THE OWNER’S MANUAL TO
THE SINGING VOICE

DOCUMENT

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the Degree Doctor of Musical Arts in the
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By

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* * * * *

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ABSTRACT

Unlike other instruments, the voice cannot simply be lifted from its hard case, examined and adjusted, fixed, cleaned, and tuned-up. Nor can the vocal folds ever be put away for safekeeping. It is but one component of a constantly functioning system, affected around-the-clock by its internal as well as external environment, making the guarantee of optimal performance impossible. The vocal fold mechanism is not primarily a musical instrument. Its many roles prevent it from ever being at rest. From assisting in swallowing, protecting the airway, helping lift heavy objects, to phonatory functions including sophisticated musical capabilities, its instrumental potential falls subject to misuse, wear and tear. As opposed to other musicians, singers cannot take their instrument out for repair and, as a result, are forced to rely on health care professionals and voice teachers for treatment and maintenance, putting themselves and their livelihood at the physician’s mercy. It is crucial, therefore, that singers be able to communicate effectively in intelligent terms with medical professionals. Singers must equip themselves with enough knowledge to clearly convey specific feelings and difficulties with their instrument. Understanding of potential dangers and disorders, familiarity with a variety of medical procedures, and comprehension in various facets of diagnosis and treatments empowers singers to own, first and foremost just like other musicians, their instrument. The Owner’s Manual for the Singing Voice is a compilation of knowledge acquired over three years of clinical and surgical observations at The Ohio State University, ExcelENT, and The Ohio Surgery Center. The Manual attempts to provide the tools mandatory for every singer’s toolbox in a very user-friendly, technically correct, and accessible way.
ACKNOWLEDGMENTS

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CHAPTER 1

INTRODUCTION

As singers, we talk about our voice as an intangible phenomenon and take for granted its physiological functions. We are athletes, training for marathon careers. But what happens when something goes wrong? What do we do when something feels wrong? To whom can we turn and trust? We go on vocal rest, blame it on stress, a sore throat, a cold, the weather, being out of shape, being physically tired, over-singing, etc. How could we have prevented “it” and insure “it” won’t happen again?

We trust our voice teachers’ empathetic ears and long history of experience. We go to the doctor or drug store for medications. But WHAT is going on with our instrument? How can we be sure that the measures we decide to take are the best ones?

As singers, we are in tune with our voices and use them in an athletically vigorous and intricately detailed way. With discipline and good technique, our larynxes appear refreshingly healthy and even muscicularly toned. Because of this, a singer with a complaint may be dismissed as healthy by physicians who rarely care for the singer and are accustomed to seeing severe vocal disorders and maladies. By the singer’s standards, however, the voice is low functioning. The singer’s livelihood relies on being able to communicate specifically with the physician about the condition of the instrument. This manual attempts to give singers insight on their instrument and possible conditions in a very approachable, applicable way. This was written with the singer-audience in mind, but any professional voice user - be it actor, politician, teacher, minister, lawyer, or salesperson - may find it helpful as well.
CHAPTER 2

THE SINGER AS AN ATHLETE

2.1 The many functions of the larynx

The larynx is your instrument, but it’s important to understand it plays three roles in your body, and the principle role is NOT producing sound! Your instrument exists primarily to prevent anything from entering the lungs except air. A special type of mucous membrane called stratified squamous epithelium lines the larynx and has ultra sensitive sensors that cause your larynx to spasm (laryngospasm) and the epiglottis to snap shut over the windpipe (trachea) if any substance other than air touches them. The spasm causes laryngeal muscles to contract, and the vocal folds to pull together to form a protective shield over the trachea.

The larynx’s second most important role is that it allows you to hold your breath. Your vocal folds contract over the trachea and prevent air from escaping. The trapped air provides a pressurized resistance for you to lean on during heavy lifting, pushing (defecation, childbirth, etc.). This role is properly referred to as thoracic fixation, meaning that the thoracic cavity, commonly known as the chest, is stabilized.

Lastly, the larynx produces sound. In order to produce sound, the laryngeal musculature contracts to adduct the vocal folds. While they are adducted, air travels up from the lungs through the trachea. Air pressure builds in the trachea, under the adducted folds, and blows the folds apart. The folds then draw back together (elastic rebound). Because moving air has less density than stagnant air (known as the Bernoulli Effect), the folds are sucked together until the air pressure builds again and the process repeats itself, producing vibrations that create sound.

2.2 Buff with lungs of steel

Singing is a coordination of muscles and breath. Disciplined healthy singing develops the abdominal muscles through supported low diaphragmatic breathing, expands the lung capacity through large intakes of air, and enhances blood circulation through vascular stimulation. I’ve observed too that while laryngeal musculature is not of a bulking nature, the visual appearance of a classically trained singer’s laryngeal anatomy is better defined and more vascularly toned on camera when compared with that of non-singers. In order to more fully appreciate the sophistication of this coordination, consider that of our total lung volume (TLV), 10% is reserved for air that doesn’t leaves our lungs until we die (residual air), 15% of our TLV is used in regular conversation, 60-80% is used to create very loud animated speech, and a whopping
90%+ is used for singing arias.\(^1\) Another way of looking at it is that our TLV is about four liters of air. Only .5 liters of air is circulated in one passive breath, while almost all 4 liters may be circulated in order to sing a long phrase in an aria!\(^2\) In order for this coordination to function optimally and gain endurance, a singer must pursue adequate rest, nutrition, hydration, muscular conditioning, and appropriate exercise.

### 2.3 Rest

Sufficient rest for will differ with each singer. There is no fixed amount that meets everyone’s needs. Some need six hours; others need ten to feel refreshed.\(^3\)

### 2.4 Nutrition

Like athletes, singers need a wide variety of foods that are low in fat and high in carbohydrates and fiber. A healthy diet’s total calorie intake consists of 55% fruits, vegetables, grains, and beans, 12% protein, and 30% fat. For optimum performance, never skip breakfast. After sleeping for 8 hours, you are essentially breaking a fast with breakfast and should eat within three hours of waking. Research has shown that breakfast-skippers will experience less ability to concentrate, will train less effectively, and will perform sub-optimally. Singers may experience less fatigue eating six small meals / day rather than two or three large ones.\(^4\) It is necessary to maintain the proper balance between energy intake and energy burning. Singers would do well around performance time to follow an athlete’s recommended regimen. Athletes are advised to eat carbohydrate-rich meals the day before a performance so that their bodies can store energy in their muscles (Warning: Fats do not fuel muscles), and a light meal or small snack one to three hours before the performance to enhance their stamina and endurance. Evening performances mandate a hearty breakfast, a lighter lunch, and a small snack as tolerated. Although many singers believe they should sing on an empty stomach, a one to three hours pre-performance snack enhances stamina and endurance. Choose your pre-performance snack wisely, however!\(^5\) (See 2.5 Foods to avoid and why)

### 2.5 Foods to avoid and why

- Caffeine is a diuretic, meaning it causes the body to lose water. Serious singers are rarely seen without their water bottle and are notorious for their bathroom frequenting. Not only do they need

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\(^2\) Martin L. Spencer, “Physiology of the Singing Voice,” paper presented at The Ohio State University Hospital Voice Clinic (Columbus, Ohio, February 2001), 2.


all the water the can get, but they urinate often enough without caffeine as it is! Caffeine is found in chocolate, some sodas, coffee (due to evaporation processes, the older the pot, the higher the caffeine concentration), black teas, and most green teas. Decaffeinated beverages contain caffeine as well, but are a lesser evil. Opt for caffeine-free and herbal alternatives whenever possible.

- Alcohol, including beer and wine, is also a diuretic and should be avoided for the same reason as caffeine.
- Salt intake should be limited to a maximum of 2,400 mg. per day to avoid unnecessary bloating.6
- Carbonated beverages cause burping and exacerbate GERD / LPR.

2.6 Foods to avoid two hours prior to performance and why

- Sugar offers a quick energy rush and can leave you with little energy. Avoid refined and concentrated sugar sources such as soda, candy, pastries, syrup, honey, as well as sweetened fruit juices and even dried fruit. These cause your body to secrete a hormone called insulin that when combined with activity may lead to symptoms of rebound hypoglycemia such as shakiness, fatigue, and lack of muscle coordination.7
- Orange juice, dairy products, chocolate, and peanut butter cause the body to produce thick mucus (viscous mucus). This response serves to protect mucosal linings from developing sores as acidic orange juice passes from the mouth down the esophagus, as well as helps dairy, chocolate, and peanut butter get properly broken down for digestion. The viscous mucous response, however, also may interfere with singing and provoke throat clearing which in turn may cause folds to swell.

The diaphragmatic action involved in classical singing can jostle and put pressure on a full stomach, irritating the digestion process and causing acid to regurgitate and burping to result. Singers who burp often should avoid foods that:

- Are very acidic and irritate the stomach: fried foods, fatty meats, pizza, salsa and other tomato-based products, onions, garlic, cabbage, pepper, pickles, chilies, mustard, high-osmolality juices (orange, pineapple, apple, grape, wine), carbonated beverages, spicy foods
- Cause the stomach to overproduce acid in digestion: high fat dairy products (ice cream), sherbet, nuts, high-fat / fried foods, gelatin, malted milk, calcium supplements, alcohol, carbonated

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beverages, caffeine (including chocolate, which contains caffeine-related stimulants called methylxanthines)

- Relax the stomach valve (lower esophageal sphincter / LES), allowing acid to splash up the esophagus such as mint (including peppermint and spearmint), chocolate, nuts, fried foods, fatty foods (including fatty meats), and alcohol (See 4.7 Reflux)

(Note: Mint contains a chemical property that relaxes the stomach sphincter and makes you feel less full. Restaurants owners use this trick by providing mints at the door so that you will take one on your way out and leave without feeling over stuffed.)
(Note: The Nicotine in cigarette smoke relaxes the stomach sphincter and increases acid production as well!)
(Note: High protein foods that are lean, such as lean meat, actually help keep the LES constricted!)

Singers with a tendency to burp frequently benefit by eating slower, ingesting smaller meals, and allowing at least one and one half hours for digesting small meals before singing.

2.7 Body movement
Singing places demands on the body like a sport. It’s a workout for the laryngeal and thoracic musculature, as well as the lungs, and the nervous system. The stressful aspect of performances can cause ulcers as well as decrease the ability of the immune system to fight off infections. Singers who add warm-ups, stretches, and cool-downs to body movement, and maintain consistent and appropriate body movement over time, such as walking a minimum of 20 to 30 minutes at a comfortable pace every day, may find they have more energy and cognitive sharpness. Proper physical movement and conditioning can help to reduce stress. Eurhythms, Alexander Technique, Feldenkreis, and Yoga are some recommended types of singer-appropriate body movement whereas, power lifting is not due to the strain it places on the laryngeal musculature and often the vocal mechanism itself.

2.8 Vocal maintenance
Water is every singer’s best friend. We drink it to ward sickness, promote thinner mucus and moisten dry throats. We guzzle away, but how much water is enough? And does that amount include soup, juice, and other liquids? According to physiologist Dr. Heinz Valtin, the average person drinks 6 glasses of water/day and that while 8 is ideal, any more is superfluous and can actually increase exposure to pollutants. If you don’t like water, concentrate on consuming the equivalent with other non-diuretic liquids and high water content foods such as salad veggies, fruits, and soups.

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9 Heinz Valtin, ‘’Drink at least eight glasses of water a day.’ Really? Is there scientific evidence for ‘8x8’?,” *AJP-Regulatory, Integrative, and Comparative Physiology*, 283, no. 5 (Nov. 2002), 993-1004.
Dehydrated vocal folds become viscous and thus more fricative with vibration. The vocal folds swell in attempt to cool the tissues with fluid. Singing with swollen vocal folds is never a good idea; all types of sores can result. (See Chapter 9) Singing requires well-hydrated vocal folds. Hydration allows the folds to vibrate with less subglottal pressure and thus minimal effort and decreases the risk of most vocal disorders. It takes hours for water to reach the submucosal glands above the vocal folds and be secreted onto the mucosal surface of the vocal folds. This superficial lubrication, however, is only part of what makes your instrument function smoothly. In order to perform optimally, the superficial layer of the lamina propria (a.k.a Reinke’s Space) must be hydrated. This layer is filled with protein-bound water and cushions the folds during phonation. Its contents are not replenished by the glands that superficially hydrate the folds, but take three to four weeks of consistent “peeing-pale” to replace.10 Drinking a lot of water the day of a performance doesn’t do much except superficially hydrates the mouth and pharynx. Vocal fold hydration is a lifestyle rather than a day-of precaution. Singers would do well to drink two to three large glasses of water (or other appropriate and tolerated beverage) two hours prior to performing. This allows 90 minutes for the kidneys to process the liquid and 30 minutes to empty the bladder before going onstage. Singers that sweat a lot during a performance ought to down one to two more cups of water ten minutes before going onstage. Do not wait until you are thirsty to hydrate. By the time you sense thirst, you have lost 1% of your body weight to dehydration. A 2% loss weakens your performance capabilities by 10-15%!11 The key to knowing when you’re hydrated is in the color and transparency of your urine. A hydrated body produces transparent urine that is very light yellow.

(Note: Consistently “Pee Pale!” is the general rule.)
(Note: 70% of your body’s volume and 50% of its weight when adequately hydrated.

Sweaty summers and dry winters deplete your body of water and can eventually take a toll on your vocal folds. Maintaining at least a 40% humidity level in the air where you live, especially during winter months is helpful.13 Use a cool mist humidifier, rather than a warm one to avoid mold from growing in the humidifier. Humidity level indicators are available at most department stores.

(Note: Due to its sodium content, Gatorade may help keep up your hydration during the summer. Rather than quenching thirst, it stimulates thirst, enhancing your desire to replenish fluids.)

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10 L. Arick Forrest, M.D., personal consultation.
2.9 Vocalizing
A ballerina would not simply drop into the splits without a purposeful warm-up. The vocal folds contain muscles. Like any muscles, they benefit from being warmed up and stretched before intense use.\(^{15}\) Vocalize with light and easy exercises before moving gradually into vocalises that involve agility and range extremities. Doing so will help you avoid unnecessary muscle inflammation, as well as possible nodules or a hemorrhage.

Rather than throwing his fastest balls before a game, a pitcher prepares to throw his best and fastest balls by focusing, limbering up his arm, and throwing nice easy pitches. In turn, a wise singer conditions for a performance months ahead of time and, the night of a performance, avoids extreme vocalization that would tax the muscles and deplete the mucosal layer.

A runner who sprints 10K and then sits is going to get stiff muscles. A singer who uses gentle phonation to cool down after an intense vocal warm-up or performance, does his laryngeal musculature a great service by preventing the laryngeal muscles from post-exertion tightening.\(^{16}\)

Singers gain endurance by sticking to repertoire and roles appropriate for their voice Fach. Appropriate “menus” of repertoire are determined by the fullness of accompaniment, instrumentation, tradition, and performance venue. Until a singer comes to know his voice and its limitations and capabilities, he’d be wise to rely on an experienced voice pedagogue for guidance.

2.10 Mouth breathing vs. nose breathing
Our noses are lined with mucus and little hairs (cilia) to help filter dust particles when we inhale. Breathing through the nose may benefit a singer on a dry stage or in the cold. Since air takes a less direct route to the trachea though the nose than through the mouth, nose breathing aids in warming, moistening, and cleansing air before it reaches the vocal folds.

2.11 Vocal hazards
The various “hazards” listed below are included for their potential to harm the voice. Likewise, while all the “damages” mentioned are potential damages. They are not always a direct result of the hazard. The information discussed below is based on my clinical observations and conversations with speech-language pathologist and Jo Estel instructor, Kerrie Obert and otolaryngologist, L. Arick Forrest.

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\(^{15}\) University of California at Berkeley, ed. The New Wellness Encyclopedia. (Boston: Houghton Mifflin, 1995), 238-9
\(^{16}\) Keith G. Saxon and Carole M. Schneider. Vocal Exercise Physiology (San Diego: Singular 1995), 70.
Inhaling irritants

Whether exhaust from automobiles, or smoke from cigarettes, inhaled irritants pass through the vocal folds and down the trachea to the lungs. Singers must especially beware of theatrical special effects such as artificial fogs and smokes, and pyrotechnics.

- Short term damage: inflamed and dehydrated mucosa and respiratory tract linings, lessens vocal stamina, scratchy voice quality, hindered respiration, loss of upper range and expansion of lower range, allergies, vocal folds and surrounding tissues redden (erythema) and swell (edema).
- Long term damage: nodules, precancerous swelling, leukoplakia, vascular alterations, laryngeal cancer, lung cancer, emphysema, blood vessel disease, permanent loss of range, stiffening of vocal folds, etc.

Singing without warming up

(See 2.9 Vocalizing)

Yelling, talking over noise, animated phonation

Being a teacher, a parent playing with kids, known as the loudest at a party, or the owner of a dog, places you at a higher risk of phonotrauma injury. Yelling, using animated phonation (i.e. vocalizing a sneeze, glottal fry, speaking on inhalation, etc.), and talking over noise are common culprits.

(Note: Rather than yelling, use hand claps, buy an amplification system for your classroom, draw people’s attention by speaking quietly, and use Confidential Speech)

- Short term damage: Erythema, edema, vocal fatigue, voice onset delays
- Long term damage: loss of upper range and expansion of lower range, nodules, hemorrhage, contact ulcers, unilateral polyp, diplophonia, aphonia, dysphonia, bowing

Speaking too low

Many people pitch their voices lower than what is natural. Diskjockeys and professional speakers are often advised to speak in a deeper voice to sound calm and make themselves easier to listen to. Women, especially, may find themselves dropping their voices to be taken more seriously. With time, this habit wears on the vocal folds.

(Note: An SLP can help you find your optimal speaking range. The idea that the appropriate pitch for your voice lies a fourth above your lowest note is outdated.17)

- Short term damage: unnecessary vocal fatigue
- Long term damage: nodules, granuloma
Speaking too high (falsetto)

- Short term: none
- Long term damage: enlarged mutational chink, nodules, bowing

Throat clearing

Throat clearing aggressively adducts the vocal folds in an effort to get rid of a tickle or mucus. The effort is futile, because with every grinding adduction the folds swell and more mucus is produced to protect from further harsh impact. The production of added mucus further instigates throat clearing and the problem is aggravated.

(Note: Drink water instead of clearing your throat. If you must clear, clear gently with non-vocalized, soft puffs of air.)

- Short term damage: wear and tear of mucosa, erythema, edema
- Long term damage: hoarseness due to nodules, granuloma, hemorrhage, bowing

Coughing

Just like throat clearing, coughing violently adducts the vocal folds, banging them together and instigating a vicious and ineffective cycle.

- Short term damage: erythema, edema, hemorrhage, polyp
- Long term damage: polyp, contact ulcers, granuloma, bowing, hemorrhage, nodules

Exposure to loud noise

There is no treatment that fully corrects damage done to hearing. Singers should be aware of noise hazards and avoid them or use hearing protection in noisy surroundings. Be careful of exposure to loud music through headphones, chainsaws, snowmobiles, motorcycles and power tools as well as certain symphonic instruments, and popular orchestras whose frequency levels exceed 85 dB.

(Note: Engage in as many relatively quiet periods as possible during a performance and long periods of silence between performances.)

- Short term damage: Ringing in the ear (Tinnitus), short-term hearing loss
- Long term damage: Permanent hearing loss

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**Flying in planes, long car trips**

The air on a plane is recycled and dry, easily spreading germs and dehydrating vocal folds. Cars blowing heat or air conditioning pose similar threats. Constant white noise produced by both planes and vehicles aggravates the ears and encourages vocal fatigue when trying to project.

- Short term damage: dehydration, inflamed vocal folds, hearing loss
- Long term damage: may contract contagious illnesses, hearing loss

**High dosages of Vitamin C (ascorbic acid)**

In efforts to avoid getting sick, some singers may ingest large amounts of Vitamin C to flush their system. Vitamin C is a diuretic, and although small doses may prove beneficial to well being, large amounts can be very drying. Everything in moderation!

- Short term damage: dehydration
- Long term damage: those with kidney problems may develop acidic urine.

**Whispering**

Whispering is achieved by narrowing the glottis (contracting the thyroarytenoid muscles), and not approximating the folds enough to vibrate. Contrary to popular belief among singers, gentle whispering is not likely to harm the voice, nor is the flow of air likely to cause superficial drying since the air passing through the glottis is hydrated from the lungs. Forced, loud whispering, however, causes laryngeal muscles to over contract and passes a high flow of air through tensed vocal folds.¹⁹

- Short term damage: superficial dryness, vocal fatigue, laryngeal muscular strain, edema
- Long term damage: muscle tension dysphonia, loss of range

**Phone talk**

Because of the phone’s close vicinity to our mouth, we generally tend to drop our pitch and speak without supporting our sound. Such lazy speech prevents the vocal folds from vibrating efficiently and causes the voice to tire more easily. Tilting the head to support a phone on your shoulder compromises the linear air column and impedes air flow.

- Short term damage: vocal fatigue, erythema, edema
- Long term damage: nodules

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Glottal Fry

While talking, many of us drop our voices at the ends of sentences into something called glottal fry. As a result we find talking makes us tire easily. Glottal fry is unsupported speech that drops in pitch and sounds gravelly or crackly. It’s a common voice to play with as children when pretending to be a lion or scary monster. In order to achieve this, the folds must adduct more completely than in a whisper, as though to talk, but instead vibrate on just a little bit of air.

- Short term damage: vocal fatigue, laryngeal tension, erythema, edema
- Long term damage: nodules

Glottal Attacks

While talking, we may use hard onsets to begin words starting with a vowel (i.e. “Ohio”, “Uh oh”). These hard onsets require the folds to completely adduct and be forced open with a burst of air. Depending on how tightly tensed the adduction, and how habitually practiced, such force may wear on the vocal fold tissues.

- Short term damage: vocal fatigue, laryngeal tension, erythema, edema
- Long term damage: nodules, hemorrhage

Voice rest

Complete voice rest (no phonation whatsoever) lasting longer than two weeks can do more harm than good for the voice. Post phonosurgery, complete voice rest lasting longer than one week is counterproductive in most patients.  

- Short term damage: None
- Long term damage: Muscle weakening (atrophy)

Warm mist humidifying

A warm mist humidifier must be cleaned and sanitized regularly since bacteria and molds are more likely to form from warm rather than in a cool mist production. (Living space should maintain a forty percent humidity level.)

- Short term damage: none
- Long term damage: allergies, oral fungi, weakened respiratory function

Gargling

- Short term damage: None.

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Long term damage: Gargling with mouthwash / salt water is irritating and drying if used more than two times per day. Follow each gargling session with a cup of water to reduce superficial dryness.21

Singing with a sore throat
The larynx has very few pain receptors. When you have a sore throat, you are feeling the inflammation of the pharyngeal walls. Chances are if the pharynx is red and irritated the vocal folds are too. When the vocal folds are inflamed, they are less elastic and usually have enlarged blood vessels. Both aspects make them more prone to hemorrhage.
- Short term damage: additional erythema, edema, laryngeal muscular strain
- Long term damage: acute nodules, hemorrhage, polyp, cyst

Lifting weights
Optimum singing conditions require that the body be in a relaxed and flexible state. Heavy weight / power lifting requires intense thoracic pressure. Such pressurized fixation tends to force upper thoracic and neck musculature to contract and tense to the point that laryngeal vertical movement is impeded, supraglottic musculature contracts and subglottic pressure is released in strained vocalization.
- Short term damage: laryngeal muscular strain, erythema, edema, hemorrhage
- Long term damage: impeded laryngeal vertical movement, less flexibility

Excessive crying
Crying with high emotion may engage thoracic fixation to such a degree that supraglottic musculature constricts and bears down on the larynx.
- Short term damage: laryngeal muscular strain, dryness, erythema, edema
- Long term damage: dysphonia, nodules

Singing on swollen vocal folds
Swelling is often induced by allergies, a cold, dehydration, drinking alcohol, PMS, etc.
(Note: The body, including the vocal folds, slightly swells while sleeping. This may make warming up a little difficult for higher voices first thing in the morning!)
- Short term damage: erythema, edema, laryngeal muscular strain
- Long term damage: acute nodules, hemorrhage, polyp

21 This information was attained through observation of Michael D. Trudeau, Ph.D. in at The Ohio State University Hospital Voice Clinic during a laryngeal exam. Scientific studies supporting mentioned theories were not found.
Vocalize a sneeze
Similar to coughing, some ways of sneezing tend to bang the folds together. Try to release sneeze without tensing the throat or vocalization. Never suppress a sneeze, as the pressure may strain the laryngeal mechanism.22
- Short term damage: edema, erythema, mild dysphonia, hemorrhage, polyp
- Long term damage: hemorrhage, polyp, cyst, dysphonia

Regurgitation
Like reflux, regurgitation (i.e. throwing up) involves stomach acid burning the esophagus and larynx. Bulimia often leads to chronic laryngitis.
- Short term damage: edema, erythema, mild dysphonia
- Long term damage: chronic cough, deepening pitch, dysphonia, laryngeal lesion(s), laryngeal scar tissue, esophageal cancer, laryngeal cancer, discoloration of and loss of dental enamel23

2.12 Vocal myths
The common beliefs listed below were disputed by otolaryngologist, L. Arick Forrest in a conversation with the author. Supportive scientific studies were not found.

Drink a lot of water the day of a performance.
(See 2.8 Vocal Maintenance)

Diuretics will decrease vocal fold swelling.
Diuretics will not bring down vocal fold swelling, whether it’s inflammation or premenstrual related! Excess fluid in the vocal folds due to inflammation or hormones is bound, not free. Diuretics will, however, dehydrate a singer, making the folds less elastic and vulnerable to nodule development.

You shouldn’t drink water with ice in it.
One theory is that drinking ice water after a strenuous warm-up will bring down vocal fold swelling. Another is that icy beverages cramp up laryngeal musculature making it difficult to sing. In actuality, neither is true. Imagine your eyelid is swollen. In order to bring the swelling down at all, ice must be held on it directly for a long period of time. Once swallowed, icy water passes over the larynx and down the esophagus, never touching the vocal folds, and only touching the remote vicinity for a split second. Factor in the fact that the body almost immediately alters the temperature of anything that enters it. Suffice to say, drinking ice water does not bring down vocal fold swelling or cramp musculature.24

22 Clark A. Rosen, Thomas Murry, www.upmc.edu/upmcvoice/dos.htm
23 Cosmetic alteration only, however, cosmesis concerns performers.
Gargle with olive oil and vinegar. Honey is good for the throat.

Honey, and olive oil - vinegar mixtures are lubricants. They do not literally “coat” the throat, but rather stimulate salivary flow. Hard candy, lemons, and even an apple achieve the same end. Products such as “Singer’s Remedy” are basically prettily packaged glycerin sprays. Glycerin is a humectant, meaning a moisturizing substance. Gummy Bears contain glycerin and are a lot cheaper, however beware of their laxative effect if eaten in large quantities.
CHAPTER 3
TROUBLESHOOTING

You notice that the vocal folds are not functioning smoothly while singing.
(See 4.2 Dehydration, 4.3 PMS and 4.7 Reflux)

It feels as though there’s a lump or mucus in your throat that won’t go away. You cough but can’t seem to clear your throat.
(See 4.7 Reflux, 9.5 Cyst, and 9.6 Polyp)

It hurts to swallow
(See 4.7 Reflux, 9.9 Granuloma, and 9.10 Contact Ulcers)

You have difficulty warming up your voice, wake up coughing, wake up with difficulty swallowing or an acidic taste in your mouth, often have bad breath, frequently burp, have a dry cough, experience tightness in your throat or upper chest, have experienced a loss of upper range, vomit after eating
(See 4.7 Reflux.)

Voice tires as the day progresses, experience voice onset delays
(See 4.2 Dehydration, 4.7 Reflux, 2.11 Speaking too low, 9.4 Nodules, 9.5 Cyst, and 9.6 Polyp)

Voice itches or tickles while vocalizing, eyes burn, urine is dark yellow
(See 4.2 Dehydration.)
CHAPTER 4

INDIRECT CULPRITS

The various “culprits” listed below tend to involve physical changes that have the potential to adversely affect the vocal mechanism.

4.1 Allergies

- Effect on vocal mechanism: Physical responses to allergens vary. Generally, allergic reactions include nasal, throat, and vocal fold edema and erythema, sneezing, sore throat, and viscous mucosal secretions. The body produces the latter in efforts to protect tissues from irritating substances. A breathy voice may result from vocal fold swelling. Congested resonating cavities may dampen sound intensity. Further complications such as lesion development or laryngeal infection may ensue with attempts to employ an allergy-affected vocal mechanism in singing, since the use of the instrument in a less than optimal state often involves compensation and strain.

- Remedy: To reduce the vulnerability of the vocal mechanism, wear a pollen mask when mowing grass or house cleaning, change home air filters in heating/cooling systems monthly, and consider a humidifier in the winter. To optimize vocal conditions during allergic reactions, sleep with the head of the bed raised to prevent sinuses from draining into the pharynx, drink warm water or herbal tea with lemon (lemon acidity helps thin viscous mucus), have your ENT prescribe a mucolytic. When conditions require taking further action, singers should opt for allergy shots and topical steroid sprays rather than inhalers. Inhalers dry and irritate the vocal tract and are not an option for singers.

4.2 Dehydration

- Effect on vocal mechanism: Depletes lamina propria of cushioning, vocal fatigue, nodules

- Remedy: Water is always safe, but water doesn’t have to be the only fluid option! Juice, lemonade, soups, and even salads are high in water content and will help hydration.

4.3 PMS

- Effect on vocal mechanism: During the premenstrual period, many women suffer side effects triggered by a decline in estrogen and progesterone levels. Often tissues in the body will retain water and cause a bloated feeling. Vocal folds that swell or thicken with PMS are likely retaining fluid in their Reinke’s Space. (See 8.6 Misnomers) The blood volume to the vocal folds increases
with PMS as does the amount of water in red blood cells, thus thinning the blood and raising chances of hemorrhage, as well as weighing down the folds and impeding efficient vibration. Side effects may include hoarseness, sluggish laryngeal movement, uncertainty of pitch, vocal fatigue, submucous vocal fold hemorrhage, and loss of high notes.

- Remedy: To lessen the risk of hemorrhaging, avoid using aspirin and aspirin substitutes during periods of vocal exertion. Take acetaminophen or Celebrex for cramps instead, but beware of masking pain while singing.

(Note: Many European opera contracts offer singers respect days to refrain from singing during their premenstrual period.)

### 4.4 Obesity

- Effect on vocal mechanism: Weight gain in the upper body puts more pressure on the digestive tract (i.e. stomach and intestines. This pressure may force acid to leak up into the esophagus and even into the laryngeal area, leading to erythema, edema, and hoarseness. (See 4.7 Reflux)
- Remedy: Stay away from foods that further aggravate reflux, eat a low-fat diet, get plenty of exercise, and lose weight if overweight. (See 4.7 Reflux)

### 4.5 Pregnancy

- Effect on the vocal mechanism: A significant increase in estrogen and progesterone levels tends to increase blood volume up to 55% as well as salt and water retention. Edematous vocal folds are commonly a direct result. Pregnant women often suffer reflux as well. Not only is it triggered by the extra weight put on during pregnancy (see 4.4 Obesity), but also the pressure of the baby on surrounding soft tissue organs, the stomach for one. With growth, the baby pushes up on the diaphragm, and the fluid-filled stomach is caught in between. This intraabdominal pressure tends to aggravate reflux, leading to vocal erythema, edema, and hoarseness. The above effects may leave the vocal mechanism more vulnerable to submucosal hemorrhage during vocal exertion brought on by labor and delivery. Respiration may also be impeded with fetal growth, since the diaphragm has less room to lower during inhalation.
- Remedy: Little can be done for the shortness of breath that often accompanies fetal growth. Recognize your voice’s limitations under such conditions and avoid voice injury by not compromising your technique to attain a desired sound that might be impossible due to symptoms out of your control. (See 4.7 Reflux) Conservative practice is advised.

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(Note: Formal research hasn’t been done, but due to their frequent use of low abdominal breathing, classically-trained singers may push more efficiently and have shorter labors.)

4.6 Menopause

- Effect on the vocal mechanism: With menopausal hormonal changes, tissues lose elastic and collagenous fibers, muscles begin to atrophy, laryngeal cartilages stiffen with ossification, lung power decreases, and vocal folds thicken. As estrogen levels drop, the voice often deepens, loses flexibility, range, and the ability to smoothly change between chest and head registers. The lungs begin to lose power and may fail to adequately support sustained pitches.
- Remedy: Estrogen supplementation may relieve symptoms.26

4.7 Reflux and / or Heartburn/ GERD / Laryngopharyngeal reflux (LPR).

- Effect on the vocal mechanism: Stomach acid burns tissue in and around larynx causing erythema and edema. If left untreated, chronic reflux of gastric acid may erode the lining of the gastrointestinal tract and cause bleeding and / or tissue changes such as: peptic ulcers (gastric and duodenal ulcers), pachyderma, scarring, PVFD, Reflux Laryngitis, tracheitis / tracheobronchitis, esophageal narrowing (stenosis), anemia, and cancer.
- Remedy: Avoid eating large meals and lying down after eating. This tips stomach contents, encouraging spillage. Wait three hours after eating to get into a reclining position so that gravity will help keep stomach contents down and out of esophagus during digestion. Elevate the head of the bed by putting bricks under the bedposts or create a wedge under the mattress (piling pillows under the head is not sufficient – they move around too much during the night). Decrease intraabdominal pressure by losing weight if overweight, eating smaller meals so as not to overstuff stomach, avoiding strain/constipation and refraining from bending at the waist after eating. Avoid having too much acid in your diet by limiting the following: pizza, salsa and other tomato products, alcohol, and orange juice. Avoid triggering acid production by managing stress, and avoiding the following: ibuprofen, mints, cheese, milk, and nuts. Take OTC antacids, or Rx medications Zantac vs. Prevacid vs. Prilosec vs. Nexium vs. Protonix. Be careful, however, antacids can lead to mineral imbalance if taken for long periods of time.

(Note: Prilosec and Prevacid do not interfere with digestion. The stomach has more than enough acid to digest food – you can even totally remove the stomach and still digest lower in the intestinal tract!)  

(Note: Heartburn, the burning sensation at the lower end of the sternum, is one symptom of reflux. Of the patients seen at The Ohio State University Hospital Voice Clinic, however, 60% of those whose larynxes show evidence of reflux related change claim to not even have heartburn!27)

4.8 **Obstructive sleep apnea**

- Effect on the vocal mechanism: Obstructive sleep apnea occurs when the airway collapses in or gets interrupted. Most sufferers have a small resonating cavity to start with and thus are at higher risk for airway interruption. Consistent airflow pressure is needed to keep the airway open while sleeping. Inhalation attempts during interrupted airflow actually result in creating a siphon for reflux. Sleep apnea exacerbates reflux in most sufferers, laryngeal tension and sleep deficiency, leading to chronic tiredness and a low threshold for vocal fatigue.

- Remedy: Wear a Continuous Positive Airway Pressure (CPAP) face mask created specially to incite continuous positive air flow, lose weight if overweight, sleep on your side instead of your back, and avoid drinking alcohol and taking sleep medications, both of which decrease hydration and relax laryngeal musculature making it harder for you to breathe while sleeping.

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27 Based on OSU Hospital Voice Clinic records (November 2002).
CHAPTER 5

WHAT PURPOSE DOES THE ENT CLINIC SERVE, AND HOW WILL IT SERVE YOU?

5.1 The ENT clinic
The ENT clinic specializes in the ears (otology), nose (rhinology), and throat (laryngology). The clinic may be a private practice, but will more likely connect with a hospital. Although patients seen at the clinic usually deal with hearing, sinus and laryngeal disorders, some are even referred when an unrelated surgery involves the neck area. The employed voice specialists, state of the art equipment and instrumentation, make the ENT clinic the preferred setting for singers seeking care.

5.2 The voice specialists
Ideally, an ENT clinic will have a clinical voice pedagogue on staff (i.e. someone who is involved in the vocal arts as well as owns a working understanding of the medical and scientific aspects of the voice). However, this is a brand new ideal, and while a growing number of clinics recognize the need for such an interdisciplinary professional, few have strived to attain one, let alone found qualified applicants. Generally speaking, the core voice specialists at the ENT clinic are the otolaryngologist and the speech-language pathologist. Depending on the size of the clinic, there may be one of each or multiples. The otolaryngologist is commonly referred to as an ENT and has the initials M.D. or D.O. after his name, certifying that he is a physician with a medical degree. His medical specialization is in otorhinolaryngology (otolaryngology, for short) and certifies him to diagnose problems and issue medical and surgical treatment of the ears, nose, throat, as well as other structures belonging to the head and neck. He has completed four years of medical school, a five-year residency program, and may be board-certified in a certain area, such as plastic reconstructive surgery or may have done a fellowship (one extra year) making him more specialized. When singers are concerned, it is preferred that the otolaryngologist has a fellowship in laryngology.

The speech-language pathologist has the initials CCC-SLP (Certificate of Clinical Competence – Speech Language Pathologist) following his name. SLP’s deal broadly with disorders of communication and swallowing. Rarely do they work with singers. Those that do, however, work closely with the otolaryngologist to ensure the best course of action for the patient. Their role in the clinic is limited. They do not diagnose, but rather run preliminary tests to present to the otolaryngologist. They perform therapy and can be looked at as athletic trainers. When you pull a muscle, you go to a trainer to get you back in shape. They set timetables for recovery and assess progress through video laryngeal stroboscopy (VLS), acoustic measures, and perceptual measures. They must have at least a Master’s degree in Speech-
Language Pathology, but since not all SLP programs require hands-on experience and clinic hours in voice. All SLP’s are tested for state licensure and the CCC administered by the American Speech and Hearing Association (ASHA). Singers should make sure that their referred SLP has expertise with VLS equipment as well as experience with the singing voice and its potential disorders.

5.3 Working as a team to diagnose
A singer must recognize that no one physician has all the answers (even though many may think they do) and that understanding and utilizing the voice well is obtained through respecting the combined knowledge and efforts of not only the primary care physician, otolaryngologist, and speech language pathologist, but also the vocal instructor.

The vocal instructor is primarily a voice teacher with pedagogical knowledge of essential voice anatomy and physiology. He works aesthetically with healthy voices and trains many with potential to perform at Olympic levels. Once a vocal instructor’s student has been diagnosed with a problem, he is expected to encourage the student through the potentially slow rehabilitation process and is welcome to attend therapy sessions and view recorded examinations of the student’s condition. Once the team approves of the student’s condition to sing, the vocal instructor is responsible for gradually guiding the student back into healthy singing and eventually resume performing.

This interdisciplinary approach is most effective when everyone’s goal is to return the vocal mechanism to its optimal structure and function, and maintain it there. However, regardless of the medical concern, the ultimate responsibility for the well being of the voice rests with the singer. The singer must be self-aware and willing to take charge of his voice.
CHAPTER 6

A VOCALIST’S GUIDE TO FINDING THE RIGHT ENT

6.1 Why go?
Just as a singer goes to great lengths to find the right voice teacher, so ought he seek out a clinic equipped with up-to-date instrumentation and well-informed voice specialists. Building a trusting relationship with a qualified otolaryngologist is key to a singer’s good health. The specialized expertise and authority of the otolaryngologist offers protection to the singer if needed when dealing with other physicians as well as emergency situations. Visits to the ENT should not just be about problem solving, however. Like any physician, an otolaryngologist is much more effective treating a person than a patient. You need the otolaryngologist to know your lifestyle, vocal demands, and personality in order to reduce the sense of urgency and crisis when problems arise and to enable him to make decisions on how to best treat you.
Every singer needs “vocal headshots.” Schedule a baseline visit at the ENT clinic when healthy, warmed-up, and in good voice. Have photos and a video taken of your folds in their optimum condition to keep on file at the office. Require copies for your own portfolio as well. These pictures can be used for comparison if and when you have problems and are especially helpful for vocal emergencies during travel. You may even purchase a copy of your exam video if you provide the tape and the equipment is available.

6.2 Whom to ask?
Finding a competent otolaryngologist should be one of the first orders of business for a singer. Consult any of the well-informed resources listed below for recommendations.

Opera directors / singers / voice teachers / coaches found in:
1. Local opera companies
2. Universities
3. Conservatories

Speech Language Pathologists found in:
1. Speech-pathology departments at large hospitals
2. Speech and Hearing departments at major universities
Singers may also keep well informed by keeping association or membership with the following organizations:

1. American Speech Language Hearing Association (ASHA)  
   [www.asha.org](http://www.asha.org)
2. National Association of Teachers of Singing (NATS)  
   [www.nats.org](http://www.nats.org)
3. American Choral Directors Association (ACDA)  
   [www.acdaonline.org/](http://www.acdaonline.org/)
4. Music Teachers National Association (MTNA)  
   [www.mtna.org/](http://www.mtna.org/)
5. American Academy of Singer  
   [www.voiceteachersacademy.org/](http://www.voiceteachersacademy.org/)
6. Acoustical Society of America  
   [asa.aip.org/index.html](http://asa.aip.org/index.html)
7. Voice Foundation  
   [www.voicefoundation.org/](http://www.voicefoundation.org/)

### 6.3 What to ask?

Since not all otolaryngologists and ENT clinics are equipped or have the expertise to work with singers and specific problems common to singers, it is important that the singer ask pertinent questions to ensure quality care. An interview should be conducted with the prospective physician. Remember, this is *your* instrument and not all ENT’s are created equal! Request a consultation session. Gather the following information to determine whether or not an otolaryngologist is well suited to your needs.

1. Are you certified by the American Board of Otolaryngology?
2. Do you sub-specialize in Voice Disorders and Phonosurgery?
3. Do you have certification (i.e. a specialized intern process or fellowship) in dealing with the singing voice or have you just dealt with singers based on private experience?
4. How many voice cases do you see regularly?
5. How extensive is your history treating laryngeal problems in performing artists?
6. Would you call your approach in treatment and surgery conservative?
7. Do you know that laser surgery on and stripping of vocal folds is forbidden?
8. Of what professional voice-related organizations are you an active member?  
   a. American Medical Association  
   b. Board on Otolaryngology on Head and Neck Surgery  
   c. American College of Surgeons  
   d. Collegium Medicorum Theatri (CoMet)  
   e. Laryngologic Society  
   f. Triologic Society  
   g. ASHA (American Speech Language Hearing Association)  
   h. The Voice Foundation  
   i. NATS  
   j. The American Speech Language Hearing Association  
   k. The International Association of Logopedics and Phoniatrics
9. Are there publications or research papers you’ve written to which I could gain access and read?

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28 Your otolaryngologist should attend meetings and / or present papers for two or three of the mentioned organizations.
10. Do you work closely with an SLP who specializes in voice?
11. Do you personally know of a good voice teacher?
CHAPTER 7

THE FIRST VISIT AND PROCEDURE

7.1 How long will it take?
In my experience, first visits generally take anywhere from two to three hours. Allow yourself plenty of
time so that you may relax and get to know the clinicians. This will help determine whether or not you feel
comfortable with their abilities and personalities. Subsequent visits may only take an hour. Depending on
what is being evaluated, the typical laryngoscopy exam itself takes only about 10 minutes.

7.2 What they need to know about you and why
Plan on filling out a case history sheet each time you visit the ENT. (See Figure 7.1) Filling out the forms
will require knowledge of medications and problems, past and present, vocally related and not. Remember,
anything relating to your health may affect your voice. The questions you answer in writing while sitting in
the lobby may be asked again by the physician or other clinician during your visit. Though seemingly
redundant, verbal explanations often reveal more than those you wrote down, while those that you wrote
are filed in your medical chart for future reference. Offer any previous pictures of your vocal folds so that
the physician may better determine your present state. Be honest and thorough when answering questions
and offering information. Not only must you trust your otolaryngologist, but also he must be able to trust
you. After you leave the office, the otolaryngologist will likely dictate a summary of your visit to be kept
with your chart. If your visit included a session with an SLP, he too will summarize his findings for your
chart. (See Figure 7.2)
Please answer the applicable questions on both sides of this sheet:

Please indicate whether you have the following symptoms with a ✓:

- Hoarseness
- Breathiness
- Vocal fatigue
- Bitter/acid taste in mouth
- Can’t sing
- Loss of pitch range
- Tickle/cough
- Hoarse in morning mostly
- Bad Breath
- No voice at all
- Heartburn
- Hard to swallow
- Regurgitation of food
- Feels like something stuck in throat

1. VOICE (if not a voice problem then please skip to question 2):

   When did the problem begin?
   ________________________________
   How did it start? GRADUAL SUDDEN
   Any pain at start? YES NO
   Any pain NOW? YES NO
   What makes it better?
   ________________________________
   What makes it worse?
   ________________________________
   Do you use your voice extensively at work? YES/NO
   What treatments or therapy have you tried?
   ________________________________
   Which voice part do you usually sing? SOPRANO MEZZO ALTO TENOR BARITONE BASS
   Have you studied singing, where, and for how long?
   ________________________________
   What types of music do you usually sing?
   ________________________________

2. BREATHING (if not a problem then please skip to question 3):

   When did the problem begin?
   ________________________________
   How did it start? GRADUAL SUDDEN
   Do you feel short of breath? YES NO
   Is it EXERTION INDUCED and/or SPONTANEOUS
   Does it occur in episodes/attacks? YES NO
   How often do they occur? ________________________________
   What makes your breathing better?
   ________________________________
   What makes it worse?
   ________________________________
   Do you wake up choking? YES NO
   Do you have a chronic cough? YES NO
   Is the cough PRODUCTIVE or NON-PRODUCTIVE?
   ________________________________
   Do you use inhalers? (Please Specify): ________________________________
   Are they effective? __________
   Do you hear wheezing when you breathe? YES NO
   If yes, is the wheezing present on inspiration, exhalation, or both?
   ________________________________
   History of abuse (verbal, physical, emotional, sexual)?
   ________________________________

3. SWALLOWING DIFFICULTY

   Do foods stick in your throat? YES NO
   Do you tend to choke when eating? YES NO

Figure 7.1: The Case History (continued)
If so, are there certain food consistencies that give you greater difficulty than others (please circle)?

WATER  THICK LIQUIDS  PUDDING  PUREE  SOLIDS  PILLS

**Diet/Lifestyle:**

Do you use tobacco products? YES NO How much per day? ___________ For how long? ___________

Former smokers, when did you quit? ___________ How much and how long did you smoke? ___________

Is your work or home place smoky? YES NO

Do you drink alcohol? YES NO If YES, what? ___________ How much per week? ___________

How many cups of coffee, tea, pop/soda, or other caffeinated beverages do you drink daily? ___________

How many glasses of water do you drink per day? ___________

Circle the following foods that you might typically eat: SPICY  FRIED  FATTY  DAIRY

PEPPERMINT/MINTONIONS/GARLIC  CITRUS FRUITS/FRUITS (oranges, tomatoes, etc.)

Do you typically eat close to bedtime? YES NO

Any recent weight gain? YES NO If YES, when and how much? ___________

How would you rate recent stress levels in your life? MILD  MODERATE  SEvere

**Medical History:**

Are you allergic to topical anesthetics? YES NO

List any allergies that you have (medications, foods, environmental): ___________

Do you usually have nasal congestion, sinus congestion or post-nasal drip? ___________

List all current and recent medications you have taken regularly (prescription and over-the-counter): ___________

**Please indicate the following medical conditions:**

_____ Diabetes  _____ Sinusitis  _____ Cancer  _____ Heartburn/Reflux

_____ Arthritis  _____ Hernia  _____ Thyroid  _____ High Blood Pressure

_____ Emphysema  _____ Asthma  _____ Hearing Loss  _____ Heart Disease

Other conditions e.g. stroke, pneumonia, migraines, Parkinson Disease, MS, ALS: ___________

**List previous surgeries:**
Figure 7.2: The VLS Examination Report (continued)
**Voice Institute**

**Videolaryngostroboscopy (VLS) Examination Report**

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**Stroboscopic Assessment**

Keith, we would like pull-down menus for this section—but we also need to be able to write in something different if needed.

<table>
<thead>
<tr>
<th>Glottic closure</th>
<th>Phase closure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complete, Posterior Chink, Anterior Chink, Irregular, Slit, Hourglass, Incomplete</td>
<td>Regular, Somewhat Open, Open, Somewhat Closed, Closed</td>
</tr>
<tr>
<td>Amplitude-left</td>
<td>Phase symmetry</td>
</tr>
<tr>
<td>Regular, Slightly Decreased, Moderately Decreased, Severely Decreased, Absent, Absent At Lesion</td>
<td>Symmetrical, Occasional Irregularity, Consistent Irregularity, Side To Side</td>
</tr>
<tr>
<td>Amplitude-right</td>
<td>Periodicity</td>
</tr>
<tr>
<td>Regular, Slightly Decreased, Moderately Decreased, Severely Decreased, Absent, Absent At Lesion</td>
<td>Regular, Occasional Irregularity, Consistent Irregularity, Aperiodic</td>
</tr>
<tr>
<td>Mucosal wave-left</td>
<td>Vertical level of VF</td>
</tr>
<tr>
<td>Regular, Slightly Decreased, Moderately Decreased, Severely Decreased, Absent, Absent At Lesion</td>
<td>Equal, Left Higher Than Right, Right Higher Than Left</td>
</tr>
<tr>
<td>Mucosal wave-right</td>
<td>Other</td>
</tr>
<tr>
<td>Regular, Slightly Decreased, Moderately Decreased, Severely Decreased, Absent, Absent At Lesion</td>
<td></td>
</tr>
</tbody>
</table>

---

**Summary of Findings**

(Keith, we need to write 1-2 paragraphs here)—also this sentence should be in most (50%) of our summaries—which might be nice if it were already written, with the option to delete or modify (this will be the last sentence in the summary): Otherwise, speech and language were perceptually evaluated and found to be appropriate for these patients and gender.

**Diagnosis** (this could be a pull down menu—Paradoxical Vocal Fold Dysfunction, Laryngopharyngeal Reflux Disease, Vocal Fold Nodules, Right Vocal Fold Cyst, Left Vocal Fold Cyst, Polypoid Corditis, Right Vocal Fold Polyp, Left Vocal Fold Polyp, Granuloma, Papilloma, Leukoplakia).

**Recommendations** (this could also be a pull down menu with option to modify) Laryngeal Control Therapy, Laryngopharyngeal Reflux Management, Voice Therapy, Follow-up with Otolaryngologist, Follow-up with referring physician.

Then, we would like this sentence right before our signatures: Thank you for the referral of this patient. Please don’t hesitate to contact the Voice Institute with any questions or concerns.

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Kerrie Obert, M.A., CCC/SLP (need a macro for all our names—Michael D. Trudeau, Ph.D., Martin Spencer, MA, CCC/SLP—Martin and I both like “clinical voice pathologist, Mike prefers Associate Professor”)

L. Arick Forest, M.D. (Dr. Forrest’s name appears on every report)
7.3 Instruments used in the office

The mirror
An otolaryngologist may initially use a tiny mirror, similar to that of a dentist, to look at your folds. This procedure is called indirect laryngoscopy or mirror imaging. He will likely prep the mirror against fogging by running it under hot water or coating it with a blue anti-fogging liquid called Butler Clear Dip. A light, usually worn on his head will be adjusted to light the back of your throat. Holding your tongue with a piece of gauze or depressing it with a tongue depressor, he will then guide the mirror in to your mouth until it is just below the uvula, reflecting the anatomy behind the tongue. Although it’s a common approach, mirror viewing is not best. Because the vocal folds are so tiny, the mirror offers very little information. It may reveal larger lesions and whether or not the folds are opening and closing properly, but beware of physicians viewing with a mirror only. The mirror cannot always be angled to capture the entire length of the vocal folds.

The scopes
Video Laryngoscopes are the most commonly used instruments when viewing the larynx. There are two types, both of which are tiny video cameras that are positioned to obtain moving and still pictures of the top of the larynx. An examination using either of the two type scopes (discussed below) is called a Video Laryngoscopy. All laryngoscopy patients remain fully conscious throughout the exam and rarely need topical anesthetic (e.g. Cetacaine) to counteract discomfort. The flexible fiberoptic nasendoscope is one type where a tiny video camera / light unit is attached to a skinny, flexible cord that passes through the nose until the tip of the scope hangs just above and behind the tongue and looks down on the laryngeal area. This procedure is called a nasendoscopy and takes about five minutes, but can go on indefinitely to employ activities such as talking and singing for observation. Before performing a nasendoscopy, the clinician coats the cord with a slick gel and swabs a defogging liquid on the scope (e.g. Butler Clear-Dip). He then inserts the cord into one nostril. The image is projected onto the
monitor next to him and reveals three optional tunnels (meati). The superior meatus is tiny and rarely used to avoid pain and viewing the larynx from an odd angle. The medial and inferior meatus are the clearest, most open passageways through which to feed the scope, and of the two, the one that appears most open on the camera at the time will be the passage the clinician chooses. It may feel a little strange to have a thin cord inserted in your nose, and the stimulation to the sinuses may trigger involuntary eye watering or a slight discomfort as it passes through a narrow spot in the tunnel. But once the camera is in place, it should feel comfortable and allow the clinician to observe you talking, singing, breathing through the nose, or any number of normal activities. Nasendoscopies are also the VLS of choice for children who don’t sit still and patients with a sensitive gag reflex.

(Hints: Before the physician inserts the nasendoscope, you may want to determine which nostril is more open by closing off one nostril at a time and sniffing. Keep your eyes open during a nasendoscopy to distract yourself from tensing up, breathe through your nose to help open the nasal passages.)

The second type is the rigid fiberoptic oral endoscope, a 20 centimeter-long wand mounting a tiny camera and light at one end and used in a roughly five-minute procedure called an oral endoscopy. After the oral endoscope is defogged, the clinician holds the patient’s tongue with a piece of gauze and guides the wand into the mouth, but not down the throat. The wand is positioned just below the uvula at the back of the tongue. Because the oral endoscope’s camera lens is angled at 70 degrees, it’s able to peer over the back of the tongue at the laryngeal structures without the wand touching the back wall of the pharynx. Many clinicians are able to balance the wand in their hand during insertion so that it touches nothing and provokes no gagging.

29 Some older endoscopes have cameras angled at 90 degrees. Such instruments can cause discomfort, since their tips must meet the back pharyngeal wall in order to capture an image of the larynx.
The images captured by both scopes are projected onto a monitor that the clinician observes throughout the procedure. The oral endoscope produces a more accurate and brilliantly colored image than the nasendoscope due to its magnification of the larynx and more efficient light gathering (i.e. brighter light); however, activities are limited due to its oral interference.

(Warning: Stay still during the insertion and removal of the oral endoscope. Sudden movement could result in a chipped tooth!)

(Hints: Sit forward in your chair and place feet flat on the floor. Having feet crossed at the ankles and placed under the chair tends to tense the larynx. Extending your neck and chin out like a turtle will allow the oral endoscope a better view of your larynx. Breathing through the mouth will keep the soft palate up and help to prevent gagging.)

The light source on both scopes is usually halogen and provides the means to observe general laryngeal movement and appearance. However, because the folds vibrate 50-1500 cycles per second (cps), the constant light of the halogen bulb doesn’t allow the naked eye to discern vocal fold vibration. There are three buttons on a floor panel operated by the clinician’s foot. When a clinician needs more detail, he may depress the strobe light button on the panel to affect an impression of slowed vibration. A procedure illumined by a strobe light (xenon lamp), rather than constant light is called stroboscopy or Video Laryngeal Stroboscopy (VLS). The strobe light is set to pattern itself “out of phase” with the fundamental frequency (F0) of your sound picked up by electroglottograph via the stethoscope / microphone held against your neck. The revealed mucosal wave pattern is not a true continuous vibratory cycle slowed
down from real time. Rather, the flashing light picks up a certain ratio of your vibratory pattern to create a picture of averaged vocal fold opening and closing that appears to reveal slow motion vibrations that can be discerned by the human eye. Another button at the clinicians foot is a slow and fast phase lock option that times the stroboscope “in phase” with your vocal folds’ motion to pick up only the closing (adduction) or the opening (abduction) part of each vibration and create a ‘frozen’ picture of the fold’s position during each. However, the vocal folds vibratory cycle must be regular (periodic) to achieve a freeze. A cycle that is irregular (aperiodic) will have motion evident in the freeze picture.

Before beginning the procedure, the clinician will type your name into the computer and attach or have you hold a microphone or stethoscope against one side of your thyroid notch. He may ask that you say your name or count to ten. This allows him to observe the vocal frequency display and ensure that it’s sensing your voice. Once the procedure is over, the clinician should invite you to observe the video with him while he explains what he’s found. If he doesn’t, feel free to ask. Laryngoscopies are often recorded on either videotape, DVD RAM, or CD ROM and saved indefinitely for future reference. Still pictures are selected from the video, printed and filed with your chart. Request copies of photos for your own documentation and even bring in a blank videotape or CD for a copy of the exam as well. 

7.4 Understanding hygiene in the clinic

Because the ENT clinicians are dealing with people’s mouths all day long, many precautions are taken to ensure each procedure is sanitary. Flexible nasendoscopes and rigid oral endoscopes are both soaked in Xidex for a minimum of 20 minutes before being used on a patient. All clinicians are required to wear latex gloves when handling equipment and the patient and must wash their hands before putting the gloves on. Once the gloves are on, extreme care is taken not to contaminate the scope. The clinician’s hand that holds the patient’s tongue in gauze during the procedure is considered contaminated and may not touch the scope or anything other than the patient’s mouth. This leaves only one hand available to handle the scope and is why a floor control pad of buttons are used so that the feet may adjust equipment. Once the procedure is complete, instruments are soaked and all waste is deposited into a receptacle operated by the foot. Gloves are removed and hands are washed again.

7.5 What they will do, where they will probe and why

Generally speaking, a laryngeal exam should include inspections of the ears, nasal passages, mouth, and throat. Depending on the patient’s complaint, the clinician may or may not choose to perform a laryngoscopy. Laryngoscopy is an expensive procedure and unless the complaint necessitates detailed laryngeal observance, a mirror or more superficial method will be used. 

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30 If the clinician or physician offers you a copy of your exam photos it suggests they’re experienced in working with singers and aware of the singer’s needs.
31 Laryngoscopy procedures generally cost around $600 to perform at The Ohio State University Hospital Voice Clinic (November 2002).
depends upon the patient’s compliance and the aspects of the larynx needing to be observed. Young children do not usually tolerate rigid oral endoscopy well since it requires that they sit still, breath only through the mouth, and have their tongue held. The flexible nasendoscope allows them to continue to talk and move around and is therefore almost always used. Some people have a sensitive gag reflex that is triggered by the oral endoscope touching the back of the mouth. Incessant gagging may interrupt visibility, prolong the procedure and make it impossible to obtain pictures, in which case the clinician will switch to a nasendoscope. Since the nasendoscope allows the clinician to observe talking, nose and mouth breathing, and does not induce gagging, why might he prefer the oral endoscope? The oral endoscope offers stronger magnification of the larynx and brighter light, allowing better detail visibility of the laryngeal structures. It takes clearer pictures and is preferred when evaluating vocal fold lesions and mutational chinks (the latter of which can only be discerned with oral endoscopy). Clinics with limited funds, however, will likely only have a nasendoscope.

Anesthesia
The clinician will most likely offer to use a topical anesthesia spray in the nose or mouth, such as Benzocain or Lidocain. These anesthetics behave much like the Novocain used by dentists, but are not administered through a needle. The oralendoscopy is a painless procedure that requires numbing only in gag-prone patients. The nasendoscopy may cause slight discomfort in some patients, but at the OSU Voice Clinic only about 65% of patients feel they need the anesthetic.32

Sounds you will make and why
When performing an oralendoscopy, the clinician will ask you to perform various tasks on vowels, much like simplified vocalises. To help him attain the most accurate evaluation of your voice, make sure you go to your exam as warmed up as your vocal condition will allow and that all sounds you make during the exam are supported.

He will likely begin by holding your tongue and asking you to sing “eeee” at a comfortable pitch. Achieving a pure [i] sound is virtually impossible with the tongue held. However, your attempt to sing a pure [i] advances the tongue forward and up and allows for more complete laryngeal exposure. It’s hard to capture an image of the anterior commissure otherwise. The vowel [i] doesn’t involve the lips, it won’t interfere with the scope’s position. While sustaining the [i] vowel, the clinician will look at periodicity of your vocal fold movement. If a lesion is present, its consistency can often be determined by whether it moves with the folds or completely obstructs vibration. Evaluating lesion consistency can determine if therapy might be helpful or if surgery is definitely needed for resolution. The clinician may also ask you to sing “hee hee hee.” These aspirate attacks allow him to observe how the folds come together as well as check for hyperfunction, vocal fold weakness, paresis, and asymmetrical movement. He may use aspirate

32 Based on OSU Hospital Voice Clinic Records (November 2002).
attacks to clear mucus from the folds if he’s trying to determine if what looks like a vocal fold lesion is actually mucus. The clinician may remove the scope and ask you to swallow or gently cough if he’s still not certain or if there is mucus that obstructs his view. He may have you glide from the bottom of your range to the top of your range. Phonation breaks in the glide can imply aperiodicity due to muscle tension, dehydration or vocal fold stiffness. The inability to glide high and low suggests a paresis, whereas being able to glide low but not high often means a lesion(s) is preventing the fold from expanding and thinning enough to vibrate in the upper register. Dynamics also play into evaluating your problem. If singing softly is impossible, bilateral nodules and / or MTD are likely at fault.

A nasendoscopy allows for any number of sounds to be made. In addition to the exercises above, common requests are for the patient to talk and sing problematic passages.
CHAPTER 8
A PARTNERSHIP IN PERFORMANCE

8.1 Diagnose with the doctor – don’t be left out!
Singers, don’t be afraid to ask the physicians and clinicians anything. Their job is to help you get better, but they also are responsible to educate and help you understand vocal health. You’ll only benefit from being able to observe with them. You must be your own best advocate!

8.2 How voice specialists see your instrument
The clinician begins by listening. He lets you talk about your problem and asks you questions or has you vocalize a little for him, but all the while he is assessing and evaluating vocal quality. He watches you breathe, notes how loudly, high, or low you speak, and observes if the voice improves during the exam. When he brings up an image of your vocal folds, he goes down another mental checklist of observations. He first checks your folds for hydration, making sure the mucus is thin and plentiful and the lamina propria is providing ample cushioning during phonation. He can tell if you’re not hydrated when the mucous is more sticky than wet and in globs or strings. (See Figure 9.12) He looks for smooth vocal fold edges and asks you to phonate to check the folds for complete closure. Are the folds uninterrupted by lesions from bottom to top? Is there a mutational chink? Is the chink a normal size or so big that air leaks through, suggesting faulty technique? Are the folds and/or their surrounding tissues swollen? He evaluates how the vocal folds come together in adduction, looking for synchrony, simultaneousness, and bottom to top closure (mucosal wave). He is able to identify pre-nodular formation if the point of maximum glottal contact meets before the rest of the fold upon adduction or if mucus collects at that point during phonation (often signifies faulty technique). He notes the structures’ colors and symmetry. Are the folds pure white and surrounded by light pink tissue? Are they the same length, width, and weight (the latter is often determined vibratory periodicity)? Or are they swollen, gray, or threaded with enlarged capillaries and bordered with abnormally red surrounding tissues? He ensures that the arytenoids move simultaneously without overlapping, and that the false folds don’t come into play during phonation. He searches for evidence of reflux by observing the condition of the interarytenoid space as well as the distance between the back of the larynx / arytenoids and the esophagus. Thick, wrinkled skin filling the interarytenoid space alarms the clinician of chronic reflux, as does distance between the back of the larynx and the esophagus signifying swollen tissue. He will check the mucus consistency in the pyriform sinuses, and assess the condition of the subglottic region by observing how the folds function from above.
Both Figure 8.1 and Figure 8.2 are pictures of a healthy larynx obtained with an oral endoscope. The coloration of Figure 8.1 differs due to the use of a stroboscopic light source. To capture these images, the endoscope was inserted into the mouth to peer over and behind the tongue, allowing a sublingual / supraglottic view down into the larynx from above. Laryngeal imaging is always magnified, since the vocal folds are really only slightly bigger than the white half-moons on your little fingernails and difficult to observe otherwise. Due to the nature of the scope and camera, all images actually appear reversed on the monitor, and thus the left vocal fold in the picture is actually the right vocal fold and vice-versa. Let’s map what we see. The right and left diagonal lines that form a white “V” in the center of the Figures are the two true vocal folds. There are only two. In Figure 8.2 they are abducted, allowing air to pass in and out of the trachea below (can you make out the rings of tracheal cartilage subglottally?). In Figure 8.1 the folds are gently adducted and phonating. The folds similarly adduct to cough and hold the breath, but the adduction would appear more compressed than it does here. Where the vocal folds come together at the point of the “V” is actually directly behind the thyroid notch. Therefore, the bottom of the photos may be referred to as the front of the neck. Sometimes, clinicians will point to the top of the picture and call it the back of the neck, simply to orient the patient. However, the top of the picture would more accurately be described as being toward the middle of the neck, since the larynx only spans a few inches at the front of the neck. The faint horizontal line posterior to the larynx at the very top of the photos is where the larynx meets the pharyngeal wall. If you separated the tissue on either side of the line, you’d see the esophageal sphincter.

In order to discuss the vocal folds, physicians may use directional terms such as lateral (along side of), posterior, etc., as well as map the folds into numbered anterior to posterior sections (one through nine), and divide them into upper and lower lips. These distinctions are made to address specific observations and more accurately identify location-specific pathologies.
The vocal folds adduct and vibrate during phonation and abduct when resting / breathing. Above the vocal folds are more folds, commonly referred to as false vocal folds but accurately referred to as ventricular or vestibular folds. The ventricular folds are, for the most part fibrous and only move passively unless subjected to extreme and continuous muscle tension. (See 9.14 Muscular Tension Dysphonia)

The Superior Laryngeal Nerve is a short direct line from the brain to the cricothyroid muscle. The SLN enervates the cricothyroid muscle, causing the vocal folds to lengthen as pitch rises and provides you with sensation above the glottis.

The right and left Recurrent Laryngeal Nerves is a long line from the brain extending into the chest and may divide into several branches in the neck before entering the larynx. The RLN enervates all intrinsic laryngeal musculature except the cricothyroid.

(Note: When the lamina propria and mucosa layers are well-hydrated, they are jelly like and able to adhere together to seal out excess air during phonation as well as stretch like elastic for high notes.)

8.4 Semantics
Much of our studio terminology is figurative, based on imagery and subjective opinion rather than scientific measurement and rational. In the studio, we have the luxury of sharing a common slang vocabulary with each other to describe what we feel and hear. Though not scientific, this vocabulary is virtually universal among classically trained circles. Clarified below are a just few words commonly misunderstood by singers.

Jitter
Occasionally a singer may use jitter to describe shakiness in their voice or uneven vibrato. Using the term jitter in this way may confuse the ENT clinician however, who recognizes jitter as a measurement device. When any given sound is broken down and displayed on a graph (spectrograph), individual vibratory periods are visible and can be compared. Jitter refers to the minor differences in period duration between one cycle and another that do not audibly interfere with / detract from the sound quality. Jitter is noticeable, but noise would be the result of more extreme differences.

Intensity vs. Loudness
The term intensity denotes a measurement of sound strength in decibels (dB), whereas loudness is the subjective human perception equivalent.

Fundamental Frequency vs. Pitch
Fundamental frequency is the measured vibrating rate of the vocal folds, whereas pitch is the general perception of a given sound.
**Vestibule vs. Ventricle**

Ventricular folds and vestibular folds are two other ways to say false folds. However, a vestibule and a ventricle are different things. A ventricle is any small recess or hollow space, whereas a vestibule is a hollow space forming the entry to a canal. You may concur that all vestibules are ventricles, but not all ventricles are vestibules. With regard to the larynx, the ventricle, also known as Morgagni’s ventricle, refers to the cavity just below and lateral to the false folds, above the true folds. This space must be unobstructed to allow the true vocal folds to vibrate freely. The vestibule is the epilaryngeal area above the false folds, within the aryepiglottic sphincter. Therefore, by referring to the false folds as ventricular or vestibular, we are depicting their location in the larynx.

**Vocal Fold vs. Vocal Ligament, Thyroarytenoids, Vocalis**

People incorrectly substitute these terms for vocal folds. When in fact...

- Each true vocal fold (synonymous with the less preferred term “vocal cord”) encompasses three layers: cover, transition, body.
- Each fold contains one vocal ligament in its transition layer. These ligaments are bands of tissue connecting the vocal processes of the arytenoids with the inside of the thyroid cartilage.
- The thyroarytenoid muscles lie in the body layer and make up the main mass of the true folds.
- The vocalis is most medial of the two sections making up each thyroarytenoid muscle. The thyromuscularis section lies laterally to it.

**Attack**

Singers often use the term attack to mean onset, as in “glottal attack.” However, the term onset is a better choice when speaking with clinicians.

**TMJ vs. TMJ Syndrome**

Laymen often use the term TMJ to refer to a chronic problem with pain or limited movement in the TMJ, however this is incorrect. TMJ refers to the temporomandibular joint only. In order to convey that you have a joint condition, it’s better to say, “I have TMJ syndrome or disorder.”

**Adam’s Apple vs. Thyroid Notch**

Many people use these terms interchangeably to refer to the prominence at the front of the neck. Adams Apple, however, refers to the lateral (left to right) angle of the thyroid cartilage. While thyroid notch denotes the protrusion’s tip.

**8.5 Synonyms**

1. Ventricular folds / vestibular folds / false folds
2. Ventricle / Morgagni’s ventricular / vestibular ventricle
3. Vocal tract / pharynx
4. Vocalist / singer / vocal performer
5. Body of the vocal folds / thyroarytenoids
6. Vocalis / pars vocalis
7. Thyromuscularis / pars muscularis
8. Larynx / voice box / vocal apparatus
9. Trachea / wind pipe
10. Breastbone / sternum
11. Esophagus / food chute
12. Hemorrhage / burst blood vessel
13. Vocal Folds / true vocal folds
14. Varix / varicose vein / blood vessel prominence
15. Velum / soft palate
16. Otolaryngologist / ear nose and throat doctor
17. Epilarynx / aryepiglottic sphincter
18. Voice clinic / ENT / speech and hearing clinic
19. Glottal attack / hard onset
20. Cycles per second / Hertz
21. PVCD / PVFD
22. Voice therapy / vocal rehabilitation
23. Aspirate attack / breathy attack / blown onset
24. Simultaneous onset / easy onset / gentle onset / soft onset
25. Recta / rectus / straight
26. Myasthenia laryngea / bowed vocal folds / Presbylarynx
27. Pitch range / frequency range
28. Dynamic range / intensity range
29. Polypoid degeneration / Reinke’s edema / polypoid corditis
30. Nasendoscopy / transnasal fiberoptic laryngoscopy
31. Videostroboscopy / video laryngeal stroboscopy / strobolaryngoscopy
32. Puberphonia / mutational falsetto / incomplete mutation / adolescent transitional dysphonia
33. Total lung volume (TLV) / total lung capacity (TLC)
34. Diplophonia / Biphonia
35. Hemorrhage / Bruising
8.6 Misnomers

Pachyderma (or Pachydermia)

This term is used by otolaryngologists to refer to laryngeal tissue that has been repeatedly burnt by refluxed stomach acid. Evidence of pachyderma is apparent due to its whitish gray color and wrinkled tethered appearance left by burn scars. Pachyderma breaks down in Greek to literally mean thick skin (pachy means thick, dermatos means skin). However, because laryngeal tissue is not skin but actually mucus membrane, the term pachyderma is incorrectly used in this sense. Most physicians do not realize this! If you want to impress, attach the Latin suffix for membrane and say pachymenia instead! (See Figures 9.1, 9.3, 9.4, 9.5, 9.6-8, 9.13, and 9.14 and Pachyderma)

(Note: A pachyderm is any thick-skinned mammal such as an elephant, hippopotamus, or rhinoceros.)

Bilateral nodules

To say bilateral nodules is redundant since technically nodules are always parallel and always in pairs. However, physicians often use the word nodule to generically refer to bump-like lesions (including polyps and cysts, etc.) until they are sure of the type of lesion it is. For instance, bilateral polyps may be referred to as bilateral nodules until it’s been ruled out that they’re not a cyst and reactive change.

Reinke’s space

Reinke’s space is the most superficial layer of the lamina propria. It’s not actually a space, but a cushion of very thin fluid that allows the cover of the fold to slip around and vibrate over the more dense deeper layers of the folds.

8.7 Terms you’d best not use

ENT

The acronym ENT refers to the ear, nose, and throat clinic and not a person. Do not call your otolaryngologist an ENT (to his face at least)!

Node / nodes

There is no such thing as a “node.” Therefore, to say “nodes” is grammatically incorrect. Nodules is the correct term and will always be plural since nodules always occur in pairs.

Vocal cords

The term “vocal cords” misrepresents our multi-layered instrument.

The two “cords” that come together and vibrate are really multi-layered inside and are thus appropriately called vocal folds.
Voice box
Better to say larynx.

[lare-ingks] NOT [lare-niks]
A very common pronunciation mistake made by not only laymen but doctors and nurses as well! Think, ‘larynx and pharynx rhyme with sphinx,’ and you won’t go wrong.
CHAPTER 9
COMMON PATHOLOGIES IN SINGERS AND POSSIBLE TREATMENTS

Voice pathologies and disorders fall under many categories; those relating to the organs of the body (organic), those relating to the moving and functioning of the body (functional), those relating to personal behaviors (behavioral) and those relating to the brain (neurological). Lesions may also be characterized as stemming from vocal hyper-/hypo-function, meaning that too much or too little muscular force and physical effort is being used when breathing or phonating. Acute lesions can erupt from a one-time occurrence of the vocal mechanism being employed in an inefficient and harsh manner such as one loud yell, or hard cough (vocal misuse). Whereas others may stem from bad vocal habits such as speaking too loudly or too much or habitual throat clearing (vocal abuse). Both vocal misuse and vocal abuse fit under the more general and less negative term phonotrauma.

9.1 Laryngeal Edema and Erythema

Figure 9.1: Laryngeal Edema and Erythema

a. What is it? (Pathology)
   - Edema\(^{33}\) is the medically correct word for swelling and denotes protein-bound water build-up formed as a protective cushion.
   - Erythema is the medically correct term for unusual redness.

\(^{33}\) Significant erythema and edema may be classified as laryngitis, depending on the etiology.
b. How can you tell if you have it? (Symptoms)

- Audibly: Hoarseness, deep throaty voice, loss of flexibility and range.
- Visually: Generally speaking, the two conditions appear together. Edematous tissue has a puffy look and erythematic tissue is abnormally red and inflamed, and / or has enlarged blood vessels.
- Production Variants: less flexibility, have difficulty getting warmed-up and staying that way.

c. How did you get it? (Causes)

- An organic inflammatory reaction triggered by infection or PMS, a functional voice disorder (vocal hyperfunction, reflux), a behavioral abuse (smoking), or any irritating lesion on the opposite fold.
- If there is an abnormal distance between the arytenoids and the esophagus, the tissue is swollen, then reflux is likely the cause.
- If the tissue surrounding the arytenoids is edematous, arthritis could be the reason.
- If the vocal folds are edematous, culprits may include reflux, talking too low, talking too loudly, coughing, sneezing, dehydration, or infection.

d. Who’s susceptible?

- Anyone
- Moms yelling at kids, dog, cheerleaders, animated concertgoers / sports fans, menstruating women, smokers, alcoholics.
- Those who sing when throat is sore! (There are few pain receptors in larynx, so if you feel pain when singing something is very wrong!)
- Untrained professional voice users (teachers, preachers, lawyers, etc.)

e. How is it fixed? (Treatment Options)

- Hydration, sleep, Ibuprofin
- If the condition is caused by abuse and isn’t too advanced, it may resolve with abuse cessation and voice therapy.
- Vocalizing in a comfortable range and volume and using simultaneous onsets

(Anecdote: Scientist, Verdolini scheduled to have a voice lesson right after work one day, but the clinic was particularly busy and vocally taxing, leaving her hoarse and too tired to sing. She strobed herself with the oralendoscope and saw a little redness and swelling. When she called to cancel, however, her teacher urged her to come in anyway, promising just to vocalize her a little. The easy vocalizes left Verdolini’s voice feeling clear and smooth. Excited, she drove back to office after the lesson and strobed herself again. All redness and swelling had disappeared. Moral: your voice tires more quickly from inefficient use than from too much use. How you phonate affects your voice more than how long you phonate.)

34 Katherine Verdolini, Care of the Professional Voice; Lessac-Based Resonant Voice Therapy Training, conference (Columbus: The Ohio State University Voice Institute, September 23-4, 2000).
9.2 Laryngitis

a. What is it? (Pathology)
   - The general term for inflammation of the larynx. Characterized by hoarseness and “loss of voice” (dysphonia or aphonia) that accompanies inflamed/swollen vocal folds.
   - Physicians distinguish between three types:
     - Traumatic Laryngitis / Functional Laryngitis
     - Infectious Laryngitis / Viral (with URI), Bacterial (with LRI)
     - Reflux Laryngitis.

b. How can you tell if you have it? (Symptoms)
   - Audibly: The telltale sign of laryngitis is temporary hoarseness or aphonia.
   - Visually: (See 9.1 b)
   - Production Variants: A raw or tickling sensation, and the constant urge to clear the throat accompanies dysphonia.
   - Other: Long-term, recurring (chronic) hoarseness or aphonia is a sign of Reflux Laryngitis. Gradual onset of hoarseness is a sign of Traumatic / Functional Laryngitis. Sudden (acute) aphonia is a sign of Infectious Laryngitis, in which case symptoms should not persist longer than two weeks.

c. How did you get it? (Causes/Etiology)
   - Allergies, excessive smoking and drinking, and phonotrauma can cause Traumatic Laryngitis.
   - Bacterial, viral, or fungal infections cause Infectious Laryngitis.
   - Chronic acid reflux can cause Reflux Laryngitis.

d. Who’s susceptible?
   - Anyone.

e. How is it fixed? (Treatment Options)
   - Voice conservation, hydration, and steaming are the treatments for viral laryngitis and only relieve symptoms.
   - Antibiotics for infectious laryngitis.
   - Gargling with salt water may provide minimal relief by superficially disinfecting the area.
   - Corticosteroids decrease inflammation and mobilize bound water accompanying acute inflammatory laryngitis. Some ENT’s prescribe steroids in low doses, however for a singer’s
purposes, a higher dose for a short period of time may be more effective. Corticosteroids should be prescribed to singers as a last resort, and ONLY when singer is committed to performing professionally and inflammation will hinder the performance.

9.3 Vocal Fold Hemorrhage and Varix

Figure 9.2: Hemorrhage

Figure 9.3: Varix

a. What is it? (Pathology)

- A vocal fold hemorrhage is a ruptured blood vessel.
- A varix is a tiny vascular prominence commonly called a pepper speck or pin point and is a member of the varicose vein family.

b. How can you tell if you have it? (Symptoms)

- Audibly: Blood is heavy, and a vocal fold with any enlarged or ruptured capillary will not vibrate as easily, causing hoarseness. (An enlarged blood vessel disrupts the vocal fold vibration. The opposite fold is unable to vibrate evenly over the vessel’s prominence.)
- Visibly: Enlarged or burst blood vessels can appear anywhere on the vocal fold membrane, but often occur at the point of maximum glottal contact.
- Production Variants: Loss of flexibility and range.

c. How did you get it? (Causes)

- Functional voice disorder due to vocal abuse (excessive voice use), vocal hyperfunction, vocal misuse (one hard cough).
- Organic voice disorder due to irritation caused by a lesion on the opposite fold during phonation.
- Using painkillers during phonation to desensitize inflamed folds may lead to overuse unawares.
- Aspirin, alcohol and other analgesics such as Ibuprofen and its relatives (Aleve, Advil, etc.) ingested during periods of heavy voice use can interfere with blood clotting and thus increase the risk of hemorrhaging.

35 L. Arrick Forrest, M.D, personal consultation.
(Note: Tylenol is a better choice for singers in pain, since it doesn’t thin the blood. Singers must be careful when they use any type of painkiller, however, since it reduces sensory awareness. Whenever perceptual feedback is dampened, over-singing can result.)

d. Who’s susceptible?
  - Pregnant women have a greater risk of hemorrhaging with vocal strain.
  - Women just prior to and at the onset of menstruation, especially if using aspirin products.

e. How is it fixed? (Treatment Options)
  - One to three weeks of complete voice rest is often advised to resolve a hemorrhage and avoid possible scarring. The size of the blood vessel and the degree of leakage determine how serious the hemorrhage. Whether the hemorrhage was caused by an explosive sneeze or poor singing technique will determine the therapy. Five to six weeks of voice therapy is often recommended.
  - For varices voice conservation (including no singing) and occasionally voice rest is advised for possible self-resolution to avoid further irritation and).
  - Occasionally, a prominent blood vessel or hemorrhage accompanying a lesion mandates CO2 laser photocoagulation of the vessel as a last resort. The use of lasers on singers, however, is never recommended due to the high risk of using such intense heat near surrounding healthy tissue.

9.4 Vocal Fold Nodules

![Figure 9.4: Vocal Fold Nodules](image)

a. What is it? (Pathology)
  - Nodules are bilateral bumps that rise superficially at the midpoint of the folds from acute or chronic friction caused when vocal folds rub together inefficiently. They are the most common type of lesion found in singers.³⁶

b. How can you tell if you have it? (Symptoms)

- Audibly: Hoarseness.
- Visually: Nodules generally occur bilaterally at the junction of the anterior one-third and the posterior two-thirds of the folds since this is the location of the greatest vocal excursion. Frothy or thickened bilateral mucus pools observed in this area may indicate the beginning of nodules. Early on, nodules are fleshy pink swells of tissue. Over time, constant irritation or hyperfunction hardens the tissue, making it more fibrous, callous-like and white. Nodules that occur suddenly (acute nodules) are trauma induced and appear edematous and gelatinous, rather than stiff. Although bilateral, they are not always the same size. One can appear more prominently than another. Under the stroboscopy light, check for impeded glottal closure, and whether the point of greatest vocal excursion is coming together before the rest of the fold (premature contact / hourglass closure).
- Production Variants: Difficult to produce a soft sound, forced phonatory effort, decreased flexibility, easily reach vocal fatigue, decreased upper range.

c. How did you get it? (Causes)

- Functional voice disorder due to vocal abuse (hyperfunctioning vocal folds, speaking at too low a pitch, speaking too loudly, talking or singing too often or too long).
- Habitual faulty speaking habits. (See 2.11 Glottal Fry and 2.11 Glottal Attack)
- Dehydration, GERD, smoking, caffeine, allergies, and excessive alcohol consumption can irritate the folds and leave them in a less than optimal condition to vibrate, predisposed to nodule formation.

d. Who’s susceptible?

- Nodules are commonly found in females, untrained singers, preachers, teachers, lawyers, and singers.

e. How is it fixed? (Treatment Options)

- Voice therapy is essential for those with vocal fold nodules in order to retrain faulty vocal habits and prevent recurrence.
- Voice therapy resolves nodules in most cases. It may take anywhere from a few weeks to a few months of therapy for a singer to resolve nodules. Much depends on patient compliance and his ability to reduce vocal demands.
- Surgery is not a good idea or a ‘quick fix’ for vocal nodules and is reserved for nodules that don’t resolve despite patient compliance. Since nodules form on the outermost layer / vibratory margin of the vocal folds, cutting them would mean that damaging the mucosal layer. Scar tissue may present in the healing process, leaving the folds less elastic and smooth and resulting in hoarseness and limited range. A SINGER’S MUCOSAL LAYER MUST BE PRESERVED. (See 11.1 Medial edge mucosa maintenance and Vocal fold medial edge lesions)
9.5 Vocal Fold Cyst

Figure 9.5: Vocal Fold Cyst

a. What is it? (Pathology)

- A cyst is an epithelial lined sac of enlarged (hypertrophied) mucosa resulting from a clogged duct or gland. Depending on the type of duct / gland clogged, the firm sac may fill and encapsulate clear lymphatic fluid, blood, clear body serum, squamous debris, or mucus.

b. How can you tell if you have it? (Symptoms / Visual distinctions)

- Audibly: Diplophonia, hoarseness
- Visibly: Smooth and round, dense and non-transparent (due to its epithelial lining), deep (embedded in the vocalis muscle), unilateral, appearing in Reinke’s Space or lamina propria layers at the point of maximum glottal contact. A cyst may harden (keratinize) due to friction caused during phonation and thus significantly interrupt the vibratory pattern’s flow as well as irritate the opposite fold. Reactive changes that imply a cyst include, significant swelling and / or viscous mucus pools on vocal folds in attempt to cushion the folds, visible or broken capillaries appearing on the opposite fold. It may be difficult to distinguish between a cyst, a polyp, and even nodules. Often a small cyst may appear like nodules if the fold opposite the cyst is swollen or callused. A larger cyst may appear to be bilateral polyps if the fold opposite is hemorrhaged or has even developed a polyp from irritation caused by rubbing against / hitting the cyst during phonation.

(Note: An otolaryngologist is usually able to visually discern a cyst from other lesions; however, confirmation is only reached with surgical removal of the lesion and microscopic examination.)

- Production Variants: Effort to produce voice, easily reach vocal fatigue.

c. How did you get it? (Causes)

- The cause of a cyst is unknown (idiopathic), but its predominant appearance on the medial edge location at the point of greatest excursion may imply that, like a polyp and nodules, it’s related to voice use (functional).
- Polyps can turn into a cyst.
d. Who’s susceptible?

- Some people seem to be more prone to vocal fold cysts than others.

e. How is it fixed? (Treatment Options)

- Therapy never resolves a cyst, but is often prescribed before surgery to rule out less serious lesions and reduce any swelling that often surrounds a cyst and the opposite fold, making it easier to determine the nature of the bump(s) and more precisely operate.

- Because cysts are often embedded so deeply, they are more difficult to remove than other more superficial lesions.

- Because cysts are often embedded deep in the tissues of the vocal fold and even in the vocalis muscle, they are likely to restrict vocal fold vibration to such a degree that over time the vocalis muscle atrophies. After surgery, much patience will be needed for post-operative voice therapy to get the underused muscle back in shape.

(Note: If a lesion lies away from the vibrating edge of the vocal fold and isn’t affecting the voice, there is no reason to have it removed.)

9.6 Vocal Fold Polyp

Figure 9.6: Sessile Polyp

Figure 9.7: Hemorrhagic Sessile Polyp

Figure 9.8: Pedunculated Polyp
a. What is it? (Pathology)
- A polyp is a blister-like, fluid-filled sac. Irritation from fricative vibration may, overtime, cause the lesion to harden and its fluid to turn fibrous.
- A polyp usually erupts on one vocal fold, but can on both vocal folds as well (bilateral polyps).
- Two types:
  - One is broad-based, called **sessile**, and is simply a raised bump on the surface.
  - The other type is suspended, similar to a skin-tag or mushroom, and is called **pedunculated** (literally upon a stalk or pedestal), since ped- means foot and this polyp sticks out as though a little foot.

b. How can you tell if you have it? (Symptoms)
- Audibly: Hoarseness, diplophonia (a sessile polyp produces consistent diplophonia, but a pedunculated one may produce sporadic alterations in phonation due to its formation allowing it to shift unpredictably during vibration.
- Visually: A bump usually appearing at the point of maximum glottal contact. A fluid-filled polyp may be recognized by its transparency and motion under the strobe light during vibration. The fluid may also be clear (lymphatic) or blood, the latter of which is often fed by a visible blood vessel. The softness of a fluid-filled polyp is not as irritating to the tissue on the opposite fold. A hard polyp, whether composed of dried blood or non-transparent fibrous tissue often implies that the lesion has hardened with chronic irritation and / or age.
- Production Variants: (See 9.5 Cyst)

c. How did you get it? (Causes)
- Functional (phonotrauma), organic (inflammatory polyps caused by intubation)
- The cause of the polyp is often determined by its location.
- Polyps at the point of maximum glottal contact usually develop out of a hemorrhage caused by acute vocal hyperfunction (a single vocal event, such as one big yell, cough, etc.) Hemorrhagic polyps are the second most common lesion found in singers.37
- A polyp located anywhere else on the folds implies that the person is prone to polyps, however a subglottal polyp that gets sucked up between the folds occasionally while talking may indicate a hemorrhage that, due to gravity, resolved into a fluid-filled sac below the fold.

d. Who’s susceptible?
- Users of blood-thinners

e. How is it fixed? (Treatment Options)
- Voice therapy is almost always recommended first.
- A pedunculated polyp will not go away and must be surgically removed.

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• Sessile polyps occasionally shrink and get reabsorbed by the body with therapy and voice conservation. More often, however, polyps must be surgically drained and their extra tissue removed. This is done without disrupting the vibrating edge of the fold, but inevitably, scar tissue will form and leave the affected vocal fold less flexible. (See 11.1 Scarring)
• If popped, in surgery or by the patient, polypoid tissue would be displaced and would hinder vocal quality.
• Since a polyp lies just under the surface of the folds, a surgeon can avoid cutting on the vibrating edge and rather cut parallel to the edge, lift the tissue up and drain the polyp from beneath, and re-lay the undisturbed tissue.
• A CO2 laser may be needed to cauterize blood vessels at the base of a hemorrhagic polyp. The use of lasers on singers is never recommended since it’s never certain what the intense heat will do to surrounding tissues (i.e. thermal damage).
• A short period of complete voice rest (generally two to three days) is recommended post operation to allow the wound to begin to heal.
• Four to twelve weeks of voice therapy should follow the removal of a vocal-trauma-caused polyp to unlearn traumatic vocal behaviors.

9.7 **Polypoid Corditis**

![Figure 9.9: Polypoid Corditis](image1)

![Figure 9.10: Polypoid Corditis](image2)

a. What is it?
• Also known as *polypoid degeneration*, **polypoid edema**, or *Reinke’s edema*, a development of polyp-like lesions along both vocal folds.
• The fluid accumulates and thickens specifically under the superficial layers of vocal fold tissue and in Reinke’s Space.

b. How can you tell if you have it?
• Audibly: Extremely low speaking voice (most obvious in women)
• Visually: Thick, gelatinous vocal folds, non-distinct polyp-like lumps (individual polyps are not perceived), the entire lengths of the vocal folds are bumpy and swollen, discolored (gray) vocal folds from unhealthy mucosa, vocal folds are heavy and get sucked together on inhalation, making breathing difficult.
• Production Variants: Lack of flexibility, hoarseness, loss of range, difficulty breathing
c. How did you get it?
  • Functional, organic
  • Chronic gastric reflux
  • Heavy voice use
  • Overexposure to vocally irritating inhalants (tobacco, marijuana, exhaust, chemicals, smoke, etc.) or inhalers
  • Significant amounts of alcohol ingestion.
  • Hypothyroidism
  • Angioedema
d. Who’s susceptible?
  • Professional voice users
  • Allergic persons
  • Obesity sufferers
  • Chain smokers
  • Car mechanics
  • Chemical factory workers
  • Alcoholics
e. How is it fixed?
  • Disorder will come back as long as one continues to expose oneself to the irritant.
  • Depending on the severity of the pathology, treatment will vary.
  • If little swelling is evident, voice therapy is recommended to reduce swelling.
  • If the swelling is great and threatens the airway, surgery is mandate and done by entering lateral to the midline, lifting the mucosa and sucking fluid out.
  • Biopsy gray mucosa for cancer.
9.8 Vocal Fold Sulcus

Figure 9.11: Vocal Fold Sulcus

a. What is it?
  - A rare laryngeal pathology of subepithelial tethering / invagination of thyroarytenoid musculature causing a dip of varying size length and depth in the outer mucosa that runs parallel to the outer edges of the vocal fold.
  - Sulcus (plural sulci) is the Latin word for groove. A Physician may generically refer to any dip or groove in the vocal folds as sulcus vocalis.
  - Other physicians may differentiate between the specific types:
    - Physiologic sulcus: A slight dip along the length of the fold.
    - Sulcus vergeture: A significant dip in the tissue, likely to effect voice production.
    - Sulcus vocalis: A deep groove in the tissue that dips down to the muscle and impairs the voice.

b. How can you tell if you have it?
  - Audibly: A “reedy” or “veiled” quality voice
  - Visually: A unilateral or bilateral dip in the vocal fold (s) that parallels the medial line (extremely deep tethering may produce an appearance of a divided vocal fold), abnormal or restricted mucosal wave,
  - Production Variants: Vocal fatigue, weak voice, reduced volume

c. How did you get it?
  - Developmental voice disorder or organic
  - Ruptured vocal fold cyst
  - Birth defect (congenital)
  - Heavy voice use

d. Who’s susceptible?
  - Heavy voice users
e. How is it fixed?
   • Voice therapy may ease resulting secondary lesions and symptoms such as MTD, but will not affect the primary problem
   • Vocal fold injections to compensate for tethered area
   • Surgery effective only in certain cases

9.9 Laryngeal Granuloma

Figure 9.12: Laryngeal Granuloma

a. What is it?
   • Laryngeal granuloma is a sac of grainy or granulated tissue build up.

b. How can you tell if you have it?
   • Audibly: Possible hoarseness, breathiness, and / or diplophonia if granuloma is large enough
   • Visually: Solid bumps of redundant tissue usually developing along the vocal process of the arytenoid cartilage at the posterior section of the glottis, multiple mounding, firm, white protrusions that may develop into a large vascular mass, arytenoids overlap to compensate for lack of closure. If you have granuloma on one vocal fold, the other vocal fold will usually show an ulcerated pit where the granuloma has rubbed against it during phonation. This reaction is commonly known as “cup and saucer” due to its appearance.
   • Production Variants: Frequent need to clear throat. This is the only vocal fold lesion that may cause pain at the vocal fold level. Referred pain may accompany this lesion and radiate up to the ear, mimicking an earache.

c. How did you get it?
   • Functional, organic
   • Granulomas are commonly caused by chronic Gastric Reflux spill onto the posterior end of the folds (area 7-9) where the mucous membrane is thin and vulnerable to lesions.
   • Intubation trauma
Vocal phonotrauma such as consistently pitching the voice too low and straining phonation (in which case, they’re called contact granulomas or ulcers)
- Chronic throat clearing/coughing
- The mucous membrane is thin 7-9, so vulnerable to ulcerations with reflux.38

d. Who’s susceptible?
- Anyone undergoing surgical intubation
- Sufferers of GERD
- Women and some men who pitch their voices too low
- Teachers, preachers, lawyers, some singers who are overactive vocally.

e. How is it fixed?
- Because granulomas are usually reflux caused, medication for reflux and dietary regulations are generally prescribed. Large granulomas may not resolve with medication alone, and corrective microsurgery may be needed.
- Reduction of vocal abuse. Voice therapy will be necessary for those in need of more efficient voice production patterns.
- If the cause is voice or reflux related, granulomas have a tendency to recur when treatment is not strictly adhered to.
- Reflux management may take up to a year to resolve granuloma.
- Intubation related granuloma should resolve on its own.

9.10 Vocal Process Contact Ulcers

Figure 9.13: Vocal Process Contact Ulcers

a. What is it?
- Similar to granulomas, contact ulcers are a breakdown (ulceration) of mucosa and occur on the inner (medial) surface of the arytenoids or posterior vocal folds.
• Layered viscous mucosa.
• Some believe it’s a distinct disorder and others that it’s an early stage (immature) granuloma.

b. How can you tell if you have it?
• Audibly: Hoarseness
• Visually: Possible arytenoid displacement, “Cup and saucer” or “ball and socket” appearance at posterior 3rd of vocal folds.

(Note: Careful to check for growths during abduction as well as adduction and phonation. Contact ulcers and granulomas may slip under the vibrating medial edge of the folds during adduction and phonation and not be readily visible.)

• Production Variants: Incessant throat clearing, vocal fatigue, voice weakens with use. Like granulomas, contact ulcers are the only other voice disorder that can be painful.

c. How did you get it?
• Functional, organic
• Contact ulcers are almost always a result of chronic reflux.
• Can occur from surgical trauma.
• Frequent throat clearing and / or coughing
• Loud low phonation and habitual hard glottal attacks that slam the arytenoids together.

d. Who’s susceptible?
• Those using a habitual hard glottal attack
• Sufferers of GERD

e. How is it fixed?
• Voice conservation to heal the ulcers (6 wk minimum)  
• Corrective voice therapy
• Vigorous treatment of reflux. (See 9.10 Vocal Process Contact Ulcers)
9.11  Laryngeal Web

![Laryngeal Web Image]

Figure 9.14: Laryngeal Web

a. What is it?
   - A laryngeal web is a scar tissue bond of bilateral mucosal surface tissues, such as the anterior inner edges of the vocal folds.

b. How can you tell if you have it?
   - Audibly: Vocal fold webbing commonly causes a tight, high-pitched sound.
   - Visually: Abundant, extraneous tissue formation in the airway passages (tracheal or between vocal folds)
   - Production Variants: Laryngeal webs cause airway stenosis, obstructing and restricting airflow. Webbing at the vocal fold level prevents efficient vibration.

c. How did you get it? (Causes)
   - Organic: Congenital or acquired.
   - Most commonly associated with surgical trauma, especially after vocal fold surgery (Bilateral trauma)
   - A laryngeal web may form during the healing of surgical intubation irritate and wound the inner folds or trachea. As the wound heals, tissues may bond incorrectly and form an anterior laryngeal web across the glottis or lower trachea.
   - A web can also be congenital, in which case it’s known as Wegener’s Disease. The vocal folds never completely separated before birth.

d. Who’s susceptible?
   - Anyone undergoing surgical intubation, and / or undergoing laryngeal surgery.

e. How is it fixed? (Treatment Options)
   - Surgical separation of vocal folds, although outcome may be poor. They often heal back the same way.
9.12 Laryngeal Papilloma

Figure 9.15: Laryngeal Papilloma

a. What is it?
   - Papillomatosis is a sexually transmitted disease, an HPV virus and type of herpes of wart-like growths that can recur and spread. If it spreads to the lungs, it’s life threatening. There are 23 varieties of the virus, of which #7 and #11 are laryngeal.

b. How can you tell if you have it?
   - Audibly: The growths weigh down the folds, often allowing air to escape and resulting in hoarseness.
   - Visually: Laryngeal wart-like growths that develop on the respiratory epithelium that lines the vocal folds. They are fish egg-like in appearance and may be reddish as a result of feeding blood vessels.
   - Production Variants: The size and advancement of the growths can restrict airways and obstruct airflow, resulting in difficulty breathing

c. How did you get it? (Causes)
   - Organic
   - Close contact with infected genitals (contracted like genital warts), whether through the birth canal or other.
   - Adolescent onset may imply sexual abuse
   - A preexisting viral component of papilloma may lie dormant in the body. If susceptible tissue is disrupted during a surgery, the virus may be activated.

b. Who’s susceptible?
   - Anyone, though infants are more susceptible to chronic papilloma than children 6 and up.
e. How is it fixed? (Treatment Options)

- Attempts to control Papilloma are done through laser vaporization / usually burnt away with a CO2 laser. Special facemasks are worn throughout surgery that filter out the papilloma virus and ensure that viral particles are not transmitted through laser smoke.
- Jet or Venturi Ventilation
- The primary reason to remove the infected skin is not to improve vocal quality, but to maintain an open airway.
- Care is taken to minimize scar tissue formation to ensure optimum voice quality, and only one vocal fold is operated on at a time to prevent an anterior laryngeal web from forming in the healing process.
- Chronic papilloma necessitates multiple surgeries with each recurrence and more mucosa is removed with every operation. Removal of warts along the vocal folds may eventually leave a gap in the medial line closure. In extreme cases, counteractive Medialization surgery may be performed to bulk up the vocal folds. Rarely must a total laryngectomy be performed. Even after a total laryngectomy, however, the plentiful laryngeal warts are likely to recur – days or even 10-30 years later.
- There are two types of mitomycin that stop papilloma cells from reproducing.

9.13 Vocal Fold Bowing

![Vocal Fold Bowing Figure](image)

Figure 9.16: Vocal Fold Bowing

a. What is it?

- Also known as *myasthenia larynges, Presbylarynx* (literally old larynx), and more generically *muscular atrophy*, bowed vocal folds meet at the anteriorly and posteriorly, but reach no closure in the middle.
- Gap grows more significant with time as muscle bulk is lost from lack of vibratory involvement
b. How can you tell if you have it?
   - Audibly: Extreme breathiness, weak / too-quiet voice
   - Visually: Vocal folds don’t meet in the middle during adduction.
   - Production Variants: Vocal fatigue.

c. How did you get it?
   - Functional, organic
   - Bowing most often occurs with age. The voice is a muscle and like any muscle, begins to droop a little (bow) with age.
   - Possibly due to loss of nerve input to the vocal folds *(vocal fold paralysis)*
   - Bowed folds can result from a history of over-adduction,
   - Approximation compensation
   - May be *idiopathic*
   - Vocal fold bowing at a young age suggests muscular over-use

d. Who’s susceptible?
   - Behavioral muscular tension in voice production

e. How is it fixed?
   - Voice therapy assists in exercising the folds in such a way as to bulk-up the muscle and achieve better closure. Therapy also helps correct inefficient phonatory attacks by easing over-activity with massage like vocalizing and retraining bad habits leading to effortful voice production.
   - Surgical injections of material such as Gelfoam, Cymetra, fat etc. into the folds may help bulk up the folds and achieve better temporary closure for sound production. Injections are rarely considered an option for singers and are reserved more for elderly patients.

9.14 Muscular Tension Dysphonia

![Figure 9.17: Muscular Tension Dysphonia](image-url)
a. What is it?
   - MTD is phonation hyperfunction that results in inefficient phonation and in severe cases, false fold phonation (also known as *ventricular dysphonia, false fold phonation, or dysphonia plicae ventricularis*).
   (Note: because the false folds also have muscular properties, they have been known to approximate with great tension, develop a regular periodic vibration, a mucosal wave, and actually become a substitute voice for sufferers of MTD.)

b. How can you tell if you have it?
   - Audibly: A low pitched, monotonous and hoarse sound due to the phonation of the massy false folds. Extreme MTD may cause diplophonia due to active false vocal folds during phonation.
   - Visually: Exaggerated *mutational chink* in females, incomplete vocal fold posterior closure in males, strongly constricted aryepiglottic sphincter, false fold constriction nearly covers the vocal folds.
   - Production Variants: Vocal fatigue and discomfort, laryngeal muscle fatigue.

c. How did you get it?
   - Functional, behavioral
   - Overactive laryngeal muscle(s) activity that creates an imbalance between laryngeal musculature.
   - MTD is often the result of extrinsic and intrinsic muscles overcompensating for a less than optimum vibratory pattern, whether the culprit is post-surgery swelling, reflux-related swelling, vocal fold paralysis, or a lesion.

d. Who’s susceptible?
   - Sufferers of *papilloma* or large lesions who are compensating for poor approximation

e. How is it fixed?
   - Hyperactive laryngeal musculature is considered habitual and inorganic and can be corrected / balanced with healthy voice production therapy.
   - Laryngeal massage may also help ease MTD and can be combined with therapy.
9.15 Vocal Fold Paralysis and Paresis

a. What is it?

- Vocal fold paralysis is a condition in which one or both vocal folds are unable to move due to lack of nerve enervation to the larynx, thus impairing glottal closure. A vocal fold paresis is similar, but may be temporary and less severe.

- Types of paralysis:
  - Unilateral adductor paralysis – Common, fold is paralyzed in an open paramedial position and unable to adduct to the midline.
  - Bilateral adductor paralysis – Rare, both folds are paralyzed paramedially and unable to adduct medially.

b. How can you tell if you have it?

- Audibly: Breathy, weak quality to voice, aspiration and stridor with bilateral paralysis. When the paralysis is due to a damaged SLN, decreased sensitivity may cause choking and / or produce an unintentional “gurgly” sound (aspiration) during phonation due to pooling liquid around folds.

- Visually: Usually a vocal fold paralysis will prevent the folds from fully adducting or abducting. One fold may adduct or approximate, but the other doesn’t move or moves very little. Less common, but also possible, a vocal fold may be paralyzed in an adducted position and cut off half the airway. When one fold looks slightly thinner than the other (loss of muscle tone) it can signify a paresis/paralysis, A vocal fold with paresis may still be able to vibrate rhythmically. Unilateral adductor paralysis is often confirmed when the left side of the larynx is paralyzed, since the recurrent laryngeal nerve is longer on the left and thus at a higher risk. Bilateral adductor paralysis may leave the glottis completely open.

- Production Variants: Inability to sustain phonation for long durations, if at all, difficulty breathing, loss of mobility due to lack of use. Since the superior vagus nerve controls the cricothyroid muscle, a significant loss of range often suggests a damaged SVN. Bilateral adductor paralysis is characterized by a complete inability to phonate, cough, etc. (paralytic aphonia).
• Other: Your laryngitis that doesn’t resolve normally.

c. How did you get it?
• Organic (neurological, viral, surgical trauma)
• Vocal fold paralysis and paresis are occasionally caused by viral infections, such as colds or an upper respiratory flu. Can also be idiopathic.
• Unilateral adductor paralysis is often caused by damage to the RLN in a car accident (steering wheel) or during surgery involving surrounding areas (i.e. chest, neck, shoulder).
• Bilateral adductor paralysis implies a central brainstem lesion and therefore, dysarthria.
• A damaged SLN is rare and usually implies a neck surgery mishap.
• A paralysis onset with old age likely means a growth pressing into the superior laryngeal nerve (e.g. cancer), or a stroke.
• Lesions at the nucleus ambiguous, along the vagus or recurrent nerves
• The right and left RLN are vulnerable to direct surgical trauma including lung, thyroid, and heart procedures. The RLN can also be impeded by thyroid enlargement (due to cancer or other), tumors of the lung, aneurisms of the aorta and other blood vessels along its path
• Heart problem
• Tumor
• Brain disease
d. Who’s susceptible?
• Anyone is susceptible to viral infections triggering paralysis.
• Anyone undergoing thoracic, head, or neck surgery.
e. How is it fixed?
• The several causes and types of vocal fold paralysis / paresis varies treatment.
• First, must determine if condition is recent or if the patient has had it for a while, if it’s temporary (viral) or permanent.
• When caused by a viral infection, complete recovery often takes six months to a year. However, there is a chance that the nerve may never recover or may only partially recover.
• Voice therapy may help gain closure.
• Surgical repositioning of the fold(s) may help adduction.
• Unilateral adductor paralysis mandates 1 year of close observation and voice Tx.
• If the paralyzed fold is near to the midline, surgical injection of a bulking material such as silicon, gelfoam or fat may then be used to plump up the paralyzed fold to the midline so the opposite fold may vibrate against it.
• If the paralyzed fold is not near enough to the midline, a wedge of Gore-Tex or thyroid cartilage may be used to push the paralyzed fold to the midline (Thyroplasty). Teflon is a very hard
substance that once implanted is irreversible and often rejected by the body, thus not the ideal medialization substance.

- **Bilateral adductor paralysis** leaves the airway fatally exposed to aspiration, requiring that an immediate airway be created and surgical lateralization / nerve-muscle reinnervation crucial.
- **SLN / SVN** damage paralyzing the cricothyroid muscle may require arytenoid adduction or rotation.
10.1 Recognizing what physicians prescribe for you

Whenever seeking help from any physician, singers must go informed of drugs that pose potential dangers for their voices. Such awareness not only protects their instruments but also enables them to collaborate with the physician in selecting a singer-friendly antidote. Because physicians refer to drugs by their generic or chemical names, and because new medications come out all the time, learning commercial names is futile. Although not exhaustive, this chapter isolates hazardous agents (Haz-Mat) that make certain OTC (Over the Counter) and Rx (Prescriptive) medications vocally harmful.
<table>
<thead>
<tr>
<th>OTC/Rx</th>
<th>Common Use</th>
<th>Category</th>
<th>Harmful Ingredients</th>
<th>Vocal / Performance Effect</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>cold / allergy</td>
<td>antihistimine</td>
<td>acetylcholine antagonists</td>
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<td></td>
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<td></td>
<td>alkylamines</td>
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<td></td>
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<td></td>
<td>azatadine (Trinalin)</td>
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<td>brompheniramine (Dimetane)</td>
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<td></td>
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<td>carbinoxamine (Clistin)</td>
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<tr>
<td>Rx</td>
<td>(non-sedating)</td>
<td>cetirizine (Zyrtec)</td>
<td>drying, slight sleepiness</td>
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<tr>
<td>OTC</td>
<td>chlorpheniramines (ChlorTrimeton)</td>
<td>drying, sedative /weakens senses</td>
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<td></td>
<td>clemastine (Tavist)</td>
<td>drying</td>
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<td>cyclizine (Marezine)</td>
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<td>dextchlorpheniramine (Polaramine)</td>
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<td>diphenhydramine (Benadryl)</td>
<td>drying, tremor, sedative, sleepiness</td>
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<tr>
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<td>doxylamine (Decapryl)</td>
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<tr>
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<td>fexofenadine (Allegra)</td>
<td>weakness, sleepiness</td>
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<td>Rx</td>
<td>hydroxyzine (Vistaril)</td>
<td>drying, tremor, dizziness, sleepiness</td>
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<td>Rx</td>
<td>ipratropium (Atrovent Inhaler)</td>
<td>drying, inflammed mucosa, sore throat, tremor</td>
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<td>Rx</td>
<td>loratadine (Claritin)</td>
<td>drying, sleepiness</td>
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<td></td>
<td>meclizine (Antivert)</td>
<td>drowsiness, drying</td>
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<td>methylpyrilene (Histady)</td>
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<tr>
<td>Rx</td>
<td>promethazine (Phenergan)</td>
<td>sleepiness, sleeplessness, dizziness</td>
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<td></td>
<td>triplenlenamine (Actidil)</td>
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<td></td>
<td>tripolindine (Actidil)</td>
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</tr>
<tr>
<td>OTC/Rx</td>
<td>gastrointestinal reflux</td>
<td>cimetidine (Tagamet)</td>
<td>drying, insomnia, vomiting</td>
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<tr>
<td>Rx</td>
<td>nizatidine (Axid)</td>
<td>drying, insomnia, vomiting</td>
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<td></td>
</tr>
<tr>
<td>Rx</td>
<td>ranitidine (Zantac)</td>
<td>drying, insomnia, vomiting, easy bleeding</td>
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<tr>
<td>Rx</td>
<td>cough suppressant</td>
<td>antitussives</td>
<td>benzonatate (Tessalon Perles)</td>
<td>drying, sedation, dizziness, vomiting</td>
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<tr>
<td>OTC</td>
<td>codeine (Tussi-Organidine)</td>
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<td>OTC</td>
<td>**dextromethorphan</td>
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<tr>
<td></td>
<td>(Robitussin DM)</td>
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<tr>
<td></td>
<td>hydrocodone (Hycotuss)</td>
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<td></td>
<td>promethazine (Phenergan)</td>
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Figure 10.1: Haz-Mat Chart (continued)
<table>
<thead>
<tr>
<th>Condition</th>
<th>Medication</th>
<th>Side Effects</th>
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<tbody>
<tr>
<td>Decongestant</td>
<td>Beclomethasone (Vancenase)</td>
<td>Sore throat, cough, perforated nasal septum</td>
</tr>
<tr>
<td>Antiedema</td>
<td>Epinephrine (inhalant)</td>
<td>Drying</td>
</tr>
<tr>
<td></td>
<td>Fluticasone (Flonase)</td>
<td>Throat irritation, cough</td>
</tr>
<tr>
<td></td>
<td>Norepinephrine (Levophed)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Phenlpropanolamine (Entex LA)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Phenylephrine (Rynatan)</td>
<td></td>
</tr>
<tr>
<td>OTC</td>
<td>Pseudoephedrine (Sudafed, Actifed, Allergy Daytime)</td>
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</tr>
<tr>
<td>Steroid</td>
<td>Mometasone (Nasonex)</td>
<td>Drying, mucosa inflammation, cough, oral/nasal yeast infection</td>
</tr>
<tr>
<td>OTC</td>
<td>Diphenhydramine (Benadryl)</td>
<td>Drying</td>
</tr>
<tr>
<td>OTC</td>
<td>Dimenhydrinate (Dramamine)</td>
<td>Drying, blurred vision</td>
</tr>
<tr>
<td>OTC</td>
<td>Meclizine (Antivert)</td>
<td>Drying</td>
</tr>
<tr>
<td>Rx</td>
<td>Scopolamine (Transderm Scop)</td>
<td>Drying, drowsiness</td>
</tr>
<tr>
<td>??</td>
<td>Thiadizide (Diuril)</td>
<td>Drying</td>
</tr>
<tr>
<td>??</td>
<td>Furosemide (Lasix)</td>
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<tr>
<td>??</td>
<td>Clonidine (Catapres)</td>
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<td>??</td>
<td>Captopril (Capoten)</td>
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<tr>
<td>??</td>
<td>Enalapril (Vasotec)</td>
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<tr>
<td>Dry mouth</td>
<td>Mucolytic</td>
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<tr>
<td></td>
<td>Phenylephrine (Neo-Synephrine)</td>
<td>Possible drying when combined w/ antitussives, insomnia, tremor</td>
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<tr>
<td>??</td>
<td>Guaiifenesin (Humibid, Liquibid, Robitussin, Entex, Robitussin-PE)</td>
<td>Possible drying when combined w/ antitussives</td>
</tr>
<tr>
<td>Inflammation</td>
<td>Corticosteroid</td>
<td>Drying, gastric irritation, possible ulceration, hemorhage, insomnia, irritability, myopathy, worsening of preexisting conditions</td>
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<tr>
<td></td>
<td>Budesonide (Rhinocort)</td>
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<tr>
<td>Hydrocortisone</td>
<td>(Hydrocortone, Solu-Cortef)</td>
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</tr>
<tr>
<td>Category</td>
<td>Drugs</td>
<td>Adverse Effect</td>
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<tr>
<td>--------------</td>
<td>----------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------</td>
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<tr>
<td>Nonsteroidal</td>
<td>Diclofenac/misoprostol (Arthrotec)</td>
<td>Increased risk of hemorrhage</td>
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<tr>
<td>OTC</td>
<td>Ibuprofen (Advil, Nuprin, Motrin)</td>
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<tr>
<td></td>
<td>Nabumetone (Relafen)</td>
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<tr>
<td></td>
<td>Naproxen (Naprosyn, Anaprox, Aleve)</td>
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<td>Oxaprozin (Daypro)</td>
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<td></td>
<td>Rofecoxib (Vioxx)</td>
<td>May trigger cough, reflux</td>
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<td></td>
<td>Diuretic Furosemide (Lasix)</td>
<td>Drying</td>
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<tr>
<td></td>
<td>Hydrochlorothiazide</td>
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<tr>
<td>Vocal Paralysis</td>
<td>Antiviral Amantadine (Symmetrel)</td>
<td>Anxiety, drying, rapid heart beat, agitation, tachycardia, xerostomia, xerophonia</td>
</tr>
<tr>
<td>OTC</td>
<td>Pain Analgesic Aspirin</td>
<td>Vocal fold hemorrhage, weaken proprioceptive input from the larynx</td>
</tr>
<tr>
<td></td>
<td>Acetaminophen/Codeine (narcotic)</td>
<td>(narcotic) possible dysarthria and uninhibited</td>
</tr>
<tr>
<td></td>
<td>Orphenadrine Hydrochloride (Benedryl, Nytol)</td>
<td>Or diminished compulsion to speak</td>
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<tr>
<td></td>
<td>Hydrocodone w/ APAP (narcotic)</td>
<td>(narcotic) possible dysarthria and uninhibited</td>
</tr>
<tr>
<td></td>
<td>Or diminished compulsion to speak</td>
<td></td>
</tr>
<tr>
<td>OTC</td>
<td>Ibuprofen (Advil, Nuprin, Motrin)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ketoprofen (Orudis)</td>
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<tr>
<td></td>
<td>Naproxen (Naprosyn, Anaprox, Aleve)</td>
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<tr>
<td></td>
<td>Oxycodone/APAP (Endocet, Roxicet)</td>
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<td></td>
<td>Or diminished compulsion to speak</td>
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<tr>
<td></td>
<td>Propoxyphene N/APAP (Propacet 100)</td>
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<td>Anesthetic Benzocaine</td>
<td>Weakens proprioceptive input from the larynx</td>
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<td></td>
<td></td>
<td>And may lead to excessively applied laryngeal</td>
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<tr>
<td>Condition</td>
<td>Drug</td>
<td>Effect</td>
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<tr>
<td>birth control hormones</td>
<td>progesterone</td>
<td>possible fluid retention affecting range and</td>
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<td>pressure by the singer unaware,</td>
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<td>voice quality</td>
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<tr>
<td>reduced motor control</td>
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<td>fibrocystic breast disease</td>
<td>danizol (Donocrine)</td>
<td>possible permanent alteration of voice quality</td>
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<td>body building, androgens</td>
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<td>may permanently alter (deepen) voice quality,</td>
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<td>endometriosis,</td>
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<td>anxiety</td>
<td>beta-blocker (propranolol)</td>
<td>may dull performance, may trigger asthma,</td>
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<td>may alter heart rate / blood pressure</td>
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<td>albuterol (inhalant)</td>
<td>nervousness, tremor, mucosa inflammation,</td>
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<th>Figure 10.1 Continued</th>
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<tr>
<td>epinephrine (inhaletal)</td>
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<td>ipratropium/albuterol (Atrovent, Combivent) (inhaletal)</td>
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<td>salmeterol (Serevent)</td>
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<td>theophylline (Elixophyllin, Theodur)</td>
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<td>corticosteroids*</td>
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<td>Haloperidol (Haldol)</td>
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<td>Risperidone (Risperdal)</td>
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<td>Thioridazine (Mellaril)</td>
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<td>Trifluoperazine (Stelazine)</td>
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<tr>
<th>Sedative Hypnotics</th>
<th>CNS Depressants</th>
<th>Loss of Fine Muscle Control / Coordination</th>
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<tbody>
<tr>
<td>Chlordiazepoxide (Librax)</td>
<td>Benzodiazepine (Tamazepam)</td>
<td>Uninhibited or diminished desire to speak,</td>
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<tr>
<td>Chorazepate</td>
<td>Methaqualone</td>
<td>Dyssartria</td>
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<tr>
<td>Clonazepam (Klonopin)</td>
<td>Zolpidem (Ambien)</td>
<td>Possible alteration of pitch, timbre, volume</td>
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<tr>
<td>Diazepam (Valium)</td>
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<td>Loss of muscle coordination / nerve function,</td>
</tr>
<tr>
<td>Dipotassium</td>
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<tr>
<td>Glycopyrrolate (Robinul)</td>
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<td>Lorazepam (Ativan)</td>
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<td>Oxazepam (Serax)</td>
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<td>Triazolam (Halcion)</td>
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<th>OTC Appetite Aids</th>
<th>CNS Stimulants</th>
<th>Loss of Fine Muscle Control / Coordination,</th>
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<tbody>
<tr>
<td>Carisoprodol</td>
<td>Amphetamines (Adderall)</td>
<td>Drying</td>
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<tr>
<td>Cyclobenzaprine</td>
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<td></td>
</tr>
<tr>
<td>Cocaine</td>
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(Continued)
Figure 10.1 Continued

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<tr>
<th>Medication Class</th>
<th>Example Medications</th>
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<tbody>
<tr>
<td>Diuretics</td>
<td>hydrochlorothiazide/HECTZ, triamterene/HECTZ, amiloride/Lotrel</td>
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<tr>
<td>ACE Inhibitor</td>
<td>benazepril/Lotensin, fosinopril/Monopril, lisinopril/Zestari, fosinopril/HECTZ/Prinivil</td>
</tr>
<tr>
<td>ACE Inhibitor</td>
<td>enalapril/Vasotec, lisinopril/HECTZ/Byzaar, Cozaar</td>
</tr>
<tr>
<td>ACE Inhibitor</td>
<td>valsartan/Diovan</td>
</tr>
<tr>
<td>Diuretics</td>
<td>hydrochlorothiazide/HECTZ, triamterene/HECTZ, amiloride/Lotrel</td>
</tr>
<tr>
<td>ACE Inhibitor</td>
<td>benazepril/Lotensin, fosinopril/Monopril, lisinopril/Zestari, fosinopril/HECTZ/Prinivil</td>
</tr>
<tr>
<td>ACE Inhibitor</td>
<td>enalapril/Vasotec, lisinopril/HECTZ/Byzaar, Cozaar</td>
</tr>
<tr>
<td>ACE Inhibitor</td>
<td>valsartan/Diovan</td>
</tr>
<tr>
<td>Antibiotics</td>
<td>amoxicillin/clavulanate (Augmentin)</td>
</tr>
<tr>
<td>Antibiotics</td>
<td>cefuroxime (Cefin)</td>
</tr>
<tr>
<td>Antibiotics</td>
<td>cefprozil (Ceftiz)</td>
</tr>
<tr>
<td>Antibiotics</td>
<td>cephalixin</td>
</tr>
<tr>
<td>Antibiotics</td>
<td>ciprofloxacin (Cipro)</td>
</tr>
<tr>
<td>Antibiotics</td>
<td>erythromycin (Ery-Tab)</td>
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<tr>
<td>Antibiotics</td>
<td>levofloxin (Levaquin)</td>
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<tr>
<td>Antibiotics</td>
<td>loracarbef (Lorabid)</td>
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<tr>
<td>Antibiotics</td>
<td>penicillin VK (Veetids)</td>
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<tr>
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<td>tetracycline HCL (Sumycin)</td>
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<tr>
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<td>trimethoprim/sulfameth (Trimethoprim/Sulfax)</td>
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<tr>
<td>Antibiotics</td>
<td>azithromycin (Zithromax)</td>
</tr>
<tr>
<td>Platelet Aggregation</td>
<td>clopidogrel (Plavix)</td>
</tr>
<tr>
<td>Increased Risk of Hemorrhage</td>
<td>increased risk of hemorrhage</td>
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(Continued)
Figure 10.1 Continued

<table>
<thead>
<tr>
<th>Convulsions</th>
<th>Clonazepan (Klonopin)</th>
<th>Uninhibited or diminished desire to speak, dysarthria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dentropropranolol</td>
<td>Divalproex (Depakote)</td>
<td>Dysarthria</td>
</tr>
<tr>
<td>Gabapentin (Neurotonin)</td>
<td>Gabapentin (Neurotonin)</td>
<td>Uninhibited or diminished desire to speak, dysarthria, drying</td>
</tr>
<tr>
<td>Angina</td>
<td>Isosorbide mononitrate</td>
<td>Drying, bronchitis, bronchospasm, pharyngitis</td>
</tr>
</tbody>
</table>

The following herbal and vitamin supplements also have the potential to alter your voice:

1. **Dong quai** increases ovarian and testicular hormonal production
2. **Yam** has progesterone-like properties
3. **Licorice** root causes estrogen and progesterone type effects
4. **Primrose** enhances estrogen production
5. **Melatonin** assists estrogen and progesterone production
6. **Yohimbe** may enhance testosterone production
7. **Garlic, gingko, and ginseng** can dilate blood vessels and thin the blood, lowering the threshold for vocal fold hemorrhaging
8. **Niacin** and **Vitamin E** can dilate blood vessels and thin the blood, lowering the threshold for vocal fold hemorrhaging.
9. **Vitamin C** is a diuretic and can be very drying.

Certain oral contraceptives contain androgens that can permanently masculinize the female voice, as can high progesterone substances. Discuss the ingredients of your birth control with your physician to determine one appropriate for you.

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40. This chart was compiled by consulting the following sources:
   L. Arick Forrest, M.D., personal consultation.

** Steroids should only be used in emergency situations to alleviate swelling by thinning the lamina propria layer by breaking up bound water protein

*** If dextromethorphan is combined with the mucolytic, guaifenesin, results are more positive for a singer.

****When in need of a mucolytic, guaifenesin is most effective taken by itself.
11.1 Aspects of the surgical process that concern singers

Regardless of type, any surgery performed on a singer presents unique concerns demanding special consideration from all those involved. Because most physicians are not professional singers, and because their primary aim is to keep you alive at all costs, voice preservation is not top priority. Do not assume just because you tell them you are a professional singer that they will understand how to protect your instrument during the surgical process. Avoid many complications by taking the following precautions upon yourself.

Back to back scheduling
Like the rest of us, surgeons are not always in peak form either. A surgeon who has spent a day performing multiple operations may not be as patient or alert as you’d like. When selecting a date for your surgery, you might consider asking how many surgeries are scheduled around you and request as early a time as possible.

General Anesthesia
Patients undergoing general anesthesia must refrain from eating and drinking for 8 hours prior to surgery. Not only is the absorption of anesthesia into bodily tissues optimized on an empty stomach, but anything left undigested in the stomach has a good chance of getting thrown up after surgery as the anesthesia tube is being removed. The chances of choking and dying or aspirating vomit into the lungs and getting pneumonia are enough that such precautions are taken. Water, apple juice, Sprite, plain coffee and plain tea may be drunk up to four hours prior to surgery because they pass through the stomach quickly and easily. Since anesthetics are absorbed by the body’s tissues, the quickest way to shed their aftereffects is by getting up and moving. Movement and sweat helps break up and rid your body of the stored remnants.

Intubation
The intubation process poses many threats to singers. Prior to surgery, damage can be done upon the endotracheal tube’s insertion or removal if the anesthesiologist is inexperienced or if the glottis is narrow from incomplete abduction. Irritation may result in soreness and hoarseness from laryngeal mucosa disruption. Possible damages may include dislocation of arytenoid cartilages, bruising, or granuloma
formations or laceration from more serious mucosa disruptions. Attempts made by the patient to expel the obstruction during its removal, such as head and neck movements and coughing, may grind against the tube, further irritating the folds.

Depending on the procedure, some tubes are ridged with fireproof material to protect against laser-induced fire and may incidentally irritate the folds. Vocal fold trauma may also result from the prolonged use of an endotracheal tube. More often than not however, the bulk of the tube is the culprit.

Before the tube is inserted, the neck is propped up with a cushion and the head suspended back, naturally opening the jaw. Following the center of the tongue, the tube is inserted straight into the mouth, over and behind the tongue, between the vocal folds, and about halfway down the trachea. Once in place, the tube is moved to the side of the mouth closest to the anesthesiologist, so as to make room for the scope to be inserted.

Due to the dangers intubation poses for singers, alternative methods have been developed but are unfortunately not often employed. One such option is the anesthesia mask. Developed in the United Kingdom, the brain laryngeal mask (BLM) does not involve laryngeal or tracheal insertion and is recommended to replace endotracheal intubation for all professional voice users undergoing surgery. The mask is an ideal option in emergency situations, especially, since damage is often done in hurried intubations. Because the mask fits over the mouth, however, it cannot be employed during surgeries involving the upper aerodigestive tract.

Appropriate tube size

It is easier and faster to pump someone’s lungs with air using a larger tube than a smaller one and although many conscientious otolaryngologists visit anesthesiology departments to educate on the vocal complications of larger tubes, little is done to enforce using smaller tubes whenever possible. Depending on the anatomical framework, adult males can usually tolerate a 7 mm tube, adult females a 6, children a 5. Many anesthesiologists will try a size 8 tube first whenever possible. Ouch!!!

Singers, ask your otolaryngologists what the smallest endotracheal tube size would be for your trachea. Insist that the anesthesiologist performing your intubation be someone well acquainted with the risk to the vocal folds. Meet with the anesthesiologist (!) and ask that they take their time and use the smallest tube possible – preferably the size recommended by your otolaryngologist.

(Note: Keep your recommended endotracheal tube size in all your physician’s files as an emergency precaution.)

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Schedule around menstruation

When scheduling any surgery, women should be operated upon within the first two weeks after their periods. Four to five days prior to menstruation, tissues are edematous and thus less tolerant to absorbing anesthesia. Bloating may also interfere with structural definition, making anatomical structures less distinct. Patients undergoing surgery any later in their cycle increase the likelihood of adverse reactions to the anesthesia, such as nausea. Vomiting after phonosurgery is particularly undesirable due to the stress placed on freshly cut tissue and possible acid spillage on vulnerable laryngeal wounds!

Ingested interference

Although little blood is lost when operating on vocal folds, all microlaryngeal surgery candidates are asked not to ingest aspirin, ibuprofin or other anticoagulants (Excedrin, Bayer, Alka-Seltzer, Anacin, Bufferin) to avoid unnecessary bleeding and hemorrhaging. Among other substances, St. John’s Wort has been known to affect your body’s tolerance of anesthesia and should be not be taken five days prior to surgery.\(^{43}\) Tobacco, alcohol, OTC/Rx medications, and caffeine affect the absorption and tolerance of general anesthesia as well. For a list of interfering substances, log onto www.herbmed.org or see JAMA, July 11, 2001, Vol. 286, No.2.

Scarring

Once wounded, the body heals itself by forming stronger, less flexible fibrous tissue in the wound’s place. If formed along the soft palate or vocal folds, its lack of elasticity may hinder vocal range and contribute to an airy vocal quality due to its inability to achieve complete closure. As we age, our body’s responses slow and take longer to heal, however, during our teenage years, the body goes above and beyond the call of duty to heal itself. It’s designed to compensate for that period of life in which we are most likely to take careless risks and act impulsively. As a result, its scar formation response is quick and abundant. It is essential that post-operation rehabilitation therapy begin one week following any surgery on a singer to prevent stiffening during healing. This goes especially for vocal fold surgeries, after which the folds must be carefully and consistently stretched to loosen scar tissue as it forms.

Intracordal closure

Maintaining intracordal closure must be of primary importance to the surgeon operating on the vocal folds. Vocal fold surgery must be performed so that the least amount of tissue is removed in order to preserve sufficient closure for clean phonation. If too much vocal fold tissue is removed, an intracordal gap will remain and allow air to leak during phonation, resulting in a breathy, poor quality sound.

\(^{43}\) Anthony Jahn, “Vitamins and Herbal Medicines: All Good?” Classical Singer (December 2001), 22.
Medial edge mucosa maintenance

The key to beautiful phonation lies in preserving the mucosal layer covering the vocal fold. This wet cover allows the folds to slip against each other in a wave-like motion and seals the folds from air leakage during phonation. The innermost edges of the folds must be completely smooth to vibrate and produce a clean sound. Whenever surgery is concerned this edge is at risk due to possible intubation trauma but especially when operated upon directly. (See 11.1 Intubation and 11.1 Appropriate tube size)

Skeletal structure

 Maintaining the skeletal structure must be fundamental to surgeons operating on singers. Since singers use their entire bodies to sing, skeletal alignment must be intact to sing freely and efficiently. Great care must be given to insure that all anatomical scaffolding be protected. The hyoid bone, which may seem to take little part in phonation, functions to keep the airway open as well as stabilize the larynx for singing. (Beware of thyroglossal surgery!) Even the scarring that accompanies bone resection may inhibit the singing / breathing mechanism, especially if bones are costal or rib bones! Beware of chest surgery, back surgery, and posterior cervical lesion removal.

Muscular network

Because skeletal alignment must be intact to sing, so too must muscles be preserved to not only support the skeleton and the erect posture essential to singing, but also the breath mechanism and laryngeal function. Generally, after initial incisions through derma (skin) and fat layers, muscle is not actually cut, but separated. Beware of surgeries requiring the cutting of abdominal muscles, such as cesarean sections, hysterectomies, and appendectomies. Abdominal muscle rehabilitation is necessary following such surgeries in order to regain strength to support singing. Head and neck surgeries often involve separating muscle and can scar in such a way that inhibits vertical laryngeal motion and stability. Facial muscles must be preserved for emoting, diction, and resonance. Singers must stay clear of Botox® injections used to weaken facial muscles as a means to get rid of wrinkles. Beware of cervical nodules removal and thyroid surgery.

Nerve damage

The superior and recurrent laryngeal nerves must not be harmed! These nerves must be isolated and completely avoided, as one nick from a knife can irreparably alter their functional capabilities. Vascular neck, cervical disc, thyroid, chest, heart, bronchial cyst, and cystic hygroma surgeries are just some of many that endanger these nerves.

Facial nerves must also be preserved for emoting, diction, and resonance.
Respiratory alteration

Air production and respiratory function efficiency must be preserved to maintain subglottic pressure and laryngeal muscular reflexes. Ribcage and chest wall surgery interferes with respiratory function and must be followed with pulmonary function rehabilitation to avoid chest wall stiffening in the healing process. Abdominal surgery hinders respiratory support as well. In order to enter the peritoneum (abdominal cavity) abdominal muscles must be cut that help produce and maintain the subglottal pressure needed to phonate, as well as execute octave leaps and coloratura passages. Among other surgeries, open laparotomies inflict much post op pain and mandate long recoveries of 6-12 weeks. Under such conditions, normal vocal practice regimens are virtually impossible.

Resonator alteration

Whether due to facelift, chronic sinusitis or tonsillitis, adenoid or turbinate hypertrophy, or a nasal-septum deviation, operations performed in the oral, pharyngeal, and nasal cavities may alter resonance.

Articulator alteration

A singer’s tongue, teeth, palates, jaw, and lips must remain protected throughout surgical procedures. Mouth guards are usually in place throughout laryngeal microsurgery to protect the teeth from the metal scope and surgical instruments inserted into the mouth. Beware of tonsillectomies, uvulopalatopharyngoplasty (changing the pharynx through uvula and / or soft palate alterations – often in effort to help sleep apnea), partial glossectomies (removal of part of the tongue – often in effort to help sleep apnea), temporomandibular joint surgery, and orthodontic procedures.

11.2 Post operation concerns

Voice rest

Opinions regarding appropriate prescriptions of voice rest vary. There is no standard voice rest treatment, and sufficient dosages differ with and are determined by each surgeon, condition, and patient. Generally, physicians recommend that patients who have had vocal fold lesions removed be completely quiet anywhere from three to ten days. Although the voice tends to sound better immediately following a surgery, raw folds are susceptible to injury for a few days following. Voice rest is often advised during this period to allow the folds to heal. For singers, three to four days are usually sufficient to optimize mucosal healing and short enough to avoid furthering complications with muscular atrophy. Dr. James A Koufman and P. David Blalock performed a study revealing that complete post op voice rest doesn’t hasten recovery (reepithelialization) and that a seven to ten day period of post op voice conservation proves as effective as absolute voice rest in preventing postoperative dysphonia. The voice conservation that Koufman promotes

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mandates that talking and volume are limited and glottal attacks, whether verbal or throat clearing, are avoided. He also suggests that the patient be coached in vocal conservation preoperatively so as to avoid postoperative complications. However, their subjects were not classical singers and range was not considered.45

(Note: A smart surgeon will take a picture of his patient’s newly repaired folds immediately following the surgery. The picture is proof of their fixed state and can be used against the patient if follow-up pictures reveal that the patient hasn’t complied with voice rest recommendations.)

Trauma-induced laryngeal web
Vocal folds that have been operated upon bilaterally and near the anterior commissure are at risk of healing together and forming a laryngeal web. Surgical intubation often irritates the tissues it passes through and rests on the anterior commissure during surgery. Occasionally during long surgeries, it will rub bilaterally and make vocal fold tissue raw. During the healing process post-surgery, the sides may heal together, resulting in a web that narrows the airway and diminishes vocal quality.
Since the endotracheal tube lies in the airway, intubation irritation can occur in the trachea as well and result in a tracheal web.
Wegener’s Disease is congenital and not to be confused with trauma-induced laryngeal webbing.

Speedy recovery
Although aging and post operative complications are out of your control, you can endorse healing by optimizing that which is in your control: adequate nutrition, exercise (circulation), and rest (endocrine function), several weeks before surgery. This will prepare and equip your body to readily heal itself.

11.3 Common problems who’s surgeries could affect the vocal mechanism

Tonsillitis
When removing tonsils (tonsillectomy), care must be taken to preserve the anterior and posterior tonsilar pillars, as well as underlying musculature in the tonsilar bed. A good surgeon chooses his cuts carefully, knowing that scar tissue will form wherever he operates. If the soft palate is scarred, it may stiffen enough that air escapes through the velopharyngeal port during phonation, causing hypernasality.
Many times a Bovie (a.k.a. “hotstick”) is used to remove tonsils. It looks like a pen with a long cord attached to a machine of controls. The Bovie functions by burning its way through tissue with electric pulses controlled at variable frequencies; the faster the electric pulse, the deeper and more knife-like the “cutting” power.

(Note: The first time I smelled cooked human flesh was during a tonsillectomy. The smoke from the hot Bovie wafted out of the patient’s mouth, making me cough into my mask. The scent was in my hair and scrubs the rest of the day.)

_Ovarian and prostate complications_

Beware of surgeries that change the hormonal balance in the body. Operations on the ovaries change endocrine production and can lead to hormonal imbalance. Side effects include a decrease in range, hoarseness, masculinization of the female voice, and other alterations in vocal color. Prostate surgery sometimes mandates the use of hormones and can trigger masculinization as well.

_Cesarean section and hysterectomy_

All open laparotomies affect respiratory musculature and take 6-12 weeks to heal. (See 11.1 Respiratory alteration) Six weeks following abdominal surgery, 10-15 minute periods of monitored daily vocalizing should commence. Gradually increase frequency and intensity. Vocal standards will not be reached until abdominal muscles have completely healed. Reconditioning may take up to two years post op.

_Wisdom teeth removal_

Care must be taken during any orthodontic procedure to not hyperextend the jaw. Many times, the jaw can dislocate and develop temporomandibular joint dysfunction.

_Sleep apnea_

There is no good way to surgically correct sleep apnea in a singer. Corrective measures include a partial glossectomy, which alters the tongue and / or an uvulectomy, which alters the soft palate.

_Vocal fold medial edge lesions_

Classical singers are rarely candidates for laryngeal microsurgery, simply because any surgery performed on the folds is likely to disrupt the mucosal layer to some degree. A lesion occurring anywhere along the vocal folds’ medial edge is most problematic. If the lesion is a surface lesion, meaning it has developed on the mucosa (such as a granuloma or nodules), removal would mean stripping the folds and leaving them irreparably scarred. Such scarring results in dysphonia and even aphonias and rules out surgery as a means of resolve. Medial edge surface lesions respond well to expert therapy.

If the medial edge lesion is submucosal (polyp) or subepithelial (cyst), and does not respond to therapy, a special surgical technique can be employed to ensure preservation of the medial edge. This technique involves cutting laterally along the folds’ medial edge and working under the mucosal layer. When the surgery is complete, the flap is laid back and the outside medial edges are left undisturbed. However, even

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when the medial edge is successfully preserved, the healing that takes place beneath the surface will still diminish vocal function to some degree.

11.4 Common instruments and materials used in microlaryngeal surgery

Figure 11.1: The Mouth Guard, Laryngeal Scope, Pilling Light Source

The mouth guard (clear), also known as the mouthpiece is not unlike that of a football player and protects the teeth from the metal scope.

This particular type laryngeal scope (metal) is known as a Dido (“dee-do”) and is a favorite among surgeons for offering the most visibility.

The Pilling Light Source (blue cord) inserts into the scope and filters a bright light through its tube.

Figure 11.2: Micro Instruments
The micro instruments do fine detail work (from top to bottom):

- The laryngeal probe has a blunt tip used to move tissue out of the way for examination.
- The left angled scissors and right angled scissors (not shown) are used to cut tissue.
- The up scissors or 45-degree angle scissors are used to separate tissue and dissect.
- The sickle knife makes straight, clean incisions otherwise known as microflaps.
- The up cups, also known as cupped forceps may be used to grab and pull tissue out of the way. This action is known as retraction. They may also be used to retrieve a cut specimen of tissue for biopsy.

(Note: Straight cups (not shown) may be used in their place, depending on the surgeon’s preference.)

The Lewy suspension supports and steadies the scope by anchoring it to the instrument table over the patient. This allows the physician to operate with both hands.
Cottonoids or Lambsponges (7 o’clock) are manufactured on a string that is often colored for easy landmarking and accessibility during use.

Afrin or adrenaline (center) helps to contract and shrink blood vessels, providing a less messy surgery, and more visibility (due to lack of blood) for deciphering anatomy and cutting.

Formulin (2 and 4 o’clock) is a toxic preservative and is used to store the specimens that will be taken to the lab for testing following the surgery.

A large specimen (on ruler) of polypoid tissue has been removed in one neat, self-contained piece. Here it is spread on a ruler for measurement.
CHAPTER 12

A HYPOTHETICAL LARYNGEAL MICROSONRY

12.1 Scheduling

After determining that your pathology is not going to resolve with therapy, surgical intervention may be necessary. The physician discusses the procedure with you as well as his post-op expectations, such as length of rest, when to return to work, and resuming normal activities. You express all your concerns and fears and choose a date that allows you to comply with post-op demands. A follow-up is scheduled as well for one week following the surgery.
12.2 Check in
You check in one to two hours prior to your operation and meet with a secretary to fill out paperwork. You assure the secretary that you’ve prepared your gastrointestinal tract for general anesthesia by refraining from food and liquids, other than water for the last 8 hours.
(Note: A man who drank orange juice the morning of his surgery had to be rescheduled for his operation.

12.3 PreOperative Care (PreOp)
You are assigned and led to a room where you remove all jewelry, make-up, and clothing and don an I.D. bracelet, hospital gown, and robe. Personal items are bagged, labeled, and stored in a post-op. area locker. You lie covered up on a bed and are wheeled to the O.R. for your I.V. set up. The head of the bed is toward the anesthesiologist. Teeth are checked and imperfections noted, so the hospital has a record in case further damage is done. You’re asked to state any product / medication allergies or sensitivities. The phlebotomist inserts an I.V. into the back of your hand. The anesthesiologist puts an oxygen mask over your mouth and warns you that you might feel a burning sensation as the anesthetics are dripped into the I.V. line, but asks you to keep breathing. You never feel your hand burning; the effect of the twilight sleep gas takes immediate affect. Unaware, your face muscles twitched, and everything goes slack. You no longer look alive. The anesthesiologist drips paralysis medication into the I.V. to release your jaw for the intubation tube insertion. A mouth guard is fitted over your teeth, and the intubation tube is inserted through your mouth and into your pharynx, until it passes a few centimeters beyond your vocal folds in the upper third of your trachea (intubation). The tube is then taped to the left side of your mouth so that the laryngoscope can be fitted centrally. (See Figure 12.1) It attaches to a computer-run pump that feeds air in and out of your lungs, breathing for your paralyzed body. The bed is turned so that your head is toward the physician.

12.4 The Operation
Scrubbed to the elbows, masked and dressed by a scrub tech, the physician enters the O.R. He asks that a pillow be placed under your neck to allow your head to drop back. He moves your tongue to one side and slides the rigid scope straight into the larynx. The scope is anchored to the instrument table by the suspension. He runs the pilling light cord down the outside right of the scope (see demi-circle insertion point in Figure 12.3) until the vocal folds are illuminated. The light actually causes the outside of your neck to glow red! The bed is lowered and the physician sits in a chair behind your head. He peers down the scope’s tunnel through magnifying lenses and takes pre-op pictures. The pictures are printed and inserted into your chart by a technician. The physician then inserts a skinny, long-handled sickle knife down the scope. Your folds twitch against the knife, and he accidentally pops the polypoid lesion. Clear lymphatic fluid oozes out. He orders the anesthesiologist to induce a deeper sleep and checks his knife’s location under the now empty sac of loose skin, making sure as he cuts that the vocal ligament is behind the knife. Left vocal fold lesions are easier for right-handed people to operate on, and the physician permits his observing resident to perform its removal. The physician reprimands one of the scrub techs, “Try not to
rock the table, please.” The resident carefully moves under the thin lining of mucosa, being cautious not to tear it. Some of the mucosa is extremely thin from being stretched around such a large lesion and isn’t good anymore. The overly stretched mucosa that is superfluous and doesn’t run along the medial edge of the folds is removed. The excised specimen is handed to the scrub technician who promptly seals it in a cup of Formulin to be taken to the lab for testing. The physician soaks a cottonoid in Afrin and feeds it down the scope to swab blood from your folds and constrict the blood vessels. It’s a Kodak moment, and pictures are taken of your folds. The “before and after shots” are filed in your chart for future reference. Doubles are made for your personal use and are given to the nurse so that he may get them to you after you wake up.

12.5 Post Op
You gag a lot coming out of the drugs. The anesthesiologist heavily anesthetized you and had to compensate with another narcotic drug to bring you out faster. Your stomach and abdominal muscles hurt and your entire neck is sore from the surgical intubation, extubation, and laryngoscope positioning. A couple of scrub techs move you onto a new clean bed and wheel you to a room of monitored recovering patients. Here, you fully wake up and the nurse drapes a pre-warmed flannel blanket over you. Your shivering is due to the anesthesia’s effects wearing off, and doesn’t compare to the patient across from you who had open-heart surgery and shivers from a loss of body heat as well! Phonosurgery is relatively non-invasive and rarely causes your body temperature to drop, however the nurse may aim heat lamps at your body as well. You gesture to the nurse for something to write with, since you must begin your 5 days vocal rest observance. You want to clear your throat, but realize that vocal rest means no clearing, coughing, sneezing, and whispering. Instead you gesture for some ice chips. You sleep. The nurse determines that your vital signs have normalized and you are wheeled to a post-op room where you rest and wait for your ride home.

12.6 At Home
You don’t use your voice at all for three days. On the fourth day, you speak softly for about five minutes every hour, but still resist the urge to cough or clear your throat. Every other day you increase the time you talk by about five minutes. Your voice is unpredictable, much like a pubescent boy, and will be for about three or four weeks. The most optimal healing you can hope for as a singer is about 95% of normal. Food has less taste for the first four weeks due to the pressure the metal scope put on your tongue. Jaw, throat, and tongue pain are minimal and resolve after a couple weeks.
CHAPTER 13
COMMON QUESTIONS

13.1 What gives us each our own unique sound?
It’s important to realize that if you took the larynx out of your body and were able to get the vocal folds to vibrate, the sound would be a pretty generic buzz. The pitch / quality of the buzz would vary, depending on slight differences in the length and thickness of the vocal folds, but the size and shape of the resonance chambers inside our bodies are what really distinguish one voice from another. The buzzing sound at the vocal fold level resonates in the space immediately above the larynx, the vocal tract (pharynx). The pharynx is comprised of three parts: the nasopharynx is the space behind the nasal cavity, the oropharynx is the area in the middle behind the oral cavity that we commonly call the throat and the laryngopharynx is the space immediately above the vocal folds and esophagus. Sound resonates in the nasal cavity and if the back of the tongue is not touching the roof of the mouth, sound also resonates in the mouth (oral / buccal cavity).

13.2 Why does my voice sound different on tape?
When we listen to ourselves, our ears are not only picking up the sound that leaves our mouth, but are also picking up the sound through our interior physiology. If we plug our ears, we can still hear our voice, but the sound is dampened from the bone, liquid, and tissue of our skulls (bone conduction). This dampening lessens the accuracy with which we perceive our own voices. The voice on tape does not match what those around you are accustomed to hearing either! Healthy ears hear a very broad sound spectrum, whereas electronic recording devices encompass a limited gamut of the sound spectrum, usually clipping upper frequencies peaks, and thus deadening the overall brilliance of tone. The broader the frequency-range in a recorder, microphone, etc., the closer you’ll come to hearing yourself accurately. Many digital recording devices today simulate a near-perfect likeness.

13.3 How can I be heard over an orchestra?
You may want to picture the pharynx as a roughly 7 inch long tube, closed at the vocal fold end and open at the mouth/hose end. Like any acoustic space, this tube has harmonic peaks around 500, 1500, 2500, and 3500 cycles per second (cps), meaning that when the vocal folds vibrate 500 vibrations per second, the frequency compliments the space and resonates louder. An orchestra’s frequency peaks at about 450 cps. Because our ears reach peak resonance at about 3000 cps, singers who are able to produce a sung ring or buzz at around 2500-3000 cps (Singer’s Formant), own an acoustical advantage and do not need electrical
amplification. Among other skills, westernized classical technique focuses on mastering the Singer’s Formant / ringing voice quality.

13.4 How do I avoid getting nodes?
Hydrate, don’t talk too loudly, too much, or too low, warm-up properly before singing, control reflux if you have it. Prenodular conditions may resolve with one or two days of voice rest or conservation. (See 9.4 Vocal Fold Nodules)

13.5 What are the best/worst types of beverages for you voice to take care of it while in a show?
Water is the voice’s beverage of choice. Beware of alcohol, caffeine, and carbonated beverages.

13.6 Should you really avoid dairy products while in production?
In order to digest dairy products, the body must produce viscous mucus that helps break it down for digestion. Unless you enjoy singing with thick mucus, allow yourself an hour and a half to digest after consuming dairy before singing.

13.7 How much time should I spend warming up before a lesson?
You know your voice better than anyone else. Achieving that warmed-up feeling varies with each individual. During the run of a show, a singer may need only 10 minutes, when generally they need half an hour. Time spent warming-up may depend on the time of the day, the time of the month for some women, when and what you last ate, and what you’re about to sing! Learn to recognize when you feel warmed-up and what it took you to get there.

13.8 What happens when your voice gets hoarse?
Hoarseness means that excess air is leaking during the phonation process. Air leakage signifies that the vocal folds are not coming together all the way when they vibrate. The folds must be hydrated, have smooth edges (i.e. no lesions), uniform in weight (i.e. no hemorrhaged blood vessels) in order to have the periodic mucosal wave that produces what we recognize as a clean sound.

13.9 What happens when you lose your voice?
Also known as aphonia, having no voice usually implies acute inflammation (See Laryngitis). The folds get so swollen that they become weighed down and stiff. Vibration is absent or severely decreased, irregular and slow. More phonatory pressure and increased breath flow is needed to initiate a tone. If you have to push to get a tone started, something is wrong. In such cases, rest is better than phonation.
13.10 What causes vibrato? Is it unconscious?

Is vibrato taught, imitated, or inherent? Is it volitional or involuntary? Is it a natural or contrived vocal characteristic? The finest vocal pedagogues, pathologists, and performers debate these questions but the issue remains unresolved. Three main theories exist:

Vibrato is muscularly produced and manipulatively controlled.
Vibrato is learned and / or imitated.
Vibrato is an organic, natural phenomenon.

I believe vibrato may involve all three schools of thought. In different classically trained singers’ VLS exams, I’ve observed how visually varied vibrato appears. Any number of laryngeal structures may shake - sometimes the palate, the back of the tongue, the pharyngeal walls, or the larynx itself, and other times two or three of these combined.
Vibrato may occur from a slight letting go or lowering of muscular effort, with overly relaxed laryngeal musculature producing an out of control vibrato and held laryngeal muscular effort straightening the tone.46 The mystery remains, however, as to what exactly is being relaxed and held.

13.11 Is a great voice determined by vocal physiology or is it a metaphysical gift from God?

A great voice is a combination of natural born physiology and a metaphysical gift. Aside from the slight length and width variant that generally distinguish a male’s vocal folds from a female’s, all vocal folds are essentially alike. It’s a person’s ability to coordinate their breath and vocal folds combined with a person’s resonator shapes and sizes, and instinctive musicality that factor into a beautiful voice. In other words, if I could somehow exchange my own larynx with Renee Fleming’s, my voice may sound slightly different, but still not like her due to my unique oral, nasal, and pharyngeal cavities. Even if I were to have Renee Fleming’s exact anatomical structure, larynx included, but still have my own brain, (I wouldn’t have her brain programming the muscular motion) I would not be able to sing sza to her. Our voices, like every other part of us, are wired up to our brain. Two people singing along with the radio may produce very different perceptions depending on what their brain does with the information it’s receiving. One person may consistently sing a whole tone lower than the song they’re hearing, while another may occasionally go sharp or flat but maintain relative accuracy. It’s safe to say that every healthy person is able to improve their voice and learn to sing. The innate musicality and creativity that makes a great singer is the metaphysical gift that can be guided but not taught.

46 The author assumes vibrato to be what is acceptable to the western ear, generally 5-7 pulsations per second.
13.12 What causes a tickle?
Usually a tickle occurs with infection, irritation, or dehydration of the larynx.

13.13 What do the vocal folds look like when singing a whistle tone?
Also known as falsetto / flute register, whistle tone occurs when the vocal folds are at their longest and thinnest. Only the superior most edge of the vocal fold membrane is adducted. The adduction appears slightly bowed due to the absence of thyroarytenoid muscle involvement (the latter of which give the vocal folds their adducted bulk).47

CHAPTER 14

GLOSSARY

(Includes bolded vocabulary throughout text as well as other important words.)

14.1 Acronyms

ACDA: American Choral Directors Association (60,000 – 80,000 members)

AES: acronym for Aryepiglottic Sphincter

ASHA: American Speech Language Hearing Association

ASL: Analysis through synthesis lab (multidimensional speech profile captures form of wave).

Ba: barium

Ben: benign

Bid: twice a day

BINN: acronym Jamie Coffman (Head of ENT in South Forrest University uses to describe percentages of voice disorders he evaluates most; 80% Behavioral, 60% Inflammation, 60% Neurological/Muscular (i.e. paralysis, Parkinson’s, spas.dysphonia) 30% Neoplasm (malignant or benign. = Totals 230% so average patient has 2.3 things wrong with him! He looks for a) Primary Cause b) Reactionary / Compensatory (masking over problem)

BOTOX®: botulinum toxin

Bx: biopsy

CC: chief complaint

CCC-SLP: Certificate of clinical Competence in Speech-Language Pathology

C/O: complains of

CoMeT: Collegium Medicorum Theatri

CNS: central nervous system

CPS: cycles per second

dB: decibels

D/C: discontinue

D.O.: doctor of osteopathy

Due to: due to

Dx: diagnosis

EGG: electroglottogram

Endo: endoscopy
ET tube: endotracheal tube
ETOH: alcohol
F0: fundamental frequency
FEES: Fiberoptic / Flexible Evaluation of Swallowing
FFN: Flexible Fiberoptic Nasendoscopy
FHx: family history
F/U: follow-up
GE: gatroesophageal
GERD: Gastroesophageal Reflux Disease
GI: gastrointestinal
Haz-Mat: hazardous materials, usually referring to drugs.
HEENT: head, eyes, ears, nose, and throat
HPV: herpes virus
HTN: hypertension
Hx: history
Hz: Hertz
IC: inspiratory capacity
Insp: inspiration
IV: intravenous
JAMA: Journal of the American Medical Association
L (w/a circle around the L): left
LAT: lateral
LEHPZ: lower esophageal high-pressure zone
LES: lower esophageal sphincter.
LO: lateral oblique
LPRD: Laryngo-Pharyngeal Reflux Disease
LRI: lower respiratory infection
LTB: Laryngotracheobronchitis
Memb: membrane
ML: midline
MP: menstrual period
NATS: National Association of Teachers of Singing; 8,000 members
NG: naso gastric tube
NKA: no known allergies
NL: normal
NP: nasopharynx
NT: nasotracheal
Obl: oblique
Obst: obstruction
Occ: occasional
O.P.C: outpatient clinic
OSAS: Obstructive Sleep Apnea Syndrome
Palp: palpable
PC: after meals
PEG: percutaneous endoscopic gastrotomy
PO: by mouth
Post-op: post operative
Prelim: preliminary
Pre-op: pre-operative
Prep: prepare
Prim: primary
PT: patient
PVCD: Paradoxical Vocal Cord Dysfunction
PVFD: Paradoxical Vocal Fold Dysfunction
®: right
RFOE: Rigid Fiberoptic Oral Endoscopy
RLN: recurrent laryngeal nerve
R/t: related to
RVT: resonant voice therapy
Rx: prescription
SLN: superior laryngeal nerve
SMR: submucous resection
SOB: shortness of breath
SVS: singing voice specialist
Symp: symptoms
T&A: tonsillectomy and adenoidectomy
TE: tracheoesophageal
TFL: transnasal fiberoptic laryngoscopy
TLV: total lung volume
TMJ: temporomandibular joint
TPR: temperature, pulse and respirations
TV: tidal volume
Tx: treatment
UES: upper esophageal sphincter
UGI: upper gastrointestinal
Unk: unknown
URI: upper respiratory infection
VARN: Vocal Arts Resource Network
VAS: vascular
VC: vital capacity
VF: ventricular fibrillation
Vent: ventricle
VLS: Video Laryngeal Stroboscopy
Vol: volume
VS: vital signs
VSD: ventricular septal defect
WNL: within normal limits
Wt: weight
X/R: xray

14.2 Prefixes and Suffixes
-otomy / -ectomy: implies the surgical removal of something (Tracheotomy, Laryngectomy, Tonsillectomy, etc.)
-ostopy: implies a hole that is created surgically (Tracheostopy).
-opsy: denotes a medical exam or inspection.
-iacin: family of medications that fight staff and strep bacteria.

14.3 Vocabulary
A compilation of terms including bolded words from the text as well as others the author deems important additions to every singer’s vocabulary.

Abduct: to open the vocal folds.
Acetaminophen: a common medication used to decrease pain and fever without decreasing inflammation. Found in Tylenol products. 
Acute: having sudden onset and lasting a short time.
Adduct: to close the vocal folds
Adrenaline: surges can dry out mucous membranes that line the body in areas.
Amplitude: The distance a vibrating object travels from the midline.
Analgesics: cause blood platelets to dysfunction, which thins the blood and heightens the risk of hemorrhage. Analgesics are often prescribed for laryngeal pain or irritation. Singers should substitute acetaminophen for analgesics and even then, only when necessary.
Anesthesia: a process producing lack of pain, amnesia, and paralysis, making it easier to operate.

Anesthetics: also spelled anaesthetics in the United Kingdom, drugs used to produce anesthesia. Many types.

Angioedema: an inflammatory reaction of blood vessel dilation. Often due to angiotensin-converting enzyme inhibitors (aspirin, penicillin) or non-steroidal anti-inflammatory agents found in medications such as “-cycline” and “-mycin” family antibiotics.

Anterior: Latin for before. Toward the front.

Anterior Commissure: the area toward the front of the neck where the vocal folds come together and meet at the thyroid notch.

Antitussive: cough suppressant.

Aperiodic: irregular.

Apex: the highest point.

Aphonia: no voice; refers to the inability to produce any phonation.

Approximate: (verb) the nearing of the vocal folds. (See Adduct)

Aryepiglottic Folds: the rim of the aryepiglottic sphincter. The folds include and are pulled taut by the cuneiform cartilages.

Aryepiglottis / Aryepiglottic sphincter: actually an acoustical space above ventricular folds outlined by the epiglottis and upper rim of the thyroid cartilage. The rim of the outlining walls / aryepiglottic folds tense and relax with swallowing, creating a sphincter-like constriction. This action pulls the larynx away from the back wall of the pharynx, stretches open the esophageal entrance and allows food to pass into the esophagus.

Arytenoids: Latin for ladle-like. Paired cartilages mounted like saddles atop the cricoid cartilage. They can slide and rock as well as pivot. Tend to be very pronounced in singers.

Aspirate: to inhale fluid into the lungs.

Atrophy: the weakening or wasting away of a tissue or organ.

Bilateral: relating to or occurring on both sides.

Bilateral Adductor Paralysis: (See Vocal Fold Paralysis)

Board Certified: specialty certification.

Botchalism: outpatient procedure of injecting botulinum toxin (commercially known as BOTOX®) to temporarily weaken nerve enervation to the muscles. Can be injected every 4-6 months into the vocalis via the thyroid notch to prevent hyper adduction as well as into the posterior arycoarytenoids to prevent hyper abduction of spasmodic dysphonia. Also used cosmetically to reduce wrinkles. Singers should not cosmetically resort to BOTOX® since it “freezes” muscles involved in facial expression as well as singing and thus impede vocal capability.

Bowing: a condition in which the vocal folds adduct, but meet only at the top and bottom, making phonation difficult. Occurs when the thyroarytenoid muscles atrophy or are traumatized. Often happens with old age and is known as presbylarynx.
**Buccal Cavity:** (See Oral Cavity)

**Capillary:** literally *hair-like*, the tiniest member of the blood vessel family. About .0008 mm. in diameter, they connect the smallest veins (venules) with the smallest arteries (arterioles). The larynx contains venules and capillaries only. No arteries, arterioles, or veins.

**Carcinoma:** generic term for cancers that originate in the membranes that line the body. One example is squamous cell carcinoma, which is a malignant alteration in mucosa and the second most common type of skin cancer. It is the most common form of laryngeal and lung cancer. Carcinomic growth is usually identified by its white, cottage cheese-like lesions. Laryngeal carcinoma often causes hoarseness and generally stems from smoking and / or alcohol.

**Cetacaine:** The anesthetic sprayed in the nose to counteract the discomfort of nasendoscopies, or the mouth to numb the gag reflex occasionally triggered during oralendoscopies.

**Chronic:** as opposed to acute, a symptom that persists beyond it’s normal duration.

**Confidential Speech:** Well-pitched, abdominally supported speech that is no louder or softer than if speaking to someone an arm’s length away. *If you can’t touch them, you shouldn’t be talking to them.*

**Congenital:** describes a trait or disorder you’re born with, whether it be hereditary, influenced by pregnancy, or contracted in the birth canal.

Contact Ulcer: a breakdown of the mucosa - look for displaced arytenoids. Some believe it’s a distinct disorder and some that it’s an early stage (immature) granuloma. Almost always occurs with reflux. Produces thickened mucosa layers form over layers.

**Conus Elasticus:** the lower thicker portion of the laryngeal elastic membrane that makes up the underside of the vocal folds. The conus elasticus extends from the cricoid cartilage up into the vocal ligament, the latter of which is actually the thick free edge of the conus elasticus membrane.

**Corniculate Cartilages:** small horn-shaped projections of cartilage situated on top of the arytenoids. They don’t develop until the teenage years.

**Cranial:** comes from the Latin word for skull, *cranium*. Synonymous with *rostral*, meaning toward the head.

**Cricothyroid Muscles:** affect pitch on contraction by tilting the thyroid away from the cricoid. There are two sets - the oblique (lower horn) and the recta/straight (superior lower thyroid cartilage wall). The superior laryngeal nerve of the vagus innervates both sets.

**Cunieform:** Latin for *wedge form*. Help keep the entrance to the larynx open by supporting and pulling taut the aryepiglottic folds. These tiny but crucial bumps are elastic cartilages and don’t develop until the teenage years.

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**Cycles per Second**: a measurement also described as **Hertz**. For our purposes, this phrase refers to how many times the vocal folds complete a full **period**.

**Cyst**: a clogged mucous duct, with a marble-like deposit inside, often embedded in the vocalis muscle. It irritates and causes opposite side to swell and is more difficult to remove than a polyp (which is more superficial). The cyst and its swelling can look like nodules. A cyst is hard and not as affected by the folds’ vibrations as much. Therapy helps swelling to go down allowing one to determine the nature of the bump. Doesn’t occur from vocal strain.

**Decibel**: unit of measurement for sound intensity.

**Deglutition**: swallowing.

**Depressors**: muscles that lower the larynx with contraction. They are paired with elevators that relax as depressors contract.

**Deviated Septum**: a crooked line down the midline of the nose where there should be a straight one. Can be cause from broken bone, but most often is fault in the cartilage or a break where the bone and cartilage fuse.

**Diaphragm**: a muscle shaped like an upside down salad bowl that attaches along the bottom ribs and separates the abdomen from the thorax. It contracts upon inspiration, allowing the lungs to descend and fill with air, and relaxes with expiration, returning to its inverted resting position. It’s contraction helps in childbirth (parturition) and going to the bathroom (defecation). Hiccups and sneezing are forms of diaphragmatic spasms.

**Digastric**: literally Greek for having two bellies. Some muscles are characterized as digastric muscles.

**Diplophonia**: (lit. double **phonation**) caused when two separate sources vibrate simultaneously. If you hear two voices or what sounds like your voice two different pitches are simultaneously coming out of your mouth you’re not crazy! This phenomenon often occurs with unilateral lesions. Diplophonia may also occur when extreme muscle tension pulls the ventricular folds together so that they vibrate above the vestibular folds.

**Dysarthria**: most often refers to difficulty speaking due to tongue or laryngeal muscle impairment.

**Dysphagia**: swallowing disorder.

**Dysphonia**: abnormal voice such as hoarseness.

**Edema**: adj. edematous. Swelling often caused by protein-bound water accumulating outside the blood vessels.

**Elastic Cartilage**: tissue that doesn’t ossify, but continues to stay flexible. Elastic cartilages of the larynx include the vocal process, arytenoid apex, corniculate, and epiglottis.

**Elevators**: muscles that raise the larynx with contraction. They are paired with depressors that relax as elevators contract.

**Endotracheal Tube**: also called an ET Tube, the tube placed in the trachea used to ventilate a patient during surgery.
**Epiglottis**: a thin, yellow leaf-shaped cartilage of the larynx that projects up behind the tongue and covers the airway during swallowing.

**Epilarynx**: anatomical reference to area between the epiglottis and the true vocal folds.

**Erythema**: redness due to inflammation.

**Esophageal Sphincter**: a valve-like opening that lets food into the stomach after swallowing and keeps food in the stomach during digestion. The esophagus has two sphincters – an upper and a lower.

**Esophagus**: food pipe. Entrance located just outside of and posterior to the arytenoids.

When you swallow, the larynx rises slightly and tips forward. As a result, the epiglottis folds over, and the passage to the stomach (esophagus) is stretched open to receive what you’re swallowing. Unless you are talking while your eating, this reflex is involuntary and won’t get mixed up! Nothing actually touches the vocal folds. Everything is directly deposited into the esophagus.

(Note: To **fully** understand what a sphincter is, think of your bum. Your esophageal sphincter looks identical to the sphincter of your bum. So, when you burp, it’s identical to…well, you get the idea.)

**Etiology**: the cause or root of something (in this case, any given pathology).

**Flexible Fiberoptic Nasendoscope**: instrument used to view the larynx via the nose. The long skinny tube contains a bundle of five light strands that illuminate the larynx for viewing and recording purposes.

**Functional Voice Disorder**: when a voice is anatomically and neurologically healthy, but has a disorder stemming from phonotrauma. Examples of how a functional voice problem can occur are speaking at too low or too high a pitch level, phonation that consistently seems unnaturally loud or hoarse, excessive laryngeal tension effectively closing off the airway, functional abuse (i.e. excessive throat clearing) and vocal misuse (i.e. screaming). Such behaviors can cause lesions that further contribute to an already sounding faulty voice.

**Fundamental Frequency**: The number of times the vocal folds or any vibratory source vibrate per second.

**Gastroesophageal Reflux Disease**: condition in which stomach contents spill into the esophagus due to acidic irritation, overeating, overeating, weak motility action (ability to push acid back into the stomach) or a weak lower esophageal sphincter. Singers often trigger GERD by eating a lot after a late performance and going to bed shortly thereafter. GERD is also common in singers due to the vigorous diaphragmatic action used in westernized classical singing that jostles stomach contents and triggers burping. (See 4.7 Reflux and Laryngopharyngeal Reflux Disease)

**General Anesthesia**: as opposed to local anesthesia, numbing the entire body for more serious operations. General anesthetic is delivered through an IV along with medication that paralyzes the body, making it safe to operate upon. Both are usually preceded with “twilight sleep” inhaled through a facemask. In order to keep you body functioning healthily throughout the surgery, a tube is inserted down passed the vocal folds into the top third of the trachea. The tube is connected to a machine that pumps oxygen in and out of your lungs, breathing for you, until the surgeon tells the anesthesiologist that the operation will be done soon and...
preparations are made to help you wake up. (See **Intubation**, 11.1 General Anesthesia, and 11.1 Intubation)

**Glottal**: describes the glottis / space from the anterior commissure to the vocal process ends of the arytenoids. (See Glottis)

**Glottis**: the sound-producing component of the larynx, including the vocal folds and the space between them.

**Granuloma**: extra / redundant tissue buildup from chronic irritation or infection. Often occurs in the posterior larynx with reflux or in anterior larynx from intubation trauma. A unilateral lesion can cause granuloma to form on the opposite fold. Usually takes 8 wks of vocal therapy, hydration, and rest to heal.

**Greater Cornu**: the upper and posterior horn-like protrusion of the hyoid bone.

**Hematoma**: A hematoma is a clot of blood (usually large) that forms outside of a blood vessel as a result of hemorrhage.

**Hemorrhage**: a burst / ruptured blood vessel. Hemorrhage is usually used as verb to described active blood loss.

**Hertz**: a unit of frequency measurement equaling 1cycle/second.

**Histology**: cellular or microscopic make-up of any given tissue.

**Hoarseness**: also called *dysphonia*, a harsh, noisy voice quality that occurs when there is a disruption in the regularity (*periodicity*) of vocal fold vibrations. Any disruption in the vocal fold’s phonatory pattern allows air to escape and results in a hoarse sound. Such disruptions include anything from minor edema to serious lesions and pathologies and often stem from phonotrauma. Neurological conditions such as paralysis can cause hoarseness as well.

**Hyaline Cartilage**: fibrous tissue that ossifies with age. Hyaline cartilages in the larynx (i.e. the thyroid, cricoid, and most of the arytenoid) begin to ossify from the top down in the late 20’s.

**Hyoid**: literally Greek for U-shaped, refers to the horseshoe-shaped bone originating at the base of the tongue.

**Idiopathic**: having unknown cause.

**Indirect Laryngoscopy**: also called mirror imaging. Using a mirror inserted into the oral cavity to observe the vocal folds. (See 7.3 The mirror)

**Inferior**: under or lower.

**Intubation**: the proper name used to describe the process of placing the endotracheal tune in the trachea.

**Jitter**: Jitter refers to slight differences between one cycle and another that do not audibly hinder the sound quality, but alter the fundamental pitch.

**Keratinized Tissue**: hard or horny tissue such as a fingernail or callous. A newly formed vocal fold cyst is soft and fluid filled, but can keratinize after rubbing against the opposite fold during phonation.

**Laryngeal Arthritis**: Like any joints, laryngeal joints can get arthritis. Severe cases affecting arytenoid rotation may require a **tracheostomy**, since the arytenoids adduct the folds to protect the airway and abduct the folds for respiration.
**Laryngeal Web:** is a scar tissue bond of laryngeal tissues formed anteriorly between the vocal folds, partially closing off the airway, and causing a voice to sound high, thin, and strained.

**Laryngectomy:** total or partial removal of the larynx. Often necessitated by laryngeal cancer or severe trauma to the larynx. Usually mandates a tracheostomy since without the larynx, the trachea is left unprotected. Alternative voice methods are resorted to such as the artificial larynx or esophageal speech.

**Laryngitis:** the general term for any acute virus (i.e. sudden) causing inflammation of the larynx, including swollen folds.

**Laryngocele:** a congenital or acquired defect in which an air pouch has formed in the mucous membrane of the larynx. The pouch may bulge inward through the ventricle and may even enlarge the false folds to the point of vibration and / or obstruct the airway. May also leak into the thyrohyoid membrane and produce a visible neck mass. Laryngoceles expand when a person forcefully exhales while the mouth is closed and nostrils pinched shut. Tend to appear in players of wind instrumentalists (what happened to Louis Armstrong!). Infected sacs fill with mucus-like fluid and must be surgically excised.

**Laryngologist:** an otolaryngologist who specializes in disorders of the larynx and voice.

**Laryngopharyngeal Reflux Disease:** a GERD condition in which stomach acid that gets sloshed all the way up into the larynx and pharynx / upper aerodigestive tract due to acidic irritation, overeating, or weak lower esophageal sphincter. Singers often trigger LPRD by eating a lot after a late performance and going to bed shortly thereafter. LPRD is also common in singers due to the vigorous diaphragmatic action used in westernized classical singing that jostles stomach contents and triggers burping. LPRD is a more serious type of GERD for singers, since the acid burns the tissues surrounding the vocal folds, making them swell and function less efficiently. (See Gastroesophageal Reflux Disease and 4.7 Reflux)

**Laryngopharynx:** also called hypopharynx, includes the throat and pharyngeal area directly behind the larynx.

**Laryngoplasty:** general term referring to any surgery on the framework of the larynx.

**Laryngoscopy:** an outpatient procedure in which a clinician views the larynx in motion with one of two type scopes; a rigid oral endoscope or a flexible nasendoscope. When the exam is videoed it’s called a Video Larynoscopy. When the exam involves strobe light illumination, it’s referred to as Laryngeal Stroboscopy or Strobolaryngoscopy. (See Video Laryngeal Stroboscopy and 7.3 Instruments used in the office)

**Laryngospasm:** a sudden contraction of the vocal folds and epiglottis to block the airway, as opposed to a pharyngeal reflex (a.k.a. “gag”), which causes the soft palate to raise.

**Larynx:** a cartilaginous structure otherwise known as voice box that houses the vocal folds and protects the airway. The larynx has few pain perceptors. Its development occurs as cartilage grows. The angle in the male larynx is 90 degrees and is reached after pubescent growth spurt with a sudden laryngeal tilt alteration. The female’s growth is gradual and eventually reaches 120 degrees.

**Lateral:** from Latin term *latus*, meaning side. Along side of, away from the midline.
**Lateral Excursion**: the distance a fold travels from the median, away from the vocal process (thick layers). The folds’ most lateral excursion occurs near where they attach anteriorly at the thyroid notch cartilage, at the junction of the anterior one-third and the middle one-third. As a result, this is the area where nodules will occur due to the little freedom and “pinned down” area of folds and the nodules’ their callous-like properties.

**Lateralization**: a surgical process of making two asymmetrical anatomical structures symmetrical.

**Lesion**: altered tissue. When a vocal fold has a lesion, the lesion causes that fold to be heavier than the other, thus resulting in a-periodic vibration.

**Lesser Cornu**: the lower and anterior horn-like protrusion of the hyoid cartilage.

**Leukoplakia**: white patches of precancerous mucosal tumors that usually extend subepithelially and develop from constant irritation such as smoking and GERD. They must be watched carefully, as they can become malignant.

**Ligament**: a band of strong connective tissue attaching cartilage to cartilage, bone to bone, or bone to cartilage.

**Lingual Tonsils**: lie at the base of the tongue, between the tongue and epiglottis.

**Local Anesthesia**: as opposed to general anesthesia, numbing only the section of the body being operated upon. Usually delivered by a one or multiple injections of anesthetic.

**Lower esophageal sphincter**: the valve connecting the stomach and esophagus.

**Meatus**: *meatus* is both singular and plural. A passage or opening as in the upper, middle, and lower nasal meatus.

**Medial**: toward the middle / midline.

**Menier’s disease**: chronic inner ear fluid that builds up and affects the inner ear, causing ringing and dizziness.

**Membrane**: literally, thin skin. Connects structures, separate spaces and organs, lines cavities.

**Mirror Imaging**: (See Indirect Laryngoscopy and 7.3 The mirror)

**Mitomycin**: a chemotherapy drug that may be used in surgery to diminish fibroblast proliferation and decrease scarring.

**Mucolytic**: a pharmaceutical agent that breaks down and hydrolyzes mucus to make it thinner.

**Mucosa**: adj. *mucous*, n. *mucus*. Only 1.5 mm thin and 5-7 cell layers thick, non-keratinized tissue made up of glyco-protein (water bound by protein). Water intake must be consistently adequate to maintain hydrated mucosa, and hydrated mucosa is key to vocal health and clean singing.

**Mucosal Wave**: the coming together and separating motion of the folds. As the folds adduct, they close from bottom to top. Folds that are tethered by a sulcus vocalis may only have a partial wave and meet only at the top in adduction. A unilateral paresis may cause the affected fold’s mucosal wave to be slower than the other. A mucosal wave can be observed on each fold separately or on the vocal folds together.

**Muscle Tension Disphonia**: voice disorder due to abnormal or severe muscle tension in the larynx, often in conjunction with vocal phonotrauma. May develop out of compensation for a vocal fold lesion.
**Muscular Antagonism**: in order for one muscle to contract, another must relax. All muscles except the diaphragm and the interarytenoids are paired as muscular antagonists.

**Mutational Chink**: a posterior gap in the vocal folds that is observed in the majority of all females and contributes to a breathy sound.

**Myasthenia Larynges**: also called bowed vocal folds, presbylarynx (in the older adult), vocal folds worn with overuse and plagued with dysphonia characterized by difficulty getting loud enough to be heard.

**Nasal Cavities**: two passageways opening at the nose at one end and into the nasopharynx at the other. The passageways are separated by the nasal septum. Each passage is lined with ciliated epithelium and produces highly vascular mucus that catches and traps dust and **pathogens**. Air that passes through the nasal cavities is warmed, moistened, and cleaned.

**Nasal Septum**: cartilaginous midline in the nasal cavity that transforms to bone higher up in the nose.

**Nasendoscopy**: a video laryngoscopy exam that is done by passing a flexible wire containing a camera through the most open of 3 nasal meatus. The superior meatus is tiny and rarely used to avoid pain and viewing the larynx from an odd angle. The medial and inferior meatus are the clearest, most open passageways through which to feed the cord. It is important to breath through nose to help open passageway. The stimulation to the sinuses may trigger involuntary eye watering or a slight discomfort as it passes through a narrow spot in the tunnel and a minor nosebleed may occur. But once the camera is in place, it should feel comfortable and allow the physician to observe talking, singing, breathing through the nose, or any number of activities. Nasendoscopy views are not as close as with oralendoscopy, but going through the nose works better for children who don’t sit still and patients with a sensitive gag reflex. Nasendoscopies are also necessary to diagnose PVCD since the patient’s normal talking and breathing can be better observed. A closer picture may be obtained by having the patient not swallow or cough for 10 seconds while the camera is lowered into the aryepiglottic sphincter (=muscular tightening area). A patient who does cough or swallow during this procedure will likely pass out due to the obstructed airway. (See 7.3 Instruments used in the office)

**Nasopharynx**: also called postnasal space, the area of the pharynx above the soft palate.

**Nodules**: common pathology in preachers, teachers, lawyers, singers. Either fibrous or edema nodules. Check for symmetry, mucosal wave, amplitude, phase Closure (Hyper vs. Hypo), Glottal Closure, periodicity (viewed in 0 phase), arytenoid movement. Bilateral and callus-like in nature, nodules occur at the junction of the anterior one-third and the middle one-third of the vocal fold where the greatest excursion takes place. There is no such thing as a node.

**Noise**: when any given vibration / vibratory cycle is aperiodic or irregular, noise results.

**Non-Keratinized Stratified Squamous Cell Epithelium**: non-keratinized, meaning not made up of the tough protein substance found in hair, nails. Stratified squamous cell epithelium specifies a type of skin made up of flat epithelial cells (such as the anterior surface of the epiglottis and the top rim of the aryepiglottic folds). The vocal folds are covered by non-keratinizing stratified squamous cell epithelium.

**Odynophagia**: painful swallowing.
**Odynophonia**: painful phonation.

**Oral Candida**: the most common oral / laryngeal yeast infection, also known as “thrush.” Oral candida is contagious fungus characterized by a cottage cheese appearance, burning, and implies immune system deficiency (often triggered from antibiotics).

**Oral Cavity**: also called the **buccal cavity**, denotes the mouth area.

**Oralendoscopy**: the type laryngoscopy procedure that is done with a scope that goes in the mouth and is balanced right under the uvula, to look over and behind the tongue. Some patients have a hyper gag reflex and do not tolerate this well. The angle of the camera is 70 degrees, although there are 90-degree scopes that require full insertion to the back wall of the pharynx in order to get a full picture. The oralendoscopy distorts singing quality due to unnatural position of articulators and prohibits breathing through the nose. (See 7.3 Instruments used in the office)

**Organic Voice Disorder**: as opposed to a functional voice disorder, a disorder caused by some abnormality out of the sufferer’s control. Organic causes include laryngeal trauma, a congenital defect, or an abnormality created by surgical intervention.

**Oropharynx**: the middle portion of the pharynx encompassing the space above the epiglottis and below the soft palate.

**Osmolality**: the number or concentration of compounds dissolved within a solution.

**Ossify**: harden. Due to their unique cellular makeup, hyaline cartilages in our bodies turn to bone (ossify) as we age. The process leading to ossification is called calcification, meaning the tissue has begun to develop hard calcium deposits and as a result lose pliability.

**Ostium**: hole or mouth or stoma of something.

**Otolaryngologist**: also called **otorhinolaryngologist**, a certified specialist in ear, nose, and throat disorders.

**Pachyderma**: literally **thick skin**, also known as pachydermia. Unusually thick skin. When observed at the laryngeal level, pachyderma appears at the posterior glottis between the arytenoids and implies chronic reflux. (See **Gastroesophageal Reflux Disease, Laryngopharyngeal Reflux Disease**, 4.7 Reflux, and Figures 9.1.1, 9.3.2, 9.4.1, 9.5.1, 9.6.1-3, 9.10.1, and 9.12.1)

**Papilloma**: also called *Papillomatosis and Papillomata*, wart-like growths developing from exposure to any herpes-like virus. The growths are contagious, may recur unpredictably and can spread. Of 23 varieties, #7 and #11 are laryngeal. Babies with infected mothers may catch the virus passing through the birth canal. Laser vaporization is most effective when removing papilloma and takes away less tissue than the “laying on of cold hard steel” (i.e. using a knife to cut it away).

**Paradoxical Vocal Cord Dysfunction**: (See **Paradoxical Vocal Fold Dysfunction**)

**Paradoxical Vocal Fold Dysfunction**: also called *Paradoxical Vocal Cord Dysfunction*, although PVFD is a more current term. Cannot only occur at the vocal fold level, but also at the epiglottic level in which epiglottis constricts airway. Usually is reflux or stress triggered due to subconscious narrowing of the throat muscles to protect trachea.
(Note: PVFD is commonly misdiagnosed as asthma. If you have been diagnosed with asthma and medications aren’t working, it may be wise to consult an ENT to rule out PVFD. Checking for PVFD is a minor exam, whereas asthma can only be diagnosed by a doctor inducing it.)

**Paralysis**: usually permanent, significant or complete inability to function due to nerve or muscular impairment. A paralysis occurring at an old age (not due to surgery) is a bad sign and suggests a cancerous growth is pressing into the superior laryngeal nerve, or a stroke. (See **Vocal Fold Paralysis** and 9.15 Vocal Fold Paralysis)

**Paralytic Aphonia**: loss of voice due to paralysis.

**Paramedial**: *Para-* literally means near. Paramedial is a location description referring to near the middle.

**Paresis**: slight or partial paralysis, usually temporary and often caused by a virus. A vocal fold paresis is common and characterized by weakness, loss of muscle tone, loss of mobility.

**Pathogens**: substances capable of producing disease.

**Pathology**: literally *reason for suffering*, name for any condition caused by disease.

**Pedunculated**: literally *on a little foot*, at the end of a stalk as in a pedunculated polyp.

**Perichondrium**: a membrane of fibrous connective tissue that covers all cartilage.

**Period**: refers to

**Periodicity**: how regular and consistent is the vocal folds’ vibratory pattern.

**Petiole**: literally *little foot*, the base of epiglottis.

**Pharyngitis**: literally inflammation of the pharynx. The technical term for sore throat.

**Phase lock**: also called 0 ‘phase,’ the same shot timed to frequency so that if phonatory patterns are regular, a consistent open or closed phase will show. It must be done with straight tone, since vibrato will confuse the pitch frequency.

**Phonation**: sound produced by vocal fold vibration. Air is exhaled out of the lungs up the trachea and through approximated vocal folds, setting the vocal folds into vibration.

**Phonosurgery**: laryngeal surgery dealing with altering position, tension, mass, mobility, length, or shape or vocal folds.

**Phonotrauma**: the term this paper advocates to denote both vocal abuse and misuse.

**Laser Photocoagulation**: technique employed by surgeons in which laser light rays are focused on hemorrhaged blood vessels. This laser, with the heat from a fine-point laser beam, cauterizes the vessels to seal them from further leakage. Photocoagulation is also known as the "hot" laser treatment, because it destroys surrounding healthy tissue while coagulating.

**Physician**: the only professional qualified and licensed to identify, medically diagnose, and prescribe treatment for pathology. A physician is not an expert on the behavioral aspects of pathology or the treatment realm, but mostly focuses on cutting and medicating. Examples are otolaryngologists. Pathologists are NOT physicians.

**Point of maximum glottal contact**: the junction of the anterior one-third and the posterior two-thirds of the vocal folds. This marks the area of the greatest vocal excursion.
**Polyp:** a blister-like bump growing out of the mucous membrane. Broad-based / sessile types can be reabsorbed and go away. The skin tag / pedunculated types however will not and must be surgically removed.

**Polypoid Corditus:** also called polypoid degeneration and Reinke’s edema, polypoid corditus occurs often in smokers (of any inhaled irritants) and those with severe reflux where the watery subepithelial layer of the folds (Reinke’s Space) gets gelatinous. Disorder will recur as long as one continues to smoke. Smoke coats the larynx, discolors the folds to gray, causes mucus to get gelatinous and folds swell. Folds may thicken until they are so heavy that they get sucked in together on inhalation, making it difficult to breath. Sometimes breathing is difficult. (Take a biopsy of the mucosa to check for cancer.) Surgical removal involves entering the mucosal wave laterally and sucking it out (also what you do when it occurs in lungs – can get a lung reduction).

**Polypoid Degeneration:** (See Polypoid Corditus and 9.7 Polypoid Corditis)

**Polypoid Edema:** (See Polypoid Corditus and 9.7 Polypoid Corditis)

**Posterior:** toward the back, or behind.

**Posterior Cricoarytenoid Muscles:** the only muscles that abduct the folds.

**Prepulcid:** a medication once prescribed to stop reflux by narrowing the esophagus and tightening its lower sphincter. It frequently caused heart attacks, however, and was discontinue. Today there are no drugs that help a weak esophageal sphincter, only drugs that inhibit acid production or help neutralize the acid.

**Presbylarynx:** literally old larynx. The voice folds’ innermost layer is muscle and like any muscle, atrophies with age, causing the vocal fold (s) to shrink and / or bow. Surgery can bulk them up with fat injections, but effects are temporary.

**Process:** a section of bone of tissue that projects out. The body has many including the muscular and vocal processes of the arytenoid cartilages.

**Proprioception:** a sense of body position in space.

**Puberphonia:** also known as mutational falsetto, incomplete mutation, and adolescent transitional dysphonia. A persistent high, breathy falsetto in a male (and occasionally a female) who’s beyond puberty and has a seemingly normal larynx. Commonly stems from a psychological disorder or learned behavior. Physiological causes such as an endocrine imbalance are rare and must be ruled out.

**Pyriform Sinus:** two deep laryngeal spaces located between the larynx and esophagus that help protect the airway by acting as gutters for collecting mucus. Their contents spill into the esophagus as the larynx raises with swallowing. They can over contract with MTD. Cancer that develops in these sinuses is called silent cancer and nearly always requires a complete laryngectomy due to its late diagnosis. Until the lesion has matured (i.e. embedding itself in muscle and large enough to interfere with swallowing), it goes undetected.

**Reactive Change:** any change produced as a result of an outside influence. Voice specialists often use this term when referring to the effects that a unilateral submucosal lesion (i.e. polyp or cyst) may have on the opposite fold.
Rebound Hypoglycemia: a condition where a lack of blood sugar causes acute fatigue, irritability, and weakness.

Recurrent Laryngeal Nerve: controls all intrinsic laryngeal muscles other than the cricothyroid.

Reflux: The food pipe leading from the throat to the stomach is the esophagus and that the sphincter-entrance to the esophagus is located behind the larynx, just posterior to the arytenoids. The esophagus has a lower sphincter as its entrance to the stomach. Sphincters allow things to pass through one-way and immediately tighten up to prevent anything from escaping. The lower esophageal sphincter allows food to enter the stomach, but keeps the acid in the stomach from sloshing up the esophagus during digestion. If someone’s lower esophageal sphincter (LES) is weak, acid may leak into the esophagus and burn its lining. Reflux can still occur despite a properly functioning LES if the stomach has produced too much acid. The burning sensation that often accompanies reflux is commonly called heartburn, although the sensation has nothing to do with the heart. People who regularly suffer from heartburn or juicy burps may have Gastroesophageal reflux disease (GERD).

Singers often suffer from a type of GERD called Laryngopharyngeal reflux (LPR) in which acid leaks not only into the esophagus, but gets sloshed all the way up to the vocal fold and pharynx area as well. Singers are prone to LPR due to the vigorous abdominal movement involved in singing, but because LPR causes heartburn sensations in only about HALF the people it affects, it’s not always easy for singers to detect. More common symptoms stem from small amounts of acid burning the laryngeal tissues and causing them to swell. Acid that touches the vocal folds may induce vocal fatigue, hoarseness, and difficulty warming up.

Reflux Laryngitis: laryngitis caused by regurgitation of stomach acid into the pharynx and onto the arytenoid mucosa and posterior vocal folds. The gastric acid burns laryngeal tissue, causing it to redden and swell.

Residual Air: air that still remains in the lungs even after complete exhalation. 10% of our TLV is reserved for residual air that doesn’t leave our lungs until we die.

Rigid Fiberoptic Oral Endoscope: instrument used to view the larynx via the mouth. The long metal rod contains a bundle of light strands that illuminate the larynx for viewing and recording purposes.

Sagittal: a vertical / longitudinal cut anatomical view.

Sarcoidosus: swelled mucosa, obstructs airway (can occur in lungs).

Sessile: as opposed to pedunculated, attached directly by a broad base.

Shimmer: An increase or decrease in amplitude.

Silia: tiniest hairs in the nostrils (not the ones visible) that sweep things into the sinuses.

Singer’s Formant: a 2500Hz – 3500Hz “ring” in the voice achieved through slightly lowered larynx and firm glottal closure.

Sleep Apnea: also called obstructive sleep apnea syndrome, a disease characterized by hypernasality, loud snoring, restless sleep, and labored respiration during sleep caused by airway obstruction. OSAS generally
develops out of adenoid and tonsil hypertrophy for which treatment is an adenotonsillectomy. Sometimes uvular hypertrophy is the culprit, mandating Uvulopalatopharyngoplasty. Suffered by children and adults.

**Spasmodic Dysphonia:** a disorder characterized by tight, strangled-sounding phonation due to extreme laryngeal tension. There are two possible types of laryngeal tension involved: the tightening of muscles in adduction (spasms of hypercompression) or abduction (spasms of hypocompression). Spasms of hypocompression are more common in women, especially those over 45 years. Talking on the phone is the hardest means of communication. Yelling is easiest. Condition worsens with emotional stress. Diagnosis is reached through a team of doctors eliminating what it isn’t. This team includes an SLP, a neurologist, and an otolaryngologist. There is no cure, but symptoms may improve with periodic Botox® injections, vocal rehabilitation, or in the case of hypercompression, the surgical crushing of the recurrent nerve (not an option in hypocompression patients – patient wouldn’t be able to breathe). (See Botchalism)

**Speech-Language Pathologist:** synonymous with voice pathologist, speech therapist, and speech pathologist, SLP’s are experts in speech and voice disorders with specialized training in strob videolaryngoscopy and thus qualified to perform, but not interpret, strob videolaryngoscopy exams. More so than physicians, SLP’s are experts in the behavioral and treatment aspects of voice pathology. (See 5.2 The voice specialists)

**Sphincter:** a circular band of muscle that contracts to close an entrance. The body has many sphincters including the upper and lower esophageal sphincters, the rectal sphincter, and the aryepiglottic sphincter of the larynx. The latter doesn’t actually close, but tightens to protectively narrow the space above the vocal folds during swallowing.

**Stenosis:** narrowing. Results mostly from scar tissue formation.

**Stoma:** the rerouted airway done with a tracheostomy.

**Stratified Squamous Epithelium:**

**Stridor:** inhalation noises caused by airway obstruction.

**Stroboscopy:** a laryngeal examination in which a strob light is used in conjenction with laryngeal scope to observe vocal fold function. The flashing light is set to pattern itself “out of phase” with the fundamental frequency (F0) of your sound picked up by a stethoscope / microphone held against your neck. The flashing light picks up a certain ratio of your vibratory pattern to create a picture of averaged vocal fold opening and closing that can be discerned by the human eye. Another button at the clinicians foot is a slow and fast phase lock option that times the stroboscope in phase with your vocal folds’ motion to pick up only the adduction or the abduction part of each vibration and create a “frozen” picture of the fold’s position during each. However, the more aperiodic the voice, the less helpful the strobe is, since the strobe light can only match healthy periodic cycles. A cycle that is aperiodic will have motion evident in the freeze picture. (See Video Laryngeal Stroboscopy and 7.3 Instruments used in the office)

**Subglottis:** anatomical term for the area of the larynx below the true vocal folds including the cricoid cartilage and trachea.

**Superior:** above or upper.
**Superior Laryngeal Nerve**: the superior laryngeal nerve of the vagus controls the cricothyroid muscle.

**Supraglottis**: anatomical term for the area of the larynx above the true vocal folds and below the hyoid bone, including the ventricular and aryepiglottic folds, the epiglottis, the arytenoid cartilages, and the walls of the hypopharynx.

**Teflon**: a tough synthetic substance that was commonly used in medialization until 19—when cases of it migrating and irritating became evident. Today implanted wedges of softer and safer substances like Silastic and Gore-Tex are preferred.

**Temporomandibular Joint**: abbr. *TMJ*, literally *temple* (bone at the side of the head), *mandible* (lower jaw) *joint* (the point of two or more bones coming together that permits or prevents motion of either or both bones). The TMJ is a *ginglymo* (hinge) *arthrodial* (limited movement in all directions) joint, and functions much like the hinge on a door. It is *synovial*, meaning that the joint cavity is made slippery with a fluid not too unlike raw egg white.

**Temporomandibular Joint Syndrome**: a joint disorder characterized by painful clicking, popping, and limited movement of the jaw. Generally stems from constant excessive pressure due to teeth grinding, faulty bite, habitual teeth clenching, and pushing the tongue against the roof of mouth and is aggravated by chewing.

**Tendon**: strong connective tissue connecting muscle to bone.

**Thoracic Fixation**: a major function of the laryngeal mechanism. Thoracic fixation basically denotes inhaling and holding air, which in turn allows us to lift heavy objects, give birth, defecate, and swing from a tree.

**Thyroarytenoid Muscles**: the muscular part of the true vocal folds. They lie in the body layer and make up the main mass of the folds, contracting (shortening) for lower pitch and tensing to achieve full glottal adduction. The vocalis or pars vocalis is most medial of the two sections making up each thyroarytenoid muscle. The thyromuscularis or pars muscularis section lies laterally to it and increases vocal fold stiffness necessary for low pitches.

**Thyroid**: starts ossifying from its bottom up around late 20’s.

**Tidal Volume**: amount of air taken in and let out during passive (at rest) respiration.

**Tissue**: everything in our bodies is some type of tissue. Structurally similar cellular make-up (equals about 500 cc in the adult male).

**Tonsils**: Latin for almond, rounded lymphatic tissue. There are many different tonsils, including those at the very back of the tongue (lingual tonsils), and those embedded in the mucous membrane of the pharyngeal faucial pillers (faucial tonsils), among others.

**Total Lung Volume**: consists of a person’s vital capacity (roughly 4-5 liters in the average adult) and residual volume (approx. two liters), which is never depleted unless lungs collapse.

**Trachea**: windpipe.

**Tracheostomy**: is the window cut/stoma.

**Tracheotomy**: is the procedure of cutting of the trachea.
**Transverse**: a horizontal cut anatomical view.

**Trauma**: injury.

**Unilateral**: appearing on only one side.

**Unilateral adductor paralysis**: (See Vocal Fold Paralysis and 9.15 Vocal Fold Paralysis)

**Upper Esophageal Sphincter**: the valve connecting the oral cavity with the esophagus.

**Vallecula**: shallow dip or indentation. Often used to describe where the tongue meets the epiglottis.

**Varix**: (plural: varices) any prominent blood vessel. In the varicose vein family. Often appears as a tiny “pepper speck” or “pin point” capillary prominence on the vocal fold in singers. May lead to the development of a polyp.

**Velum**: soft palate. Also refers to any thin partition or covering.

**Ventricle**: a small recess or hollow space.

**Ventricular Vestibule**: space / ventricle above true folds and below the false folds. It must be unobstructed in order to allow the true folds to vibrate freely.

**Venule**: Latin for *little vein*, also called venula. Venules are the smallest veins and are connected to the smallest arteries (arterioles) by the tiniest blood vessels (capillaries). The larynx contains venules and capillaries only. No arteries or veins.

**Vestibule**: a hollow space forming the entry to a canal.

**Vestibular Ligament**: the strong band of elastic tissue within the false vocal folds.

**Video Laryngeal Stroboscopy**: also called videostroboscopy. A recorded stroboscopy exam involving a monitor, stethoscope/microphone, speaker, camera, video printer, keyboard, electroglottogram (measures the fundamental frequency as well as how sharply folds come together by passing electrical impulses through the thyroid catilage), camera driver, tape deck / VCR, strobe light, vocal frequency display, relative amplitude display, a slow and fast phase lock. (See Stroboscopy)

**Viscous Mucus**: sticky, gelatinous mucus.

**Vital Capacity**: includes the inspiratory and expiratory reserve volumes and the tidal volume of the lungs (i.e. the amount of air breathed in and out during respiration)

**Vocal Abuse**: the term used by most voice specialists when referring to habitual actions or substance exposure that harm the voice such as excessive coughing, throat clearing, or smoking. However, since vocal abuse has a negative connotation suggesting intentional wrongdoing, this paper advocates the term phonotrauma.

**Vocal Folds**: two separate folds of layered tissues that come together over the trachea and vibrate to produce sound. The false vocal folds are located above the true vocal folds and do not take part in phonation.

**Vocal Fold Paralysis**: Because paralysis is accompanied by decreased sensitivity, a vocal fold paralysis is often accompanied by aspiration, evident through “gurgly” sounding inhalations due fluid pooling around the folds and choking. (See Paralysis and 9.15 Vocal Fold Paralysis)

There are two types:
1. **Unilateral adductor paralysis**: common paralysis where one fold is paralyzed paramedially and unable to adduct to the midline. Mandates 1 year of close observation and voice therapy. Often caused by a damaged RLN, confirmed when accompanied by paralysis of the entire left side of the larynx (Trauma may involve a car accident steering wheel collision or chest/neck/shoulder surgical mishap. Occasionally caused by a damaged SLN, confirmed when accompanied by a significant loss of range.

2. **Bilateral adductor paralysis**: rare paralysis where both folds are paralyzed in a paramedial position and unable to adduct to the midline. Bilateral adductor paralysis implies a central brainstem lesion evident when accompanied by dysarthria. Characterized by a complete inability to phonate (paralytic aphonia), or cough. Bilateral adductor paralysis may leave the glottis completely open.

**Vocal Ligament**: a strong band of elastic tissue within the true vocal folds and the false vocal folds.

**Vocal Misuse**: behaviors harmful to the voice are considered misuse of the voice. Examples include habitual phonation that is pitched too low, too high, or too loudly, hard glottal onsets, and voice overuse. Bad technique is an example of vocal misuse. One bad habit can trigger others to develop in efforts to compensate.

**Vocology**: a specialty science for SLP’s encompassing the study of vocal habilitation and the treatment of voice disorders.

**Wegener’s Disease**: a congenital disease causing tissue to web together. Webbing can occur between vocal folds. Trauma-induced webbing that forms post surgery is separate and should not be confused with Wegener’s Disease.

**White Noise**: just as “white” encompasses all colors, white noise encompasses all sound frequencies and is produced when sounds of all frequencies sound simultaneously. White noise easily masks other sounds, making it difficult for one voice to project and be heard.

**Xidex**: antiseptic that all procedure utensils are soaked in for at least 20 min.
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