for tremor-free movement of graspers, cutting instruments, and needle-drivers with untiring action, and restores the ability to perform two-handed surgery.

History of Robotic Surgery

The term “robot” was introduced to the public by Czech author Karel Capek as a name for artificial people in his 1920 play “R.U.R.” (“Rossum’s Universal Robots”).⁴ Capek originally considered the term “labori” for his fabricated workers,

but he settled on “robot,” which had its origins in the Czech words for “hard labor” and “drudgery.” Throughout the history of machines, people have conceived of “robots” either as automated instruments that relieve mankind of drudgery or machines that improve the quality of work. The evolution of surgical robots has followed a similar pattern.

The National Aeronautical and Space Administration (NASA) began development of a remote surgeon for orbiting astronauts in 1972. Researchers at the Stanford Research Institute furthered that work in an effort to improve minimally invasive surgery (rather than to perform remote surgery). The Defense Advanced Research Projects Administration (DARPA) expanded on the Stanford researchers’ work to develop a remote telesurgery unit that enabled surgical procedures to be performed on wounded soldiers in the battlefield. In 1995, Intuitive Surgical Inc. was formed to design a robot that could improve the surgeon’s capability. By the late 1990s, three surgical robotic systems were being used in academic institutions: the daVinci Surgical System made by Intuitive Surgical, and the Aesop endoscope robotic control system and Zeus robotic system made by Computer Motion. The first robotic surgery—a beating-heart coronary artery bypass graft procedure—was performed in the late 1990s using the Zeus system at the University of Pittsburgh. Today, Intuitive Surgical’s daVinci system is the only commercially available surgical robot.

The da Vinci robotic surgical aid has three components: a remote console, an instrument cart, and a wired vision cart. The surgeon sits at the remote console, where he or she manipulates the master controllers to move a binocular 0-degree or 30-degree camera and instruments. The instruments have 540 degrees of wrosted rotation. The surgical instruments are attached to a cart that is positioned adjacent to the patient; they are placed in the surgical field by the surgeon before the procedure begins. The three-dimensional surgical view is recreated at the wired vision cart, where computer processing links the

Figure

Transoral Robotic Surgery Operating Theater Set-up with Assistant at Head of Patient



Photo courtesy Mayo Clinic

image seen by the surgeon on a monitor and the spatial relationships of the instruments in a virtual surgical field (Figure). Computerized motion scaling eliminates hand tremors and fatigue, and improves the surgeon’s ability to precisely position the instruments.

Although this system was not specifically designed for transoral procedures, it has proved useful and has advantages over other transoral techniques. In 2005, Hockstein et al. conducted a thoughtful and careful investigation proving the safety and feasibility of the daVinci surgical system for transoral access of the tongue base and supraglottic larynx.⁵⁻⁷ Weinstein and O’Malley later demonstrated that transoral robotic surgery (TORS) could be used both safely and effectively for removal of tumors of the base of the tongue and larynx, which had been done primarily by transoral laser microsurgery (TLMS).^{8,9} Since then, a number of other investigators have used TORS to remove head and neck tumors and achieve outcomes that rival those of traditional transoral surgical techniques.^{10,11}

Although squamous cell carcinoma has been the primary target of robotic head

and neck surgery, surgeons have also tested its efficacy for treating thyroid tumors, obstructive sleep apnea, parapharyngeal space tumors, and laryngeal pathology.

Robotic Surgery for Head and Neck Cancers

The current literature on use of the surgical robot in head and neck procedures is summarized in the table on page 39. The research includes case reports, studies of functional outcomes of surgery, and reports on oncologic data. The following is a brief look at how robotic surgery is currently being used to treat cancers of the head and neck.

■ **Oropharynx**

Since Hockstein reported on the technical feasibility of operating through the oral cavity with the da Vinci surgical system,⁵ the majority of cases that have used this approach have involved the oropharynx. Researchers have demonstrated that this approach is both feasible and has specific benefits. For example, Weinstein et al. demonstrated high local and regional control of squamous cell carcinoma using TORS, neck dissection, and adjuvant

Table

Major Studies Discussing Functional and Oncologic Outcomes of Robotic Head and Neck Surgery

Author	Subjects (number)	Site	Airway	Feeding	Remarks
Weinstein et al. ¹	29	Oropharynx	74% extubated, rest did not require trach	96% without percutaneous gastrostomy (PEG)	One patient with distant mets on follow up
Weinstein et al. ²	31	Oropharynx	100% extubated	0% two-year PEG dependency rate	One patient with regional recurrence and one with distant recurrence
Moore et al. ³	45	Base of tongue (26) Tonsil (19)	Mean duration of trach tube seven days	89% oral intake at two weeks	No major complication, no conversion to open
White et al. ⁴	89	Oral cavity (2) Oropharynx (77) Larynx (10)		100% swallowing at last follow up	OS=86.3% OS with TORS as primary=89.3%
Genden et al. ⁵	18	Base of tongue (3) Tonsil (7) Pharynx (3) Supraglottis (3) PP (2)	No trach	All on oral diet between one and three days	
Alon et al. ⁶	7	Supraglottis	6/7 patients decannulated	2/7 with long-term PEG	No recurrence
O'Malley et al. ⁷	10	Parapharynx			9/10 resected robotically, one conversion, two with capsule disruption
Kang et al. ⁸	100	Thyroid			84 subtotal, 16 total thyroid, ipsilateral central node dissection in all
Kang et al. ⁹	33	Thyroid-modified neck dissection			Mean lateral neck lymph nodes=27 Mean tumor size=1.1 cm Mean operating time=281 minutes

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therapy in 31 patients.¹² White et al. demonstrated similar disease control rates in a multi-institutional review of TORS for oropharyngeal (OP) squamous cell carcinoma.¹¹ Important in these surgeries is the relatively high preservation of function, as more than 95% of patients were able to maintain an oral diet after completing treatment.^{10,12}

■ Larynx

In 2005, the first case report of the da Vinci system being used in head and neck surgery described the excision of a val-

lecular cyst.¹³ Since then, surgeons have used TORS to remove lesions of the supraglottis, larynx, and hypopharynx.¹⁴⁻¹⁶ TORS has been used in these areas more than others because they are not easily exposed using oral retractors. As the surgeon goes beyond the base of tongue into the supraglottis, larynx, and hypopharynx, access becomes more difficult. As cameras and instruments become smaller, surgical robots likely will facilitate access to the inferior portion of the upper aerodigestive tract as well.

■ Parapharynx and Skull Base

Transoral robotic surgery has been used to excise benign lesions in the parapharyngeal space. Most of these lesions are prestyloid encapsulated benign salivary tumors. An article published in 2010 by O'Malley and colleagues describing a series of these surgeries reported that in seven of 10 cases, lesions were removed intact using this approach; two lesions demonstrated capsule dehiscence, and one patient was converted to an open approach.¹⁷ The authors concluded that the complication rate with this approach was comparable or superior

to that of open procedures for removing parapharyngeal space tumors. They suggested that after further investigation, TORS might become the standard approach for treating tumors of the parapharyngeal space.

Lack of available rongeur and drill instruments limit the use of TORS to soft-tissue manipulation. The ability to control a camera and use two hands in the surgical field make the use of TORS for endoscopic skull-base surgery enticing. As new instruments are developed, the use of robotics for endoscopic skull-base surgery will likely increase.

■ **Thyroid**

Endoscopic thyroidectomy has seen varied acceptance at different institutions including Mayo Clinic Rochester, the M.D. Anderson Cancer Center, and the Medical College of Georgia. The motivation for using this approach is to minimize the surgical scar or to make the incision in an area where a scar will not be visible. In 2009, Kang et al. demonstrated the feasibility, and, ultimately, the advantages of transaxillary robotic thyroidectomy in the treatment of well-differentiated thyroid cancer.¹⁸ Since then, other surgeons have applied this approach using Kang’s transaxillary method or other novel incisions.^{19,20}

Robotic thyroidectomy currently takes longer than conventional thyroidectomy, even in the hands of experienced surgeons, and use of the procedure is limited by the size of the tumor, the gland, and the patient. Use of the procedure is expected to increase as surgeons become more experienced with the technology and as more and smaller instruments that can attach to robotic arms are developed.

■ **Neck Dissection and Reconstruction**

As robotic surgery has been applied to treatment of malignancies, differences in practice have arisen as to the management of the neck during resection of metastatic disease. When performing two different surgeries, some surgeons managed the neck after doing the first procedure in order to minimize communication

of the pharynx and neck.⁸ Others have managed the neck while they are doing robotic pharyngectomy and have minimized the complications of communication with primary pharyngeal closure and drain management.²¹ Still others have used the robot to perform simultaneous local flap or microvascular flap reconstruction to eliminate pharyngeal-neck communication.²²

An obvious extension of the current uses of robotic surgery would be minimally invasive robotic surgery of the neck. The feasibility of this has been demonstrated for the management of lateral neck metastasis from thyroid cancer;²³ but to date, no one has published on using this technique for the management of squamous cell carcinoma.

The conclusion we can draw from these studies is that TORS is appropriate for managing select benign and malignant head and neck tumors. The advantages of TORS are similar to those of transoral laser microsurgery: less-frequent use of tracheostomy, shorter hospital stays, and decreased need for prolonged enteral feeding.¹⁰ Limitations are related to exposure of the tumor transorally and the type of patient who is eligible (eg, patients who are not obese). As the T-stage of the tumor increases, the applicability of this modality becomes more limited.

We have also learned that robotic surgery can be done through remote and hidden incisions that result in better cosmetic outcomes. This is especially important for patients undergoing thyroidectomy and neck dissection, which have traditionally been performed through incisions in the front of the neck. The safety and feasibility, oncologic outcomes, and functional outcomes of this surgery need further investigation.

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Future Applications

There is no question robots have helped surgeons overcome the limitations of endoscopic surgery, improving their ability to see the structures of the head and neck and offering them a means to perform two-handed manipulations. Yet robotic head and neck surgery is still in the devel-

opmental stage. The size of current robotic surgical equipment hampers its use in the narrow confines of the head and neck. Its use is also limited by its instrumentation, as there are no fine cutting instruments or means to gently ablate tissue with a CO₂ laser. The lack of instruments to drill or rongeur bone also limits its use in the paranasal sinuses and at the base of skull.

Also, minimal-access surgery can be disorienting, as most head and neck surgeons are accustomed to having a wide visual field and the ability to see and manipulate the major neurovascular structures. With the integration of image-guidance, the development of haptic feedback, and the implementation of different lighting and tissue fluorescence capabilities—all of which are anticipated—the utility of the surgical robot in the operating theater will continue to grow.

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Conclusion

Robotic surgery has advanced the capabilities of head and neck surgeons in a very short time period. As with other technologies, robotic surgery has gone from being used by a few earlier adopters to being used by many in daily practice. What is still needed is a balanced investigation with rigorous data analysis that fully explores the advantages and limitations of these robots. This will come as a result of multinational and multi-institutional clinical trials and data registries that ultimately will expand our knowledge and benefit our patients. **MM**

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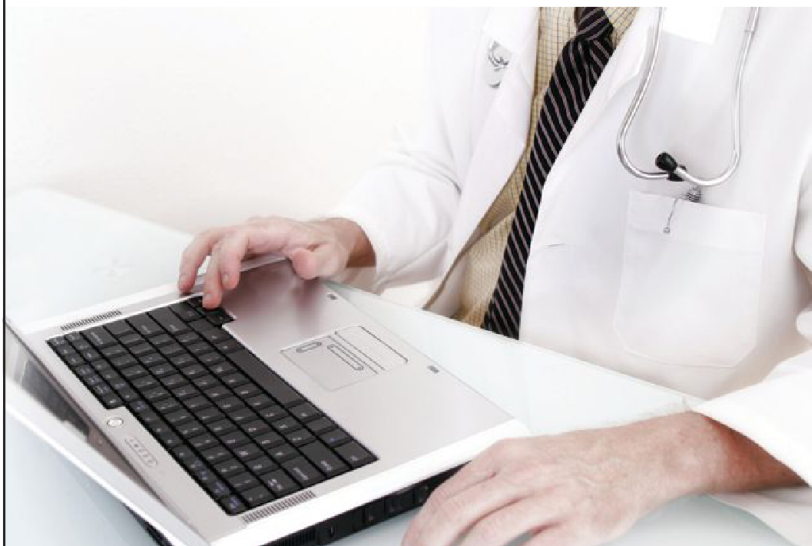
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Hyperacusis and Misophonia

The Lesser-Known Siblings of Tinnitus

By Paula Schwartz, Au.D., Jason Leyendecker, Au.D., and Megan Conlon

■ Hyperacusis (decreased sound tolerance) and misophonia (fear of sound) are two conditions about which little is known. Consequently, physicians often struggle when they encounter patients who are affected by them. This article attempts to educate the medical community about hyperacusis and misophonia, both of which can have devastating effects on the lives of patients, and ways to manage them.

Hearing loss and tinnitus are the primary hearing-related reasons people seek help from physicians. There are, however, several lesser-known maladies that result in suffering and affect a person's quality of life. Among these are hyperacusis (decreased sound tolerance) and misophonia (dislike or fear of sound). The prevalence of these conditions is not well-documented; however, it is believed that between 10% and 17% of the population experiences tinnitus and of that population, 37% requires specific treatment for hyperacusis and misophonia.¹ Although there is no surgical or pharmacological cure for either hyperacusis or misophonia, there are treatments that can help a person tolerate normal sounds and learn to cope. Audiologists who specialize in tinnitus assessment and treatment can evaluate and treat patients with these conditions. This article describes cases of hyperacusis and misophonia that we have seen in our practice and presents some of what is currently known about these disorders.

A Case of Hyperacusis

Sue Smith is a professional cellist. While playing, she was exposed to an unexpected loud sound that came from a monitor directly in front of her. She immediately experienced reduced hearing, a feeling of aural fullness, and sensitivity to sound. Those sensations continued for six months. During that time, Sue stopped playing the cello and took a leave of absence from her orchestra job. She started wearing earplugs most of the day in anticipation of encountering sounds such as traffic noise, a referee's whistle at her son's hockey games, and the beeping of commercial vehicles backing up. Those sounds caused physical discomfort and pain in both ears. She also would anticipate offending sounds prior to their occurring; this made her fearful and anxious.

Sue initially was seen by an otolaryngologist who assessed the structural integrity of her auditory system and an audiologist who evaluated her hearing. She was diagnosed with acoustic shock, hyperacusis, and misophonia. She was referred to our clinic. She started tinnitus retraining therapy, during which

she wore ear-level white-noise generators, devices that look like small behind-the-ear hearing aids, during all waking hours. She also was weaned off the hearing protection and began following a daily protocol to address the anxiety generated by her fear of sound. After six months of treatment, Sue's sensitivity was restored to normal ranges, and she returned to playing in the orchestra.

■ What is Hyperacusis?

Hyperacusis is the subjective perception of increased volume of sounds; it manifests as physical discomfort and pain. Patients with this disorder can experience acute discomfort from sounds that occur at levels as low as 40 dB HL or that of soft speech. It is postulated that the disorder involves the limbic system because the patient's reaction to sound is so strong it triggers the fight-or-flight response.¹

In addition to experiencing pain and discomfort, patients with hyperacusis often experience fear and anxiety. As a result, they are often unable to work and they avoid social activities, which can lead to isolation and depression.

Often people with hyperacusis want to wear ear protection continuously. But this can actually exacerbate the problem because the auditory system balances loudness based on median sound levels over time.¹ Although hyperacusis is a relatively new diagnosis, researchers have estimated that between 1% and 1.5% of the population has a clinically significant form of the condition.²

In the majority of cases, the etiology of hyperacusis is unknown. However, it has been linked to head injury, sound exposure, acoustic shock, Bell's palsy, Lyme disease, Williams syndrome, Ramsay Hunt syndrome, stapedectomy surgery, perilymphatic fistula, migraine, depression, increases in cerebrospinal fluid pressure, autism spectrum disorder, and Addison's disease.¹ The dearth of strong epidemiological data and the lack of animal research and double-blind human studies about the potential mechanisms responsible for hyperacusis prevent us from proving the validity of any theory as to what causes it.

■ **Diagnosis and Treatment**

Because there is little understanding of hyperacusis within the medical community, physicians who encounter patients with this disorder have often recommended psychotherapy and antidepressants and/or anti-anxiety medications. These medications may dull the associated emotional response; however, they do not address the underlying problem.

Hyperacusis can be reversed, and a person's sound tolerance can be brought back to within normal limits with appropriate treatment.^{1,3} Treating hyperacusis starts with a clinical diagnosis. An otolaryngologist or otologist typically makes the initial diagnosis, which involves taking a case history, administering self-rating questionnaires to the patient, and having an audiologist conduct a loudness discomfort level test.^{1,3}

The most widely accepted approach to treatment is desensitizing the patient to sound. This involves the patient undergoing sound therapy, in which he or she wears on-ear white noise generators, which are small devices that rest behind

the ear. (They do not interfere with a person's hearing.) When combined with behavioral modification exercises to address any misophonia or fear of sound, the treatment can lead to significant or complete restoration of sound tolerance. Although patients do see some immediate improvement with sound therapy, full recovery can take months.² Improvement is measured through re-evaluation with loudness discomfort level testing.

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A Case of Misophonia

Lindsey Jones is a healthy 15-year-old girl who becomes angry when she hears people chewing, smacking their lips, or making other sounds with their mouths. Hearing these sounds started affecting her when she was 12 years old. She has since stopped eating dinner with her family and is home schooled, as she cannot tolerate these sounds in the classroom and lunchroom. Lindsey exhibits signs of soft-sound sensitivity syndrome (4S), a form of misophonia.

■ **What is Misophonia?**

Misophonia is defined as a strong dislike of certain sounds and an abnormally strong reaction to them such as anger or even fear.¹ The specific sounds that cause the reaction are unique to each individual. However, they often include yawns, sniffles, chewing, lip smacking, gum chewing, and throat clearing. Very little is known about the number of people affected by this condition; however, we do know that it is typically seen in prepubescent girls and that they have violent reactions and/or exhibit OCD-like behaviors. The cause of misophonia is unknown. There is speculation that it may be related to the neural processing of sound information.¹

■ **Diagnosis and Treatment**

Until recently, many physicians and patients were not aware of misophonia. Only because of news reports about people who suffer from this condition have patients recently started coming forward, noting that they thought that they were the only ones who suffered from it. In the past, persons exhibiting these behaviors typically were

referred to a psychologist or psychiatrist and had minimal success with such treatments. Although misophonia is still not well-understood, there are strategies for managing it.

Treatment often involves a multidisciplinary team that includes an audiologist and a psychologist. An audiologist will help determine an appropriate type of sound therapy and monitor the patient's progress. Sound therapy often involves having the patient use a device such as an ear-level white-noise generator or even an iPod in order to minimize their awareness of the offending sounds. A psychologist might use cognitive behavioral therapy to help the patient manage the emotions they feel or OCD behaviors they exhibit when they anticipate or hear offending sounds.

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Conclusion

It is common for people with hyperacusis and/or misophonia to be told by a physician that they need to learn to live with the problem, as these conditions have no surgical or pharmacological treatments. This can be a tall order, as they can have a devastating effect on a patient's quality of life. We now know that certain therapies can help some patients. Physicians who encounter patients with symptoms of these conditions may wish to refer them to an otolaryngologist or audiologist who has experience with them for diagnosis and treatment. **MM**

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Obstructive Sleep Apnea

A Review and Update

By Inell C. Rosario, M.D.

■ Obstructive sleep apnea (OSA) is a common problem that plays a role in a number of other chronic health concerns including hypertension, atrial fibrillation, diabetes, and gastroesophageal reflux disease to name a few. In this article, we discuss the relationship between OSA and these conditions as well as how OSA is diagnosed and treated.

Sleep was once thought to be a static state of brain inactivity. Over the years, however, research has shown that it is actually a dynamic state during which an individual cycles through non-rapid eye movement and rapid eye movement (REM) stages. Some of the proposed functions of sleep include brain and body restoration, replenishment of cerebral glycogen, tissue synthesis and cell mitosis, protein synthesis, growth hormone release, energy conservation, regulation of noradrenergic activities, memory and information consolidation, brain development, and programming of abilities that may be genetically predetermined such as having an aptitude for math as opposed to literature. We are learning that lack of sleep can lead to short-term cognitive and physical dysfunction as well as development of long-term medical disorders.¹

Experiments in animals clearly show that sleep is necessary for survival. The work of Rechtschaffen and colleagues, for example, showed that rats deprived of sleep died within 10 to 30 days after having experienced weight loss despite increased food intake and a loss of their ability to control their body temperature.² Epidemiologic studies have shown increased mortality from coronary artery disease, cancer, and stroke in individuals who sleep fewer than four hours or more than nine hours a night, when compared with those who sleep an average of seven and a half hours a night.^{3,4}

One of the main causes of sleep disturbances is sleep-disordered breathing, which can range from simple snoring

to obstructive sleep apnea (OSA) and obesity hypoventilation syndrome. Obstructive sleep apnea is the cause of the majority of sleep-related morbidity. "Apnea," which was first described by Guilleminault et al. in 1978, is a 90% or greater decrease in airflow that lasts for at least 10 seconds despite noted ongoing respiratory effort.⁵ "Hypopnea" is a reduction of airflow of 30% from baseline with a 4% desaturation or 50% with a 3% desaturation or an arousal. Both apneas and hypopneas make up the apnea-hypopnea index (AHI), which is used to assess the severity of OSA. In general, an AHI score of <5 is considered normal; an AHI of >15 is considered critical, as this is the level at which many of the adverse consequences of OSA occur.

An estimated 24% of males and 9% of females in the United States have some form of sleep-disordered breathing (AHI >5). Four percent of males and 2% females are believed to have OSA (AHI >5 with excessive daytime sleepiness).^{1,6-8} This prevalence rate is higher among persons 65 years of age and older, persons with an elevated body mass index (>30), men with a neck girth greater than 17 inches and women with a neck girth greater than 16 inches, or persons with comorbidities such as hypertension, diabetes, stroke, depression, polycystic ovary syndrome, Parkinson's disease, Down syndrome, multiple sclerosis, congestive heart failure, and atrial fibrillation.⁸⁻¹⁰ Punjabi and colleagues found OSA in 40% to 60% of overweight middle-aged men.¹¹ Andreas et al. found more than 50% of patients with coronary artery disease also had OSA.¹²

The Relationship between OSA and Other Chronic Health Conditions

We have long been aware of the importance of sleep to safety. Many automobile crashes and a number of catastrophic accidents have been attributed to sleepiness and fatigue.¹³ More recently, we have become aware that lack of sleep is associated with a number of chronic health problems.

■ Hypertension

Obstructive sleep apnea has been shown to be an independent risk factor for the development of hypertension.^{8,9,14,15} Obstructive sleep apnea causes cyclical episodes of hypoxia and hypercapnia with augmented sympathetic discharge and vasoconstriction. Brooks et al. used canines with tracheotomies to show that with periodic closing of the stoma to create apneas, the animals developed systemic hypertension over time.¹⁶ Their hypertension was reversed when the periodic apneic episodes were discontinued. The Wisconsin Sleep Cohort Study, a random population sample study involving 5,000 state of Wisconsin employees 30 to 60 years of age, included a follow-up evaluation at four years that showed a 3.2 X odd ratio risk for development of hypertension in persons who had an AHI score >15 (adjusted for age, sex, smoking status, alcohol use, body mass index, and neck girth).¹⁵

The correlation between hypertension and OSA is in one way good news, as both conditions are treatable. Multiple studies have shown that a small drop in blood pressure can have a major impact on the severity of coronary artery disease.^{17,18} MacMahon et al. looked at the results from nine prospective studies involving 420,000 patients and found they consistently showed that a 5mm Hg decrease in diastolic blood pressure led to a 21% decrease in the incidence of coronary disease and a 34% decrease in the incidence of stroke over the mean study period of 10 years.¹⁷ A 10 mm Hg drop in diastolic pressure led to a 37% and 56% reduction in the rates of coronary artery disease and stroke, respectively. Notably, studies have shown that continuous positive airway pressure (CPAP) used in addition to medication also reduces blood pressure and, therefore, the cardiovascular risks associated with hypertension.^{19,22} A randomized double-blind controlled study by Pepperell et al. compared the use of sham CPAP (using masks with holes in them) with CPAP in 118 patients with OSA and excessive daytime sleepiness.¹⁹ Over the month-long study, the individuals treated with CPAP had an average decrease in their main arterial blood pressure of 5 mm Hg while those in the sham group had no change. Another study by Becker et al. comparing results from patients with therapeutic and subtherapeutic CPAP use showed that it was not just the use of CPAP but the effective reduction in AHI that was responsible for the blood pressure changes.²¹

■ Atherosclerosis

Obstructive sleep apnea is thought to induce carotid artery atherosclerosis, with one assumed mechanism being intermittent,

recurrent periods of hypoxia causing augmented sympathetic discharge and a release of proinflammatory mediators such as catecholamines, c-reactive protein, and various interleukins into the blood stream. Drager et al. randomized 24 patients who were matched for age and severity of OSA to either a CPAP group or a control group. Those in the CPAP group showed improvement in early signs of carotid artery atherosclerosis, with a noted decreased intima thickness. After four months of consistent CPAP use, those patients also saw a decrease in the above-mentioned mediators.²³

■ Arrhythmias

Arrhythmias (most commonly tachy- and bradyarrhythmias) are also associated with OSA. Periods with multiple apneas lead to tachycardia with hyperventilation and increased sympathetic response. After the apnea, there is a calm or quiescent period of the respiratory cycle during which patients may experience bradycardia. Gami et al. on retrospective review found that the relative risk of sudden death for cardiac-related causes was highest among individuals with OSA between midnight and 6 a.m.²⁴ One possible explanation for this is that REM sleep is more concentrated during the second half of the night, and it is during REM sleep that OSA is often most severe because of concomitant decreased muscle tone, decreased cardiac output, and increased heart rate variability.

■ Atrial Fibrillation

In a retrospective study, Gami and colleagues found that in subjects younger than 65 years of age, the frequency of atrial fibrillation was significantly correlated with the presence of OSA.²⁵ An observational study by Kanagala et al. showed a >80% rate of recurrent atrial fibrillation in patients with untreated OSA compared with a 40% to 55% rate in those who did not have OSA.²⁶

■ Diabetes

Although not well-understood, the incidence of OSA is exceedingly high in obese patients with type 2 diabetes. Viner et al. found the prevalence of OSA in this group of patients to be 86.6%.²⁷ Punjabi et al. also found that OSA is associated with increased insulin resistance, glucose intolerance, and impairment in pancreatic B cell function.²⁸ Moreover, Harsch et al. showed that with CPAP treatment, insulin resistance decreased.²⁹

■ Nocturia

Obstructive sleep apnea is believed to exacerbate nocturia. During periods of apnea, arousal can lead to decreased bladder contraction and an urge to use the bathroom. The periods of apnea, which are associated with elevated blood pressure, lead to the release of the atrial natriuretic peptide from the atrial myocytes. The release of this hormone by the heart cells in response to hypertension leads to vasodilation, increased glomerular filtration and salt excretion, and, therefore, increased urine production.¹ ↪

■ Gastroesophageal Reflux Disease

Reflux symptoms, especially nocturnal regurgitation, may be caused or exacerbated by OSA. During an apnea, there is increased negative intrathoracic pressure as well as hyperventilation, both of which increase the risk of an episode of reflux. Reflux, in turn, contributes to persistent hoarseness, chronic cough, and chest and gastric discomfort.¹

Identifying Patients with OSA

Diagnosing OSA requires a clinician to have a high index of suspicion when evaluating a patient. Traditionally, physicians suspected OSA in patients who were obese or who had certain anatomical features such as tonsillar hypertrophy, macroglossia, or retrognathia. Although these physical features do increase a person's risk for OSA, physicians also need to consider sleep apnea in the patient who has difficulty controlling his or her blood pressure or diabetes; who has atrial fibrillation, polycystic ovary disease, cognitive dysfunction, multiple sclerosis, and Parkinson's disease; or who shows signs of metabolic syndrome or complains of restlessness, morning headaches, depression, chronic fatigue, excessive daytime sleepiness, or insomnia. Physicians may need to pay particular attention to women, who may not present with the expected signs of sleep apnea such as excessive daytime sleepiness but instead may complain of insomnia or depression or decreased ability to multitask. In addition, physicians need to pay special attention to older patients, as age increases the risk for OSA.^{1,6-8, 27, 30-32}

Obstructive sleep apnea is ideally diagnosed with an overnight polysomnogram. When an in-lab sleep study is impractical (eg, if the patient is a single parent), a home polysomnogram is an option. At-home testing is appropriate for the patient who has a high likelihood of having sleep apnea and has no other comorbidities. There are different types or levels of sleep studies. A Level I study is the most comprehensive. It typically involves using 16 or more channels monitoring EEG, EKG, EOG, EMG, airflow oximetry, nasal pressure, esophageal pressure, body position, snoring sounds, and rib cage and abdominal movements and is monitored by a sleep lab attendant. Level II, III, and IV studies are done in a patient's home. Level III and IV studies are less comprehensive (eg, Level III studies monitor only two channels—heart rate and oximetry). In order for Medicare to pay for a study, it must monitor a minimum of three channels.

Treating Patients with OSA

Because we know there are significant health and safety risks associated with sleep apnea, it is important to diagnose and treat the condition in as many patients as possible. Unfortunately, there is no one-size-fits-all treatment for OSA. The treatments that are available do improve outcomes for the majority of patients. However, treatment needs to be patient-centered and often must be multidimensional. Patients should be advised to allow an adequate amount of time for sleep, generally seven to eight hours, and to minimize alcohol and caffeine use especially near bedtime.

Some patients see significant benefit from positional therapy, which usually involves sleeping on their side to minimize posterior tongue collapse. For patients who are above their ideal body weight, weight loss and exercise can improve their condition. A cohort study showed that overweight individuals who reduced their weight by 10% reduced their AHI by 26%.³³

■ Oral Appliances

Oral appliances are generally indicated for use in patients with mild to moderate sleep apnea, especially if the airway seems to collapse at the level of the tongue base. However, these devices are not recommended for patients with temporal mandibular joint disorders, who are unable to protrude their jaw 6 mm, who have multiple missing mandibular or maxillary teeth, or who have periodontal disease.

■ CPAP

Continuous positive airway pressure is universally accepted as the gold standard treatment for OSA and is often combined with a patient's efforts to improve their sleep hygiene and lose weight. The first CPAP unit was introduced in 1981 by Colin Sullivan, and it revolutionized the treatment of sleep apnea. Before that, sleep apnea was often managed surgically, mostly with tracheotomy. A CPAP device delivers a positive stream of air pressure that essentially stents open the airway. This pressure can be varied or fixed. In addition, CPAP devices also can be used to deliver oxygen to patients with more severe OSA who may need oxygen supplementation. Depending on the severity of a patient's sleep apnea, BIPAP or Bilevel positive airway pressure may be needed, especially if there are associated comorbidities such as neuromuscular dysfunction. The American Academy of Sleep Medicine recommends that initial CPAP titration be done in a lab to facilitate mask fitting, patient training, and desensitization as well as to document the point at which consolidated sleep occurs. Ideally, CPAP pressure is set once there is significant elimination of apnea and hypopneas (AHI <5) even during supine REM sleep. A variety of masks and nasal pillows can be used to deliver positive pressure. In addition, the newer CPAP machines are fairly quiet and much smaller, causing less disruption of sleep for the bed partner.

Consistent use of CPAP during the first two weeks of treatment is crucial for long-term compliance and success in resolving OSA, the likelihood of which is increased with use of additional heat and humidity. Therefore, prior to the polysomnogram and on follow up as well, it is important to educate patients about the importance of using their CPAP devices. Once they have adjusted to using the CPAP machine, patients should ideally be seen at least every six to 12 months to ensure ongoing adherence and to address any concerns.

■ Surgical Intervention

The goal of most surgeries for OSA is to reduce airway resistance. One procedure that has been used to treat sleep-disordered

breathing and snoring is uvulopalatopharyngoplasty (UPPP), during which the uvula and a portion of the soft palate are removed (if tonsils are present, they are removed as well). Research has shown a 40% to 50% success rate of UPPP in decreasing AHI by 50%. A meta-analysis by Sher et al. found UPPP to have a success rate of 39% for curing sleep apnea.³⁴ The fact that the success rate was only 39% is believed to be related to the fact that a large percentage of patients had co-existing, unrecognized hypopharyngeal obstruction. We now know UPPP is most indicated when the collapse of tissue is at the level of the retropalate. Because our ability to localize the level of airway obstruction has been improved with use of the Mueller maneuver during flexible nasal endoscopy in the clinic, cephalometric X-ray, and dynamic as well as static CT and MRI of the head and neck region, we can better identify patients who are more suitable candidates for UPPP.

Other surgeries to improve sleep apnea include correcting obstructive nasal pathology such as septal deviation or turbinate hypertrophy, removal of adenoids, tongue-base reduction genioglossal advancement, thyrohyoid suspension, palatal advancement, and submental lipectomy. Depending on the exam findings, these procedures would be indicated for patients who cannot tolerate CPAP, who have subtherapeutic reduction of their AHI using CPAP alone, or who may not be able to use a CPAP machine because of their employment (eg, a soldier in the field).

In addition, there are some office-based procedures that have some efficacy in patients with mild to moderate OSA. Radiofrequency reduction of the turbinates, soft palate, and tongue base is an option. It delivers temperature-controlled submucosal heat to denature protein, which reduces the tissue volume and improves airflow and also stiffens the area being treated, which reduces snoring. Pillar implants have also gained some popularity but are mostly indicated for snoring or mild sleep apnea. During the procedure, three tiny Dacron inserts are placed in the soft palate to induce local soft-tissue reaction and fibrosis and thereby stiffen the soft palate, reducing its mobility and decreasing snoring.

Maxillomandibular advancement, which involves moving the mandible and maxilla anteriorly by as much as 15 mm, creates more physical space for the tongue and can resolve OSA in some patients. In a patient with craniofacial deficiencies, this also can result in cosmetic improvement. Most literature reviews show a 75% to almost 100% success rate of maxillomandibular advancement for treating OSA, with a long-term success rate of 90%. However, this surgery is not often recommended for a number of reasons including the fact that it may negatively affect a person's appearance if they do not have a craniofacial deficiency. In addition, recovery can be prolonged, and trained surgeons may not be available within a given community.³⁵

Tracheotomy is the definitive surgical treatment for sleep apnea, as it creates an opening in the neck to allow for breathing, bypassing the collapsed upper airway. Although it can be life-saving for patients with severe OSA who do not respond to CPAP or BIPAP treatment, it generally is considered the treatment of

last resort, as it affects voice quality and cosmesis, and limits activities.

In general, surgical options need to be explored and discussed when patients find they cannot or are unwilling to use CPAP or still have symptoms despite using CPAP. More studies are needed to objectively document the efficacy of surgical interventions and to determine their relative cost-effectiveness. As always, a big part of our job as physicians is to tailor care to the patient although at times the patient's wishes may not be our first choice.

■ New Treatments

Hypoglossal nerve stimulation delivered by a device implanted in the intercostal space and tunneled subcutaneously to loop around the hypoglossal nerve, is currently being studied in Minnesota for the management of moderate sleep apnea. The device sends an impulse unilaterally to cranial nerve XII, which then causes the tongue's protrusion and airway opening. Other treatments under development or being tested include robotic surgery for removal of the tonsils and tissues at the back of the throat. Approved in December for removal of head and neck cancers, robotic surgery is more precise and less invasive than manual techniques. Medications such as Qnexa are being tested to aid with weight loss.

Conclusion

Obstructive sleep apnea plays a role in a number of medical conditions that affect a person's quality of life and their ability to interact with friends and family members and perform in the workplace. As we improve our understanding of the relationship between these conditions and OSA, we will be better able to provide effective therapeutic interventions for our patients. As in other areas of medicine, surgeons and sleep specialists will need to work together more often to treat patients who are not responding adequately to noninvasive therapies or who have persistent, bothersome symptoms despite compliance with the prescribed treatment. At the moment, however, we can celebrate the fact that we have made tremendous gains in our understanding of OSA and that patients have an array of options that can help them. **MM**

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HOPE Clinic

A Place to Care

By Ruth Westra, D.O., M.P.H., Steve Skube, and Melissa Zant

■ The University of Minnesota Medical School and College of Pharmacy in Duluth worked with a local drop-in center in 2008 to start a free clinic. The HOPE (Health of People Everywhere) Clinic is a student-run, faculty-organized effort that offers students an opportunity to develop their clinical skills and learn how to work in interprofessional teams while providing needed care to people who are underserved or uninsured. This article describes how this initiative came about and the impact it is having on medical students.

The second-year medical and pharmacy students tap gently on the door to the men's dormitory. "Come in," they are told. The floor is covered with mattresses and bedding; a faculty physician and pharmacist sit in the room's few chairs. The students present their first case of the day. They describe a 44-year-old male who sustained a laceration to his left forearm four days ago during an altercation. He does not have insurance, so he stitched the wound with dental floss. The students describe a two-inch area on the patient's left forearm that is red and swollen. The faculty and students then return to the exam room to evaluate the patient and discuss further care options with him.

This is a typical afternoon at the HOPE (Health of People Everywhere) Clinic, a student-run free clinic at the Churches United in Ministry (CHUM) Drop-in Center in Duluth. The center serves more than 7,000 people a year who are homeless or who have low in-

comes and are in need of shelter and support services.

The Founding of HOPE

The HOPE Clinic, which opened in October 2008, is a joint effort of the University of Minnesota Medical School and College of Pharmacy in Duluth. Its mission is twofold: to provide basic medical care and referrals for underserved and uninsured people in the Duluth area and to provide a learning opportunity for first- and second-year medical and pharmacy students. The medical students who serve the clinic are enrolled in the Rural Academy of Leadership, a two-year elective course offered through the department of family medicine and community health. In order to receive credit, they must serve the clinic at least three times a year for each of the two years. The pharmacy students are enrolled in the College of Pharmacy's early pharmaceutical experience course. When working in the clinic, they are supervised by faculty from the two schools

as well as adjunct faculty from the community.

The clinic, which operates every Tuesday afternoon, grew out of efforts of medical students who had volunteered at CHUM, taking blood pressure readings and talking with people about their health. The students often met people who had great need but few resources. In 2006, student leaders decided they wanted to do more to help this population. After conducting a needs assessment and looking at possible locations for a free clinic, they realized the drop-in center would be a great site and approached the leaders of CHUM, who agreed to provide space free of charge. In addition, the students sought donations to purchase basic medical equipment and supplies such as bandages, over-the-counter medications, office supplies, educational materials, and bus passes for patients. They have received financial support from a number of organizations including Maurices, a national clothing retailer; the Rural Health Resource Center; the University of Minnesota Medical School Student Council; the Women in Medicine student organization; and Pasek Pharmacy, which donates prescription medications. The clinic is run by an executive board composed of students and faculty advisers Ruth Westra, D.O., M.P.H., from the medical school and Tim Stratton, Pharm.D., B.C.P.S.,

F.A.Ph.A., from the college of pharmacy.

An affiliation agreement between the university and CHUM was approved in 2008. Since then, the clinic has provided care for more than 250 patients with concerns ranging from sore throats to diabetes.

Two clinical teams staff each session. Each team consists of a student pharmacist, a medical student clinician, and a medical or pharmacy student who serves

as a patient advocate. After doing an initial examination and taking the patient's health history, the team gives an oral presentation to the faculty supervisors, and together they develop a care plan for the patient. The patient is then seen by the entire team, and they discuss appropriate treatment options. If patients do not have a primary care provider, the students connect them with one through the Health

Care Access Office at the Lake Superior Community Health Center or the Duluth Family Practice Center.

..... **Preparing Students for the Experience**

Students at the University of Minnesota Medical School, Duluth, learn physical exam and history-taking skills early in their first year. Those who are involved in the HOPE Clinic participate in an orientation session to prepare them for the unique challenges that come with working at a free clinic.

The orientation begins with the basics. First-year students take a field trip to the HOPE Clinic to become familiar with the CHUM Center and the clinic examination rooms. During that visit, second-year students perform a mock patient encounter to show the first-year students how the clinic operates. Finally, the students serve a meal to clients. Listening to their future patients' stories helps them understand that each person faces unique challenges and gives them an up-close view of the concerns of the homeless and uninsured as a population.

Students then attend three workshops where they learn how to take a patient's vital signs, do laboratory testing, give oral presentations, and provide referral information. Medical and pharmacy faculty provide ongoing instruction and advice during the afternoon clinics.

A Real Learning Experience

One patient at the HOPE Clinic, who seemed to have vague symptoms of an upper respiratory infection, proved to be a real learning experience. The first team of students to meet her assessed her symptoms and then counseled her about over-the-counter medications that might alleviate them. Although the patient told us that she did not like doctors, she seemed at ease during the time she spent with us. She returned week after week for a month or so, arriving with vague complaints and clearly enjoying the opportunity to have three open-minded students listen to her story and answer her medical questions.

As we slowly pieced together her story, we gained her trust and were able to convince her that she should have a primary care provider address her chronic health problems. We set up a referral, and hoped she would go to her appointment. To our delight, she returned to our clinic a week later with stories of how great her provider was and cards for her follow-up appointments.

The students at the HOPE Clinic performed a great service for this patient, but the patient also taught us a great deal. We helped her establish a relationship with a clinic where she can get the care she needs to enjoy better health. She made a lasting impression on us. We now know that it is possible to break down the barriers that separate patients and providers. We appreciate the difficulties of people who are underserved. We know that people are more alike than different when it comes to their need for health care. Most importantly, we learned that listening and having an open mind may greatly affect the life of a patient.

– Melissa Zant

Learning the Value of Teamwork

We were just a few months into our first year as medical students, and it was my first time volunteering at the HOPE Clinic. I had learned most of the physical exam skills and barely knew how to write a patient note when the clinic coordinator turned to me and a classmate and said, "One of the second-year students just called in sick. You two can handle seeing patients, right?" As the coordinator turned away, we stammered, "Uhh..." But we couldn't let the team down. We rifled through the patient's paperwork, discussed how

we would take the patient history, and quickly reviewed our exam skills before walking into the exam room.

We worked through a focused history and physical exam together. What one of us may have missed, the other one remembered. We agreed that the patient had an upper respiratory infection. The next task was presenting the case to the physician preceptor.

We must have looked anxious because our preceptor immediately told us to calm down and take our time. We pre-

sented our case, and after she spoke with our patient, she agreed with our diagnosis. We were thrilled to "crack our first case."

Our preceptor then showed us some physical exam techniques that would have been helpful for our particular patient, taught us the meaning of then-foreign words such as "erythematous" and "rhinovirus," and discussed the importance of learning how to properly write a patient note.

– Steve Skube

Assessing the Impact on Students


The 60 medical students who work at the HOPE Clinic gain valuable experience that prepares them for their clinical years. One thing they learn is the value of team work. The teams of three students work together to complete the initial patient history, applying what they have learned in the classroom. Because the medical and pharmacy students bring different perspectives, they see how they can obtain more information from the patient together than if they were working alone.

After each session at the clinic, students complete a survey about their experience. They also are required to write a reflection on what they saw and learned (see “A Real Learning Experience” and “Learning the Value of Teamwork”). In surveys, students noted that they gained confidence in their ability to perform examinations and that their history-taking skills improved. They also reported having better relationships with pharmacy students and said that they were more comfortable working with patients who are underserved and uninsured.

Conclusion

In the HOPE Clinic, the University of Minnesota Medical School and College of Pharmacy in Duluth and CHUM have created a unique partnership that not only benefits underserved and uninsured people in the area but also allows medical and pharmacy students to gain clinical experience early in their academic career. In addition, serving in the clinic helps medical and pharmacy students understand the complexity of caring for patients and allows them to experience being part of an interprofessional health care team. **MM**

Ruth Westra is chair of the department of family medicine and community health at the University of Minnesota Medical School Duluth. Steve Skube and Melissa Zant are third-year medical students. They were co-directors of the HOPE Clinic during the 2010-11 academic year.

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Resolutions from the 2011 MMA House of Delegates

Res. 100 MMA Bylaws Changes Related to MMA Annual Meeting

Adopted as amended

RESOLVED, a component medical society may authorize the MMA to appoint delegates and alternate delegates on its behalf. The MMA may appoint delegates for unfilled positions for nonstaffed component medical societies no sooner than 75 days before the House of Delegates meeting, and be it further RESOLVED, that the bylaws changes contained in Exhibit A be adopted.

Res. 101 Sunset Policy Review

Adopted

RESOLVED, that the three “questionable” policies identified during the 2011 sunset policy review process be subject to further review by MMA staff and leadership and recommended action on them be brought to a future meeting of the MMA House of Delegates, and be it further RESOLVED, that the MMA compendium of archived MMA policies, which contains MMA policies that are no longer relevant but can be consulted for historical or informational reasons, include the attached recommended “archive” policies, and be it further RESOLVED, that the MMA reaffirm support for the attached recommended

“retain” policies, and be it further RESOLVED, that the MMA approve and reaffirm support for the attached recommended “retain as edited” policies.

Res. 102 The Democratic Process a) for a Moratorium on Implementation of R106-2010 and b) for Formation of a New Bylaws Work Group

Adopted as amended

RESOLVED, that the MMA continue to refine the resolution review process and report back to the 2013 House of Delegates meeting with an evaluation and recommendations for modifications with proposed bylaws changes, if appropriate, consistent with MMA Policy 420.78, and be it further RESOLVED, that the MMA continue to explore, through the Governance Task Force, the governance responsibilities of the House of Delegates and the Board of Trustees.

Res. 103 Prohibit CMS Waivers of Anti-Fee Splitting Laws

Not adopted

RESOLVED, that the MMA request that Congress and the Administration prohibit federal officers from giving waivers that would repeal patient protection laws including anti-fee splitting laws, civil mon-

etary penalties laws, the Stark anti-self-referral law, and anti-kickback laws, and be it further

RESOLVED, that the MMA implement this resolution by bringing it to the U.S. Congress, the appropriate congressional committees, the Minnesota members of Congress, appropriate officers in the executive branch of the U.S. government, the Minnesota Legislature, and appropriate Minnesota state officers in the executive branch.

Res. 104 Independent Practice

Not adopted

RESOLVED, that the MMA assess the prevalence of, location, and special needs of independent physician practices in Minnesota, and be it further RESOLVED, that the MMA hold as a priority, in its state and federal policy and advocacy activities, the survival and success of Minnesota’s independent physician practices.

Res. 105 Employment of Physicians by Organizations that Provide Direct Patient Care

Adopted as amended

RESOLVED, that the MMA amend current policy 470.04 (Minnesota Professional Firms Act) to reflect current Minnesota law. The amended policy will

read as follows: The MMA opposes any amendments to the Minnesota Professional Firms Act that would further erode the corporate practice of medicine doctrine or reduce physician autonomy.

Res. 106 Valuing, Tracking, and Communicating Resolutions Passed by the MMA House of Delegates

Adopted as amended

RESOLVED, that the MMA attach the names of all individual authors and appropriate component medical society authors to all resolutions submitted to the House of Delegates, and be it further

RESOLVED, that the MMA ask resolution authors, or their designee, to testify, if necessary, on their proposals at meetings of the MMA Board of Trustees and MMA committees, and be it further

RESOLVED, that the MMA continue to improve communications to members and delegates on resolutions passed by the House of Delegates.

Res. 107 Collaborative Legal Reform for Malpractice Reform in Minnesota

Referred to the MMA Board of Trustees

RESOLVED, that the MMA support medical malpractice reform that investigates the possibility of enacting the collaborative law participation agreement as drafted by the National Conference of Commissioners on Uniform State Laws as part of the Uniform Collaborative Law Act in Minnesota.

Res. 108 McLeod-Sibley Medical Society Merger

Adopted

RESOLVED, that the McLeod County Medical Society and the Sibley County Medical Society merge to become the McLeod-Sibley Medical Society.

Res. 200 Simplification of Quality Measures for Minnesota Physicians

Not adopted

RESOLVED, that the MMA continue to advocate for alignment and harmonization of state and federal quality measures, and be it further

RESOLVED, that the MMA convene public and private sector community stakeholders to identify statewide high-value quality measurement and improvement priorities, and be it further

RESOLVED, that the MMA evaluate alternatives to standardized statewide quality measurement and reporting, including methods for individual clinics/medical groups to measure and report on clinical topics that address their practice's needs based on their specific patient populations and gaps in care.

Res. 201 Chlamydia Screening

Not adopted

RESOLVED, that the MMA support annual screening for *Chlamydia* among all males and females in the 15 to 25 age range with repeat screening at the discretion of the physician.

Res. 202 Ten-Minute Physical Activity Breaks Offered as Part of the Workday

Adopted as amended

RESOLVED, that the MMA recommend that employers in Minnesota encourage increased physical activity among their employees where appropriate through worksite wellness programs such as exercise breaks, discounted memberships to fitness centers, health coaching, and other proven mechanisms.

Res. 203 Mandatory Accurate Disclosure of Provider Credentials to Current and Potential Patients and the Public

Adopted

RESOLVED, that the MMA support legislation that mandates by law precise and accurate disclosure of specific academic credentials in all patient interactions, ad-

vertising/media, and in public/legislative forums; precise verbal disclosure to patients and/or the public in a professional capacity; and visible title and accurate provider ID to identify fully and transparently a provider's degree.

Res. 204 Treatment of Mental and Substance-Related Disorders in Minnesota

Adopted as amended

RESOLVED, that the MMA develop and appoint a task force of primary care physicians and psychiatrists to recommend and to oversee the development of good/best direct care and consultation practices consistent with the aims and architecture of the medical home that meet a reasonable standard of individualized comprehensive evaluation and direct treatment of mental and substance-related disorders.

Res. 205 Resolution Regarding Discontinuing the Secure Examination as Part of the ABMS MOC Program

Adopted

RESOLVED, that the MMA delegation to the American Medical Association (AMA) direct the AMA to work with the American Board of Medical Specialties (ABMS) to discontinue the requirement for a secure examination as part of their Maintenance of Certification (MOC) program.

Res. 206 Vaccinations Given in Health Care Settings and in For-Profit Pharmacies

Adopted

RESOLVED, that the MMA work with the Minnesota Department of Health and the Minnesota Legislature to pass legislation requiring that any entity providing vaccines to patients enter the data into the Minnesota Immunization Information Connection registry.

Res. 207 Prohibiting Low-Cost Medication Prior Authorization

Adopted as amended

RESOLVED, that the MMA support prohibiting requirements for prior authorization for medications that are administered

for costs less than \$25, and be it further RESOLVED, that the MMA work with the Minnesota Academy of Family Physicians to meet with the Minnesota Council of Health Plans to institute this prohibition as soon as possible, and be it further RESOLVED, that if the health plans refuse to abide by this prohibition, that the MMA ask the Minnesota Department of Health to take action as a means to help control health care costs.

Res. 208 Regulation of Pharmacy Benefit Managers

Referred to the MMA Board of Trustees.

RESOLVED, that the MMA pursue legislation to regulate Pharmacy Benefit Managers in Minnesota to:

1. require their personnel, especially those making coverage or denial decisions, to be medically knowledgeable and have basic information about the patient's medical status and diagnoses, as supplied by the insurer (a parallel to utilization review protections), especially as there is a pending requirement to have all prior authorizations done electronically;
2. exempt other well-proven and effective medications from prior authorization requirements after they have been reviewed and approved by an appropriate multidisciplinary formulary oversight group; and,
3. require connectivity and information exchange between insurers and PBMs so that medication coverage decisions are not made without knowledge and understanding of the patient's condition.

Res. 209 Indoor Tanning

Adopted as amended

RESOLVED, that the MMA actively support legislation developed by the Minnesota Dermatological Society with support from the American Academy of Dermatology, the American Society of Dermatological Surgeons, the Minnesota Academy of Family Physicians, and the American Cancer Society that would prohibit those younger than 18 years of age from using tanning beds, and be it further

RESOLVED, that the MMA encourage the Minnesota Department of Health and the Minnesota Legislature to establish stronger requirements for the education, training, testing, and recertification of tanning facility employees and for the posting of warning requirements for customers on the risks of usage.

Res. 210 Community Measurement Waiver for Quality Research

Adopted as amended

RESOLVED, that the MMA work with MN Community Measurement through its role on the MN Community Measurement Board of Directors and its work groups and committees to develop policies that allow for waivers from public reporting of quality data for Minnesota researchers and physicians who are participating in clinical research studies. These policies should consider criteria including but not limited to the funding source, topic of research, study registration status, and the degree to which there is conflict with current measure specifications.

Res. 300 Health Insurance Exchange Study

Adopted as amended

RESOLVED, that the MMA work with the Minnesota Department of Commerce to ensure physicians are involved in the development of Minnesota's health insurance exchange, and be it further RESOLVED, that the MMA study the ramifications of all the options relevant to physician practices and patient care that might be brought forward as part of the implementation of Minnesota's health insurance exchange.

Substitute Res. 301 Greater PMAP Transparency to Achieve the Triple Aim

Adopted in lieu of Res. 301 and Res. 303

RESOLVED, that the MMA continue to support transparency of quality of care, cost of care, and physician payment data in the Prepaid Medical Assistance Program (PMAP) and other state-supported medical plans to ensure efficient use of

state dollars, quality care delivery, and access to care by patients.

Resolution 302, Restore Reimbursement for Consultation Codes

Referred to the MMA Board of Trustees as amended

RESOLVED, that the MMA adopt as policy that reimbursement for consultation codes should be restored by all payers.

Res. 304 Wellness Incentives

Not adopted

RESOLVED, that the MMA support legislation to provide wellness incentives for all Medical Assistance recipients.

Substitute Res. 305 Affordable Asthma Medications

Adopted in lieu of Res. 305 and Res. 306

RESOLVED, that the MMA work with public and private payers to ensure the lowest copays for at least one inhaled steroid and one short-acting beta adrenergic inhaler in their formularies, and be it further

RESOLVED, that the MMA work with public and private payers to ensure coverage for at least one nebulizer and one asthma inhaler spacer, and that any copays be at their lowest tier level.

Res. 307 Health Care Home Certification

Adopted as amended

RESOLVED, that the MMA work with the Minnesota Department of Health to evaluate the complexity and administrative burden of the health care home certification and recertification criteria, and be it further

RESOLVED, that the MMA work to extend the time period between health care home certification and recertification.

Res. 308 Support the Minnesota Health Plan

Not adopted

RESOLVED, that the MMA support the Minnesota Health Plan that provides universal, publicly funded health care for all Minnesotans.

Pumpkin Face

By Ashley Wentworth

At the Children's Hospital party,
I was the fish stationed by the fountain
One story below events on the balcony above,
Looping prizes on a line for the fishing game.

Look at the frogs in the waterfall!
I turned to see a mom and
Her wheelchair-clutched son.
He was four, maybe five.

His face, swollen to the size of a pumpkin,
At first distracted me from the
Gauze and tape below his lower jaw.
What did the bandage mask?

Was it a surgeon's territory, marked from
The taming of a rouge lymph node?
Or did this superficial side show distract
From an unruly circus within?

Look at the helicopter!
Mom pointed out the window,
As a steady hum engulfed
The quiet of our fountain vigil.

Maybe it's another kid coming
Here to get better like you?
His first smile ballooned his pumpkin face,
As he watched the life-sized toy.

Do you think we can see the party from here?
She wheeled him forward to watch the
Games above, and I wondered why
He couldn't join the children overhead.

Would you like a prize? I asked,
Extending the party he could not attend.
From among the brightly colored
Toys and candy, he chose a simple ball.

I heard my name called, so I left them
To their isolation within isolation,
Turning one last time to see
The smile still carved on his pumpkin face.

Ashley Wentworth is a second-year student
at Mayo Medical School.