

2003

# Vocal rehabilitation

Robin McKee Williams  
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**Vocal Rehabilitation**

A Project Report

Presented to

The Faculty of the School of Music and Dance

San Jose State University

In Partial Fulfillment

of the Requirements for the Degree

Master of Arts

by

Robin McKee Williams, CMVT

August 2003

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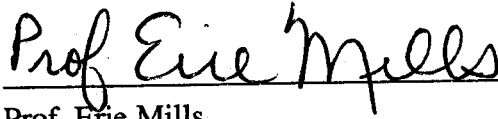
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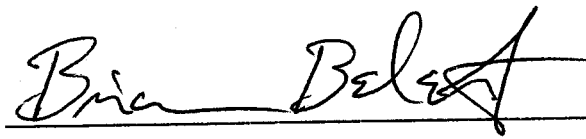
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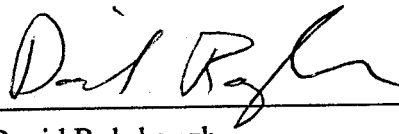
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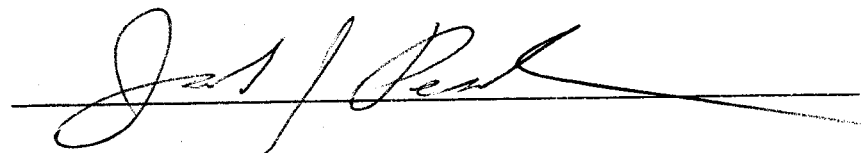


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## **ABSTRACT**

### **Vocal Rehabilitation**

by Robin McKee Williams

This project report discusses vocal injuries and recovery techniques for various types of vocal injury. Four topics are discussed:

1. An introduction to voice therapy, including a background of the vocal anatomy.
2. An overview of a specific vocal problem: acid reflux. This information is drawn from the literature, and from the author's experience in treating vocal problems.
3. A description of techniques used to solve reflux-related problems.
4. Techniques for maintaining vocal health.

This discussion presents a cross-disciplinary approach to solving vocal problems. An important aspect of this discussion describes how voice professionals can interact with medical professionals to heal a damaged voice.

Case histories add an important element of reality to the discussion. The author's descriptions of real solutions to real problems provide guidance on structuring new solutions to new problems.

## **Dedication**

I would like to acknowledge the following people who have had a profound influence on my life in music and who have helped make my career a wonderfully rich experience.

Thank you Janet Alcorn, Richard Lalli, Henrietta Pelta, Daniel Lockert, Dan Deason, Helen Simmie, Susan Shulman, and Dr. David Arnstein. And thank you to each and every student whom I have learned to help because of the love of music.

Robin McKee Williams  
Pacific Grove, California  
June, 2003

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## **Chapter 1. An Introduction to Voice Therapy**

This project report discusses acid reflux vocal injury and various recovery techniques for this condition. Several professions, including acting, broadcasting, preaching, singing, and teaching, depend on the use of the speaking or singing voice. Injuries to the vocal mechanism can be so severe that the voice professional cannot continue in his or her career. In extreme cases, the voice problem can be so severe as to be life threatening.

Many of these pathologies involve injury to muscles associated with the vocal cords. Retraining the muscles in the jaw, neck, chest, and abdominal areas is essential for complete recovery. Techniques presented in this report combine speech pathology, medical technology, and artistic methods of singing as part of the vocal rehabilitation process. The information presented here combines over twenty years of the author's experience with that of other experts in the field. The author has developed specific exercises, many based on physical therapy, for the vocal mechanism. Techniques used by traditional medical practitioners typically exhibit little success in healing some of the voice problems discussed here. This report presents the author's unique combinations of medical and artistic ideas, which have produced good results in several cases.

Proper diagnosis by an otolaryngologist specifically trained in the use of the voice by professional speakers or singers is mandatory. A misdiagnosis may result in a delayed or incomplete recovery. Cases exist where recovery was delayed for years by an improper diagnosis.

A physician familiar with professional voice use can be of enormous value in treating vocal injuries. One source of such expertise is the Voice Foundation. This organization is dedicated to the care and use of the professional voice.<sup>1</sup>

The author has enlisted the help of Dr. David A. Arnstein in assisting singers with vocal difficulties.<sup>2</sup> Dr. Arnstein is an otolaryngologist in Los Gatos, California and is on the clinical faculty at Stanford University. He attended the University of California at Berkeley as an undergraduate, and George Washington University for medical school. His residency took place at the University of California at Los Angeles in ear, nose, throat, head and neck surgery.

Another organization helpful in treating injured voices is the McClosky Institute of Boston.<sup>3</sup> This organization promotes the techniques, including vocal exercises, published by David Blair McClosky.<sup>4</sup> The author of this report, certified by the McClosky Institute as a voice specialist, has over twenty years of experience in teaching voice. Much of this experience has involved healing injured voices. In several of these cases, professional

expertise has proven critical and sometimes life saving.

The author's students include professional singers who have performed in Europe, Canada, and the United States, in major orchestral halls such as Lincoln Center, Davies Hall, and the Spoleto Festival. Other students include medical doctors, university professors, television newscasters, professional actors, psychologists, and amateur singers. One of the author's students was a professor from San José State University. She had been misdiagnosed for fifteen years. The author's techniques helped her condition, which was potentially life-threatening.

The purpose of this report is to consolidate and formalize twenty years of the author's experience. Vocal rehabilitation requires both medical and artistic expertise for diagnosis and treatment of vocal injuries in the voice professional. There are many difficult problems for which there is currently no full recovery or cure.

#### WHAT IS VOICE THERAPY?

Voice therapy treatment attempts to change behaviors that damage the speaking or singing voice. This includes voice disorders or problems that limit normal voice usage. Voice therapy is often recommended after a thorough examination and evaluation by an otolaryngologist.

Therapy can change behavior that causes injury or hoarseness. Therapeutic exercises and vocal hygiene maintenance can prove valuable here. Vocal hygiene includes the education and care of the voice. This hygiene may require behavioral and/or environmental changes, including eliminating excessive smoking, drinking, exposure to chemical fumes, and shouting. Any of these may contribute to a vocal problem.

There are therapeutic exercises that specifically target vocal problems. These include adjustments in posture and breathing, as well as relaxation of the neck, tongue and jaw. It is important for the patient to experience the difference between the old injured voice production and the new healthy voice production.

Voice therapy resembles physical therapy in that the patient must participate in the recommended exercises. The person who has injured his or her voice must be motivated to make changes.

Voice therapy typically requires two or three sessions per week to achieve the desired behavioral changes. Common voice disorders usually show improvement within six to twelve weeks.<sup>5</sup> If there is no improvement in twelve weeks, the case should be re-evaluated.

## VOICE EXAMINATION

What happens during an examination for a person with a voice disorder? The 1970's

and 1980's saw the advent of a new subspecialty featuring advanced diagnostic and surgical technology. A new technology called videostroboscopy can help diagnose laryngeal problems by taking pictures of the vocal cords and surrounding areas. New surgical methods have evolved, including microlaryngeal, phonosurgery, and CO<sub>2</sub> laser techniques. In the 1990's, many changes took place in the field of laryngology, especially in the areas of collaboration, communication and technology.

#### COLLABORATION

Before this change in the 1990's, communication between specialties was rare. The otolaryngologist, speech pathologist and voice teacher did not usually communicate with each other. Rarely was the help of a neurologist enlisted.

Today, medical treatment of the vocal professional is emerging as a new area of specialization. This specialty is quite different from an otolaryngologist treating throat problems such as strep throats, allergies, and tonsillitis. The new field has not yet established standard methods for voice evaluation. The last two decades have seen the emergence of increased communication between the specialties of otolaryngology, speech pathology, neurology and vocal pedagogy.<sup>6</sup> Multispecialty clinics are now beginning to appear in the United States.

This new emerging field employs a multidisciplinary approach. Several people are

involved, including the laryngologist, speech pathologist, neurologist and other consultants such as internists, gastroenterologists, psychologists, psychiatrists, voice teachers and coaches. Using a properly trained voice instructor can remove the requirement for a speech pathologist.

#### COMMUNICATION

Public awareness of vocal disorders has grown largely due to the support of the National Institute for Deafness and Communication Disorders (NIDCD), established in 1988. Public pressure has helped fuel increased medical and educational services for injured voices. Also, for at least fifteen years, the National Association of Teachers of Singing has been publishing articles regarding the care of the professional voice by leading otolaryngologists.

#### TECHNOLOGY

The last two decades have seen many new technological additions, including fiber optic laryngoscopy, videostroboscopy, objective measurement of vocal function (voice laboratory), laryngeal electromyography, and ambulatory twenty-four hour double-probe pH monitoring. New therapeutic additions include acoustic technology, microlaryngeal surgery, and botulinum toxin injections for laryngeal movement disorders and laryngeal framework surgery.<sup>7</sup>



## FUNCTIONS OF THE LARYNGOLOGIST AND SPEECH PATHOLOGIST

The laryngologist and speech pathologist perform independent functions. It is important that proper communication and coordination take place to maximize overall treatment effectiveness. The laryngologist is responsible for supervising the overall medical diagnosis and treatment. This involves monitoring improvement by assessing vocal function on a continuing basis. The use of the videostroboscopic instrument and the interpretation of the results play vital roles in this process.

The speech pathologist must perform related but independent tasks. The first is to independently obtain baseline measurements and documentation of vocal injury. Next, the speech pathologist must make an independent diagnosis while correlating data with the otolaryngologist. The next step is to administer appropriate voice therapy. It is vital that the speech pathologist maintain good communication with the laryngologist.<sup>8</sup>

## ANATOMY AND PHYSIOLOGY OF THE LARYNX

The muscles of the voice comprise a complex and versatile mechanical process. Intrinsic muscles are used for speaking and singing. Extrinsic muscles are used for holding up our head and neck. Often, when the speaking voice is not working properly and there is evidence of speaking or singing problems, the intrinsic muscles are not working properly and the extrinsic muscles are being used for speaking or singing.

Solving this type of problem requires knowledge about the anatomy used for speaking and singing.

## LARYNX

The larynx is made up of the following cartilages: cricoid cartilage, two arytenoid cartilages, thyroid cartilage, and the hyoid bone. The relationship of these areas can be seen in Figure 1.

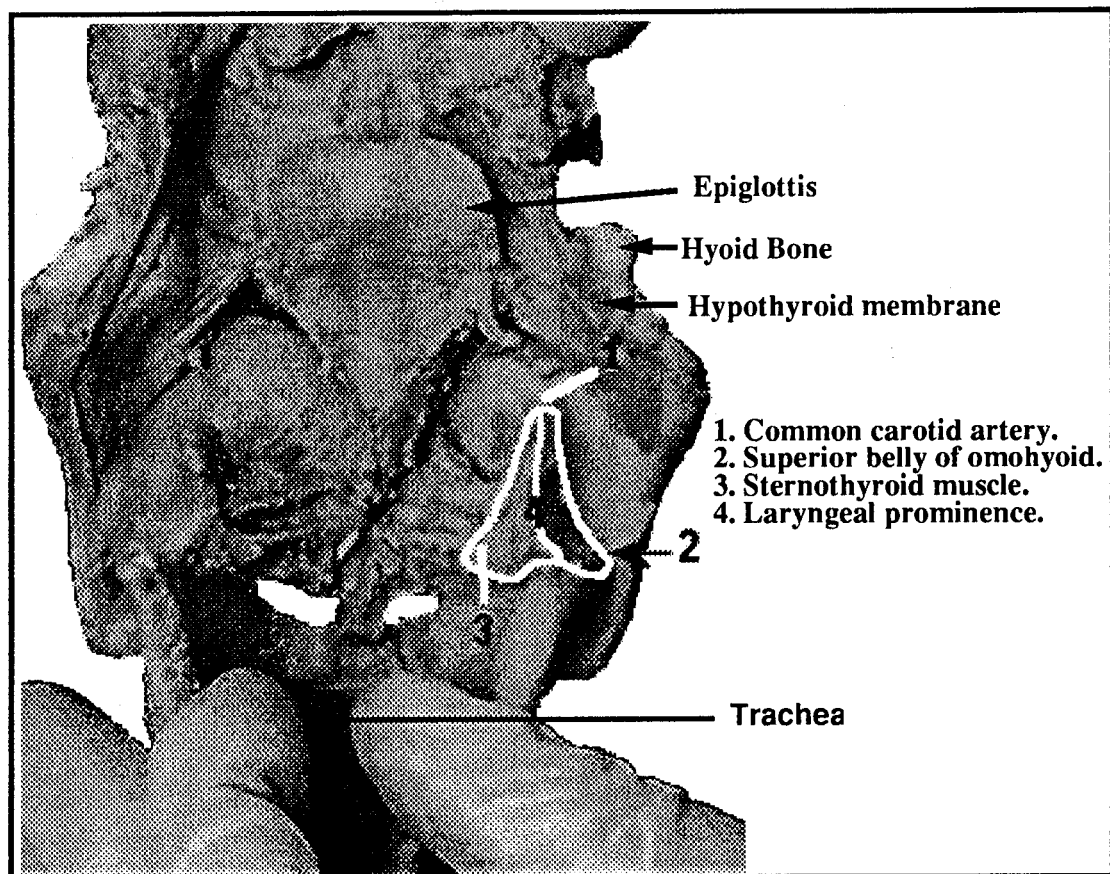


Figure 1. Larynx Components<sup>9</sup>  
Shanahan, Donal, PhD, CyberAnatomy,  
<http://anatomy.ncl.ac.uk/tutorials/larynx/text/1.html>, Used by permission.

The cricoid cartilage has the shape of the signet ring with the wider portion at the back. It is the lowest part in the larynx. It is also the top ring of the trachea. This structure appears in Figure 2. The two arytenoid cartilages rest on top of the cricoid cartilage and are connected by muscles and ligaments.<sup>10</sup>

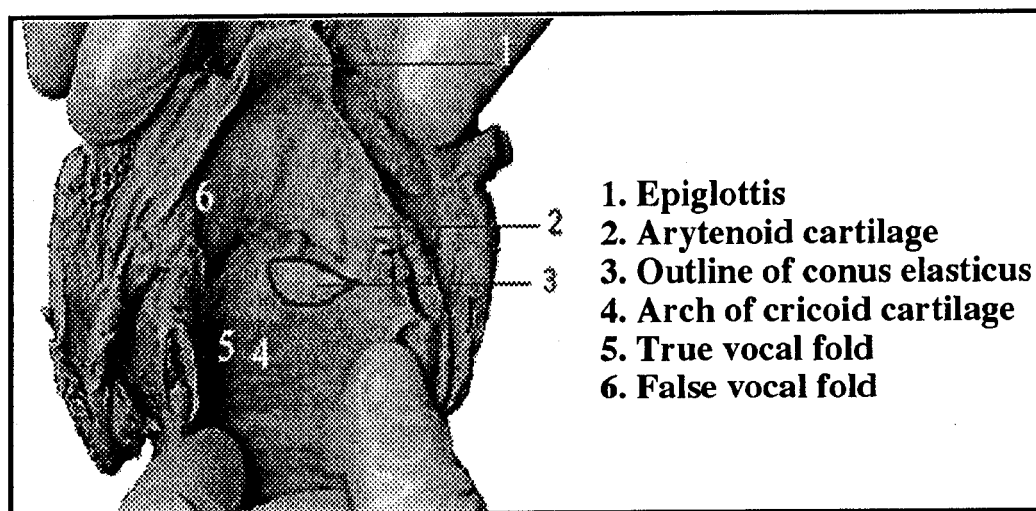


Figure 2. Cricoid Cartilage<sup>11</sup>

Shanahan, Donal, PhD, op. cit,

<http://anatomy.ncl.ac.uk/tutorials/larynx/text/m3.html>

The thyroid cartilage is the largest of the laryngeal cartilages. The front is shaped like two shields that are joined in the middle. This forms the “Adam’s apple.” It is open at the back and from each corner is a horn. The top horns reach upward and the lower horns point downwards.<sup>12</sup>

The hyoid bone is at the top of the larynx. It is a slender curved shaped bone that is shaped like a horseshoe.<sup>13</sup> The hyoid bone location appears in Figure 1 above.

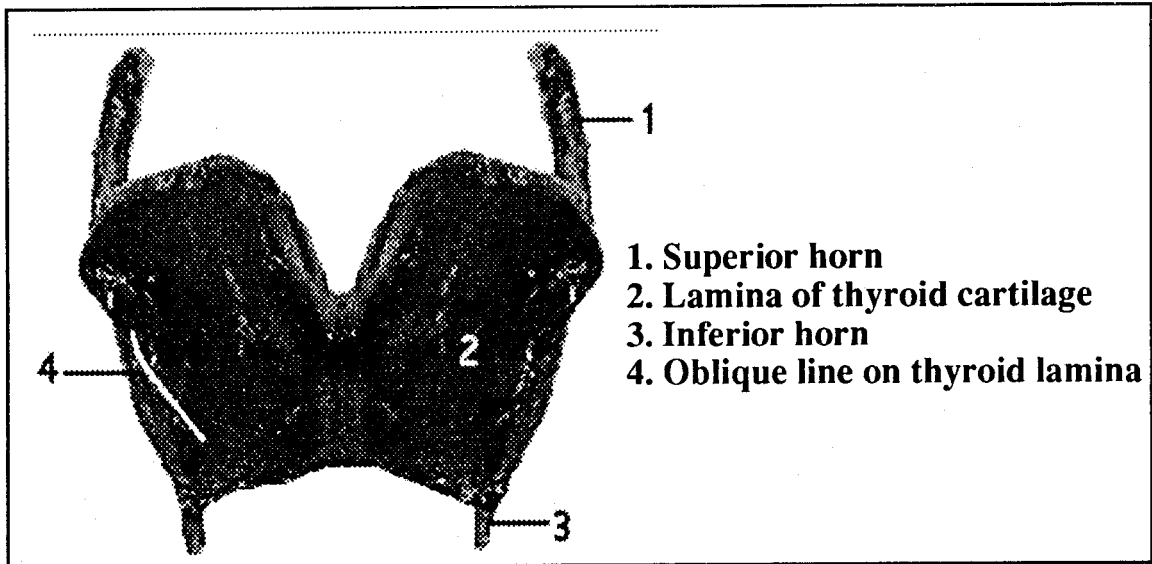


Figure 3. Thyroid Cartilage<sup>14</sup>

Shanahan, Donal, PhD, op. cit.,

<http://anatome.ncl.ac.uk/tutorials/larynx/text/p1ot.html>

#### INTRINSIC MUSCLES

Intrinsic muscles are involved with tension of the vocal folds, abduction (the moving apart of the vocal folds) and adduction (the moving together of the vocal folds).<sup>15</sup>

Thyroarytenoid muscles are the vocal folds that have external and internal divisions of the vocal ligament. They have the shape of two small pyramids. These folds have a thin mucous lining called the epithelium. The arytenoid cartilages can pivot in and out. This movement allows the vocal folds to change position.<sup>16</sup>

The posterior cricoarytenoids are muscles that can separate the vocal folds. They are able to open the glottis thus allowing air to move through them.

The lateral cricoarytenoids are muscles that allow the vocal folds to draw together.

This closes the glottis by pulling the arytenoids toward the midline of the vocal folds.<sup>17</sup>

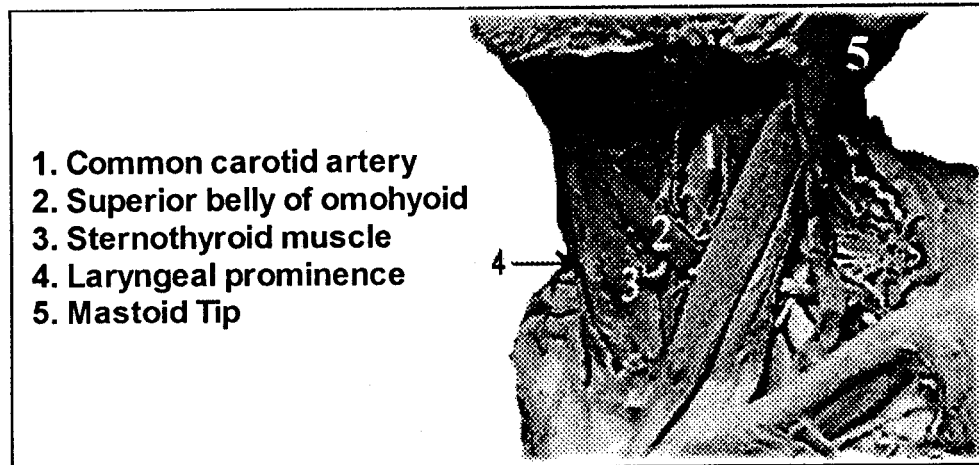
The interarytenoids serve to bring the arytenoid cartilages closer together, allowing the vocal folds to approximate.<sup>18</sup>

The cricothyroid muscle is the largest intrinsic laryngeal muscle. This muscle is responsible for most of the longitudinal tension. This is important because of its effect in controlling pitch.<sup>19</sup> This muscle runs between the cricoid and thyroid cartilages. When they contract, they change the position of one cartilage to the other.<sup>20</sup>

#### EXTRINSIC MUSCLES

The relationship of the intrinsic and the extrinsic muscles and their effect on the singing and speaking voice are not completely understood. Ten pairs of muscles are listed. Figure 4 shows where and how the muscles attach.<sup>21</sup>

The digastric muscles can change the position of the hyoid bone by raising it. These muscles also help lower the jaw. Jaw tension causes the larynx to rise. The stylohyoid muscles allow the hyoid muscle to move up and back. The geniohyoid muscles can allow the hyoid bone to move in an upward motion. This in turn will draw it forward.



**Figure 4. Extrinsic Laryngeal Muscles<sup>22</sup>**

Shanahan, Donal, PhD, op. cit.,

<http://anatomy.ncl.ac.uk/tutorials/larynx/text/1.html>

The larynx should remain in a comfortable position, and the muscles under the chin should be tension free. The genioglossus muscles affect the tension in the tongue. When the tongue is moved to a forward position, the hyoid bone is also forward. The hyoglossus muscles are connected to the hyoid bone and the tongue. If this muscle group is tight, then the larynx may be affected and tight as well. The mylohyoid muscles can also raise the hyoid bone, tongue, and the floor of the mouth. If the jaw is tight, then the larynx will also be affected and the larynx will be in a tight position.<sup>23</sup> The recurrent laryngeal nerve innervates all of these intrinsic and extrinsic muscles. Only the superior laryngeal nerve innervates the cricothyroid.

#### BREATHING AND VOCAL INTERACTIONS

Sound is produced by an extremely complex process. Only certain aspects of this

process will be presented here. The brain sends a signal to the diaphragm to begin its descent in the abdomen. This signal comes in part from chemoreceptors found in the blood vessels. The diaphragm causes air to enter the body with the help of the intercostal muscles.<sup>24</sup>

The diaphragm divides the thoracic cavity from the abdominal cavity. On inspiration, the diaphragm presses by moving down and forward on the abdominal viscera. In response, the abdomen moves outward. When the diaphragm has moved downward as far as possible, the ribs also elevate. This process also causes the lungs to expand. The diaphragm then relaxes and reverts to its initial dome shape formation. The lungs are pushed upward, causing air to be expelled. This breathing activity involves simultaneous movements in the chest and abdomen.<sup>25</sup>

The voice creates sound as a result of interactions with the power source, vibrator and the resonator. Air is compressed and is forced toward the larynx. Small puffs of air escape through the vocal folds as they open and close. The vocal folds separate and close as though they were clapping hands. This particular motion determines how fast the air puffs escape. The speed of these closures partially determines pitch.

Dynamics are determined by subglottal pressure, glottal resistance and vocal fold displacement from the midline during the vibratory cycle.<sup>26</sup> This patterned airflow is

called the glottal wave. It is driven by the force of air in the lungs. The air flow increases gradually, reaches a certain point, decreases gradually and then suddenly stops. There is a brief pause in this pattern and then this glottal wave pattern repeats itself. This process is diagrammed in Figure 5. The sound created at the vocal folds is a sound that resembles a buzz. This buzzing sound has an incomplete set of partial frequencies. The supraglottic vocal tract acts as a resonator for this buzzing sound. This area is responsible for the beauty and resonance of the voice.

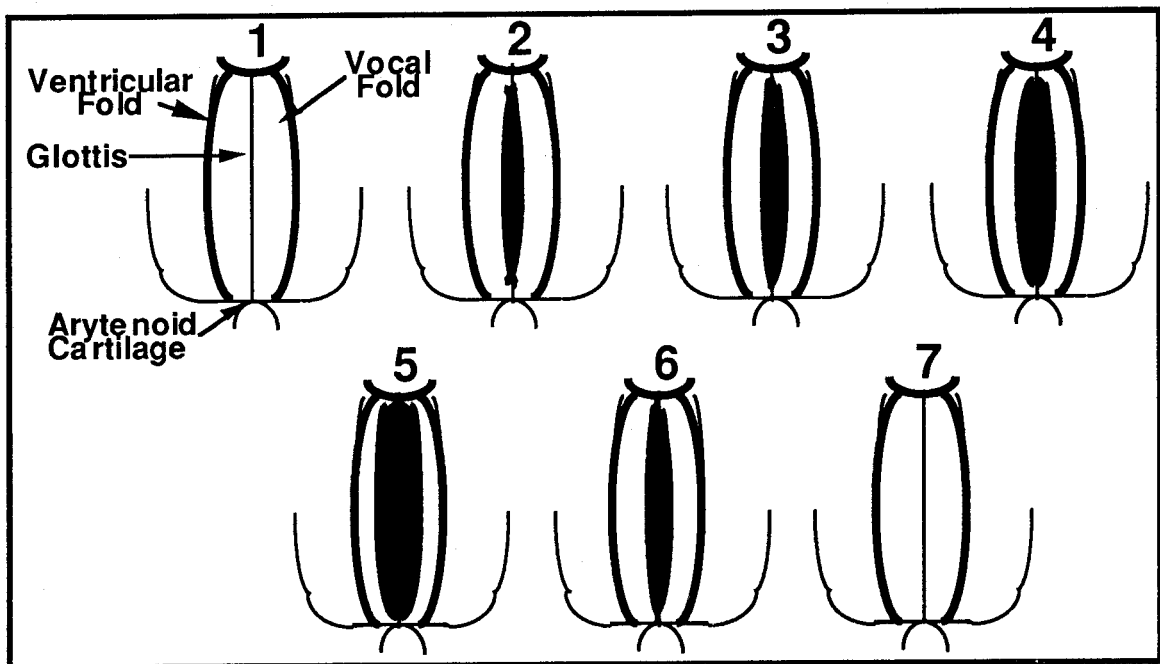


Figure 5. Glottal Wave Cycle



## Chapter 2. Acid Reflux — Cause and Treatment

The official name for the condition commonly called reflux is Gastro Esophageal Reflux Disease (GERD). This condition is also called heartburn, acid indigestion, or regurgitation. Reflux is a result of partially-digested food from the stomach coming back up the digestive tract into the esophagus or mouth. Common symptoms include irritation or burning in the upper chest. There can also be a bitter taste in the mouth or a feeling of bloating. Sometimes there is hoarseness or coughing. Other symptoms include difficulty in swallowing, wheezing, asthma, aspiration pneumonia, and interstitial fibrosis, oral symptoms such as tooth enamel tooth decay, gingivitis, halitosis, and waterbrush, as well as laryngitis, hoarseness, and earache.

The author has observed other symptoms from singers including soreness or swelling in the abdomen as well as a burning sensation from the stomach up into the throat. Some singers report feeling muscle spasms in the abdominal area. Less frequent symptoms include complete loss of voice, muscular problems in speaking that mimic spastic dysphonia and a choking of sound and speech.

Evidence indicates that up to 36% of Americans may be affected by reflux on a weekly basis. This figure drops to 9% for those experiencing reflux on a daily basis.<sup>27, 28</sup> It is more common as people age, but reflux can affect all ages. It is not uncommon for

reflux sufferers to wait years before seeking medical assistance. Smoking and obesity can contribute to the problem. Dr. Van Dam from the Harvard Medical School feels that even mild reflux can contribute to esophageal scar tissue, which can make swallowing difficult.<sup>29</sup> Reflux can also cause peptic ulcers to form in the lower esophagus. This condition is known as Barrett's esophagus.

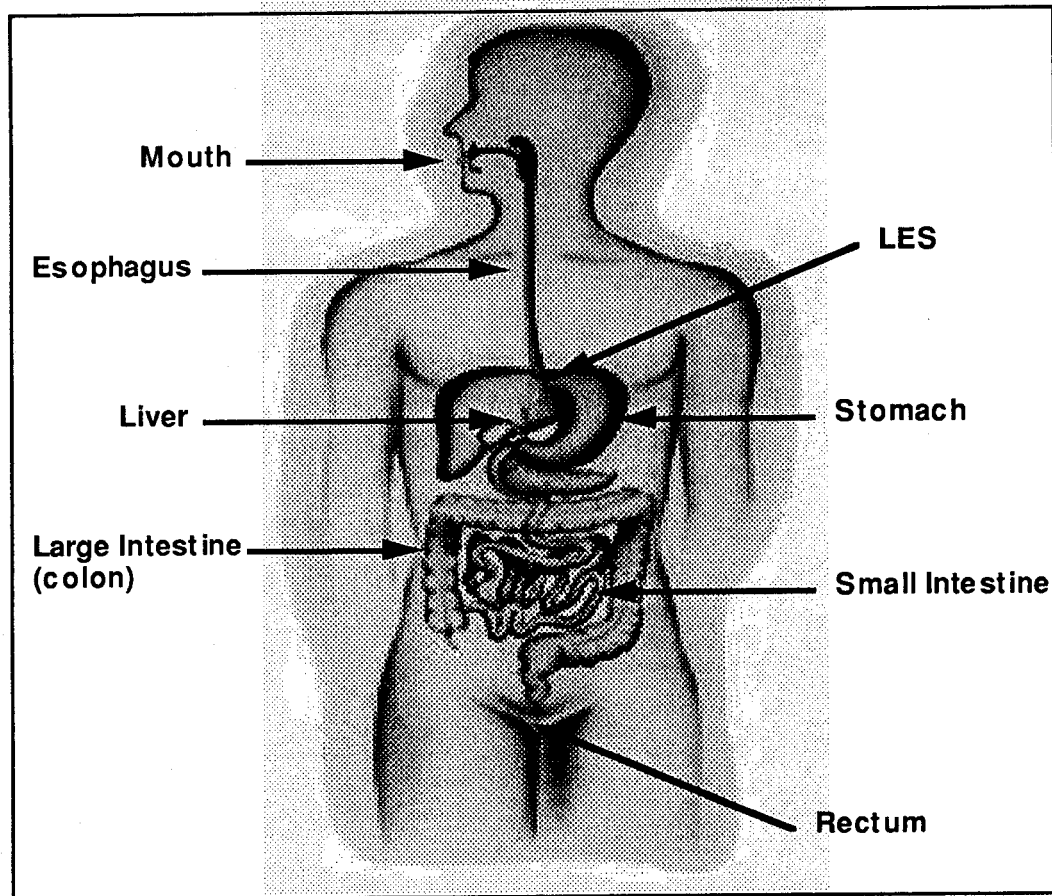
## DIGESTIVE SYSTEM COMPONENTS

Figure 6 illustrates the components of the digestive system. The right-hand side of this illustration focuses on the stomach area. Food moves through the digestive system in the order described below.

Beginning with the mouth, digestion begins when the thought of food begins in the brain. The salivary glands begin to secrete a combination of water, protein and enzymes called saliva. Saliva contains the enzyme amylase to start carbohydrate digestion. Teeth chop up the food into smaller pieces that can be swallowed without choking. The softened matter called bolus can now be more readily swallowed.

The esophagus is a muscular tube from the mouth to the stomach, about a foot long. The bolus enters the esophagus and the windpipe closes. If the windpipe did not close, it would be possible to inhale the food, causing choking. The food is pushed down by means of strong involuntary contractions called peristalsis until it reaches the stomach.

The esophagus is joined to the stomach by a sphincter (a specialized muscle), known as the Lower Esophageal Sphincter (LES). This muscle opens during peristalsis to allow food to pass into the stomach. The LES muscle quickly closes to prevent the return (reflux) of food and stomach juices back into the esophagus.



**Figure 6. Human Digestive System Components<sup>30</sup>**

International Foundation for Functional Gastrointestinal Disorders (member HON),

<http://www.iffgd.org/GIDisorders/GImain.html>

Used by permission.

The stomach can spend three to six hours digesting the food. There can be as much as a quart of food in the stomach. During the digestion process, a mixture of hydrochloric acid and enzymes helps to break down and digest the food. This mixture of food, acid and enzymes is called chyme. The stomach then pushes this mix of fluid and partially digested food into the small intestine.

Food particles are continuously broken down by various chemicals and organs. A set of muscles sends the food into the first part of the intestine, which is called the duodenum. In this first part of the intestine the broken down food is mixed with enzymes. Bile salts created in the liver are sent to the intestine by a tube called the bile duct. The food is broken down into millions of particles so that it can be absorbed into the bloodstream.

Part of this food matter cannot be digested. This waste matter is moved along into the large intestine. The large intestine also absorbs water from the undigested material before it is eliminated from the body.

There are two important ancillary organs that prepare chemicals and filter wastes in the digestive process. The liver stores vitamins, sugars and proteins so that the rest of the body can make use of these nutrients. The liver also cleans the blood of impurities. Other functions of the liver include enabling the blood to clot. The pancreas also forms

digestive chemicals that help break down the food. Insulin is one of these chemicals that allows the body to utilize sugar in the blood.

## REFLUX SYMPTOMS

Unfortunately, the digestive process does not always work smoothly. Heartburn results when the LES sphincter does not function properly. Different kinds of acidic juices from the stomach can splash back up into the esophagus. Many people have a weak or improperly timed LES muscle that allows stomach juices to back up into the esophagus, creating heartburn. This usually happens shortly after a meal. When this happens frequently, a chronic condition called gastroesophageal reflux disease, or GERD, occurs. In addition to heartburn, symptoms of acid reflux may include persistent sore throats, hoarseness, chronic cough, asthma, heart-like chest pain and a feeling of a lump in the throat. This irritation is also known as reflux esophagitis.

There are several factors that influence the frequency and severity of acid reflux: the ability of the LES muscle to open and close properly, the type and amount of stomach juices that reflux up into the esophagus, the ability of the stomach to empty properly, the clearing action of the esophagus, the acid-neutralizing effect of saliva and other factors.

It is the author's observation that this irregular splashing of acid is possibly the reason why there is often an inconsistency to the vocal tone of a singer who has reflux. Some

vowels are well produced and other vowels are hoarse and lack resonance. The singing voice uses slightly different muscles for each vowel. Depending on where the acid splashed on the vocal folds, the irritation from the reflux will cause different problems from vowel to vowel. When the author hears a singer for the first time and there is an inconsistency in the production of vowels, the author's experience indicates reflux is likely. A medical doctor can provide verification.

## REFLUX DIAGNOSIS

An evaluation of medical history is usually enough to diagnose GERD and prescribe treatment. Further testing is done when there is not a typical response to therapy.<sup>31,32</sup>

GERD is difficult to diagnose. The physician must be able to understand the limitations of the present available testing and assimilate the patient's symptoms. Some of the most current testing includes esophageal pH monitoring, technetium-99 Scintiscanning, barium esophagram, bilirubin (bile) monitoring, esophageal pH monitoring, bilirubin monitoring, bernstein test, endoscopy, esophageal biopsy, esophageal manometry, and barium esophagram.<sup>33</sup>

## CARE OF THE VOICE

An estimated 36% of the American population suffers from heartburn. Many people do not seek medical advice. An estimated 27% of these individuals take over-the-counter

antacids at least twice a month. Other treatment involves important lifestyle modifications such as elevation of the head of the bed.<sup>34</sup>

#### THINGS TO AVOID

Other lifestyle modifications can be used effectively to reduce GERD. As with most such therapy, there is a list of “Thou shalt not”s. For GERD, these include:

- Alcohol
- Chocolate
- Caffeine
- Smoking
- Carbonated drinks
- Fatty foods
- Spicy Foods
- Onions
- Mint
- Citrus Fruits
- Tomatoes and byproducts

Most of these decrease the pressure of the lower esophageal sphincter, making it easier for fluids to move from the stomach back into the esophagus. Not eating for three hours prior to bedtime can help prevent reflux. It is also helpful to remain sitting or standing up at least three hours before bed.

#### PRESCRIPTION THERAPY

Some of the effective treatments of GERD include medications that include suppression of acid secretion. This medication may include H<sub>2</sub> receptor antagonists or proton pump inhibitors. These therapies raise the intragastric pH during periods when the reflux can occur. Other H<sub>2</sub> receptors include Tagamet, Zantac, Pepcid, Axid, Prilsec,

Prevacid, AcipHex, and Protonix. Medications which have proton pump inhibitors suppress acid more effectively. The H<sub>2</sub> receptor antagonists do not suppress acid from meals. There are different kinds of acid and different causes for the acid to become worse in the stomach. Different medications must be used accordingly.

#### ANTIREFLUX SURGERY

There is a commonly used, somewhat successful surgical procedure called a laproscopic Nissen fundoplication. Some of the problems include dysphagia, bloating, and flatulence. There is less risk involved with medical therapy.<sup>35</sup>

#### THE AUTHOR'S RECOMMENDATIONS

The author recommends a thorough evaluation from an otolaryngologist who uses videostroboscopy as a diagnostic tool. If reflux is diagnosed, it is important to monitor the progress or lack of it. Lifestyle modifications are also critical. Dietary changes are also important.

The author's experience indicates that some foods are especially problematic for reflux sufferers. At the top of the list are chocolate, caffeine, tomatoes, orange juice, fried foods and alcohol. With each individual there are different foods that trigger reflux. For some, rice, certain vegetables, Snapple drinks, flour products, or spices set off the reflux. Each person is different and finding their particular triggers can be very helpful.



Some clients have experimented with herbs such as ginger root with no lasting help.

Several people have found good success with drinking cultured buttermilk and eating millet. Millet is a grain found in health food stores. Clients that continue to make small changes while working on their reflux problem have the best results.

#### EXERCISES

The author has developed a series of exercises designed to improve voice problems like reflux. Here is a summary:

1. Lie on the floor with knees up. Place a book a half an inch thick under the head or three quarters of an inch thick under the head depending on comfort. Place another book on the abdomen. Breathe mostly through the mouth but allow some air through the nose. Allow the book to rise and fall.
2. Lie on the floor with knees up. Turn head slightly to the right and breathe several times with a book on the stomach and then turn the head to the left and breathe several times while the book is on the stomach.<sup>36</sup>
3. Lie on the floor with knees up. Return the head to the center. Place a book on the abdomen and begin to sing scales. The book must rise and fall. As the book begins to fall start the first note of a scale. Repeat.

4. With hands and knees on the floor, lean with one hip to the right. Extend the right hip to the right. Pull up the stomach muscles tightly and then release. Swivel the other hip to the left. Pull up on the stomach muscles tightly and then release. Repeat up to ten times for each side.
5. Stand against the wall. Let the heels of the feet come away from the wall about an inch. Try to allow the shoulder muscles to touch the wall and then release. Repeat five times.
6. Stand erect. Try to allow the top of the head to reach the ceiling for several seconds and then relax. Repeat again five times.
7. Sit on the edge of a hard backed chair. Rest the right side of the right ankle on the left knee. Keep the back straight. Breathe as low as possible. Alternate legs and rest the left side of the left ankle on the right knee. Keep the back straight and breathe as low as possible.
8. Sit up in a chair. Let the right arm extend to the right side so that it is outstretched pointing to the right. Keep the arm straight. Do not let the elbow bend. Allow the head to fall to the left. Let the weight of the head do the stretching. This is not an aerobic exercise. Simply let the weight of the head do the stretching for a minute or two if it is comfortable. Repeat on the other side.

9. Take the right index finger and thumb. Press the fleshy area between the thumb and index finger of the left hand. Continue to press or massage area for several minutes and then repeat on the other hand.
10. Practice the McClosky techniques that are called the seven areas of relaxation in Table 1 on page 47 of this document.

## CASE HISTORIES

The author has a long history of teaching students with acid reflux. Here are three case histories of people with this problem, the specific techniques employed, and the results of using those techniques.

### CLIENT A (1999- 2002)

Client A is a woman in her twenties. She taught voice seven to nine hours a day. Her complaints included throat pain, abdominal soreness, loss of voice after prolonged use, and an inability to sing, including loss of range. She exhibited laryngeal tension in the jaw and throat when speaking.<sup>37</sup> The extrinsic muscles were visibly tense when she talked. Initially, she had a four note range. Her speaking pitch was G3 (G below middle C). The author recommended that the client be evaluated by Dr. Arnstein for a thorough evaluation<sup>2</sup>. He diagnosed vocal nodules and an internist diagnosed reflux.

The first six months of therapy focused on maintaining her speaking voice so that she would be able to continue with her job. She took weekly lessons. Client A was in danger of not being able to speak at all by the end of the school week. It is very difficult to continue working seven to nine hours a day while trying to heal a badly injured voice. Client A was instructed to limit talking outside of her job. Weekends were used for vocal rest and vocal exercises that relaxed the laryngeal muscles. Improvement was slow. Initially there was good progress in the lessons, but relearning how to use speaking muscles properly took time.

After six months, her speaking voice had more resonance and she was less hoarse. The client had three months of vacation from teaching at her school. This was a great help in healing her voice. She could do some singing in a limited range but her voice continued to fatigue easily and she would become hoarse. She could produce only a very limited pitch range. Diet and medication failed to control much of the reflux problem. She continued to make small changes in her diet.

Progress continued and her speaking voice at times began to stabilize with weekly voice lessons. There was less laryngitis. She stopped losing her voice at the end of the week. Constant laryngeal exercise work enabled her to maintain her progress. She required very prolonged warm-ups but showed very noticeable improvement. Her

treatment emphasized laryngeal and abdominal exercises. With this client (and with others in the author's experience), tight muscles near the rib cage responded well to specific exercises. In this and other cases, the person with reflux required retraining tight throat muscles and retraining the abdominal muscles used for speaking and singing.

The third year of training went more easily due to a reduced teaching load. Voice lessons still centered on loosening laryngeal muscles, but the muscles of her throat became able to withstand more rigorous training.

An injured voice will not be able to sustain a tone for any length of time. Depending on the extent of the injury, specific care and training are required to strengthen specific muscles of the throat. The McClosky exercises were especially helpful in this third year of training. Typically, progress in strengthening the vocal instrument creates a risk that the singer will overstep the boundaries of the injured voice. It is vital that progressing singers learn their limits as well as how to recognize and self-correct excessive tightening of the speaking and singing voice. Practicing laryngeal exercises frequently throughout the day helps maintain looseness in these muscles that can easily tighten.

Once an injured voice has become habitually tight, it is important to work area by area. Areas include sections of the jaw, tongue, neck, chest and abdomen. The author's strategy is to loosen and coordinate muscles on an area by area basis. When specific

progress can be seen and heard in the singing or speaking voice, it is then possible to begin strengthening the next area.

Sometimes it is necessary to focus on maintaining current progress if the muscles are not ready to do more. An example of this is retraining high notes. Slow and careful retraining is necessary. The results are accurate and excellent when excessive jaw tension is released. It took a lot of effort by Client A to maintain her progress, however.

In her fourth year of training, she began to make excellent progress. This client began to be able to sing for the entire weekly lesson. She became able to work on high notes without becoming hoarse. Her reflux at times got out of control, so she persisted in long and extended laryngeal and abdominal exercises. She had been pregnant and was breast feeding. She could not take prescribed reflux medication that was only helpful in controlling some of the symptoms of reflux. She was able to resume singing oratorio and operatic literature. Her full two and a half octave range could now withstand rigorous training even with significant reflux setbacks.

#### CLIENT B (2001-2003)

Client B is a middle-aged professional singer and voice instructor. It took nearly a year and a half to restore her voice. Her main complaints included hoarseness, loss of singing range, and a burning or stinging sensation in the throat. Singing for longer than

ten or fifteen minutes sometimes caused hoarseness. At other times there was less of a problem with singing. Sustained notes were often difficult. Vibrato sounded unsteady and wobbly. In testing her range in her first session, there was a noticeable difference in resonance when this singer sang different vowels. There was noticeable tension on her high notes. Her range was just under an octave. At the author's suggestion, she saw Dr. Arnstein. His diagnosis was reflux. Dr. Arnstein stated in a letter concerning this singer:

[H]er laryngeal examination showed marked soft tissue swelling and mild erythema of both arytenoids with slight erythema of both true vocal chords. Vocal cord motion was grossly normal.... has hoarseness and early fatigue which is likely due to swelling induced by gastroesophageal reflux...I recommend she not sing extensively during this time to allow the swelling to diminish.<sup>34</sup>

In weekly lessons, she showed improvement with laryngeal exercises and medication prescribed by Dr. Arnstein. Her neck muscles exhibited considerable swelling. It was important to go slowly and gently with exercises that required gentle massaging of the head and neck. Some of the excessive tenderness in these areas was left alone to heal on its own. When asked to extend her tongue out of her mouth, which is an exercise to stretch out muscles in the throat, she had difficulty moving her tongue out of her mouth. Her tongue appeared pointed and tense and trembled as it tried to move out of the mouth.

This indicates certain levels of laryngeal and abdominal tension. This type of tension often appears in people with reflux. Initially, the base of the tongue was so swollen and rigid that the tongue was unable to move out of her mouth. It took nearly six months for the client to move her tongue out of her mouth.

Another area of tension was the jaw hinge. It was sore to the touch. Only very gentle massaging of the jaw hinge was possible during the first three months. Please refer to the McClosky exercises in Table 1 on page 47. When she spoke, the area at the back jaw hinge where the upper and lower molars meet exhibited noticeable tension. She seemed to clench her teeth slightly when she talked. Her neck muscles also appeared tight when she was talking. Within six months much of her condition had improved. There was less hoarseness and the singing voice was beginning to sound resonant. The range was beginning to extend but the high notes sounded weak.

The voice continued to improve, allowing the singer to sing for longer periods of time without strain and fatigue. The wobble in the vibrato began to disappear when jaw tension was carefully treated with the McClosky exercises. Additional abdominal exercises allowed her to sustain longer notes.

In the next six months, retraining concentrated on coordinating the jaw and abdominal muscles. The reflux medication helped many of the symptoms, but there was



still some swelling of the vocal cords. The singer continued to make many changes in her diet to help control the problem. The abdominal muscles continued to be tight and the descent of the diaphragmatic muscles remained difficult. Additional hip exercises allowed this singer to take lower and deeper breaths. Even though the swelling persisted in her throat, additional exercises allowed the singing tone to become stronger and the high notes to be full and rich. This helped the vocal cords to compensate for the lack of coordination heard in the excessive vibrato.

It is the author's experience that reflux symptoms can mimic other vocal cord problems, including sounds that resemble bowed vocal chords. The swelling on the cords is not symmetrical. The vibratory edge does not approximate and an unevenness in the vibrato can occur. The mucosal wave loses its symmetry and pattern. The vibratory edge needs to have this very delicate wave motion or else problems can be heard in the singing and speaking voice.

After a year of retraining, the client was able to begin to sing exercises that allowed her to sing with expressiveness. Other jaw and abdominal exercises strengthened the muscles of the throat and jaw, enabling the client to sing loudly and softly. The muscles became flexible enough to sustain a pianissimo on some of her high notes. On days when the reflux was a problem, extended warm-ups were vital. Within a year and a half range,

resonance and expressiveness were restored to this singer but constant work was required because of the flare ups of the reflux.

#### CLIENT C (2002-2003)

This singer in her mid-thirties came to the author with complaints of hoarseness, vocal tension and difficulty with pitches on high notes. In her first session there was strain in the passagio of the voice, and the pitch was out of tune. Visually there was not a lot of tension in the neck and laryngeal area, but there was some strain in her tone. Her tone was mostly well produced however the author sensed that she was only using a part of her voice and that there was tension at the base of the tongue. In other words the tension in her voice was well disguised in a very beautiful voice. Often in unusually rich and full professionally trained voices, some of the problems are well hidden. Nodules and bowed vocal cords can be disguised with over-training. The author recommended that the client be evaluated by Dr. Arnstein. He diagnosed reflux, stating:

[T]here was also soft tissue swelling and mild erythema in the intra-arytenoid space...She had a slightly larger than normal glottic gap during phonation....a...singer who is having dysphonia likely secondary to chronic laryngitis. Her laryngitis is likely induced by gastroesophageal reflux.<sup>31</sup>

Dr. Arnstein recommended Nexium plus dietary and prescription changes: "I strongly urged her to continue with the elevation of head of bed and early p.m. meals, but also

take Nexium 20 mg, 30 minutes prior to dinnertime. She will return in three months for repeat evaluation."<sup>31</sup>

It is the author's experience that this is excellent advice. If medication and head elevation produce no improvement, then Dr. Arnstein may order more testing or a referral to a gastrointestinal specialist. This next step, to be rechecked by Dr. Arnstein, can be very critical and sometimes reveals more complications. In some cases, this procedure has been life saving.

The first three months of working with this singer produced good progress in the laryngeal area. The singer was able to devote time to the exercises and she did not have to use the voice excessively outside of the lessons. By the end of the three months, the reflux medication seemed to reduce the swelling of the vocal cords. She also continued to monitor different foods, but was not having great success figuring out which foods made her reflux worse. Many foods seemed to set off the reflux. As the swelling subsided the muscles of the throat became more flexible. The McClosky exercise that gently relaxes the muscles of the larynx seemed to help this singer the most. The abdominal muscles were especially rigid possibly due to abdominal surgery. This singer is also short-waisted, and the descent of the diaphragm was very difficult. This particular singer needed many abdominal exercises to achieve a small amount of progress. The

author has observed that the upper abdominal muscles for people with reflux often become tight, sore and inflexible. Progress is initially slow but with persistence and time, flexibility is restored and abdominal muscles often develop to an improved level. The author encouraged this singer to practice some of the abdominal exercises in short but frequent intervals throughout the day. This seemed to give the best results.

At the end of six months there was marked improvement in the abdominal muscles. Because the reflux medication seemed to be controlling the swelling of the vocal folds and the singer had persisted in practicing throughout the day, her high notes were starting to gain strength. The McClosky exercise for the relaxation of the larynx continued to help. She also was able to practice releasing the jaw. The muscles were starting to relax and the author was able begin coordinating the jaw and abdominal muscles for dynamics and high notes. As long as very specific throat muscles were encouraged to relax, her high notes were beginning to be in tune. Prolonged warm-ups, including a retraining of abdominal muscles, brought desired results.

By the end of the ninth month, this singer was able to demonstrate a full recovery. She was able to sustain tones, in tune while singing very softly. She was able to accomplish this first by warming up the muscles. She seemed to have mild to moderate

set backs with reflux and extended warm-ups were able to compensate for the damage caused by the reflux.

## Chapter 3. Other Therapies

### VOICE TREATMENT

The specific goal and techniques of voice therapy will vary from person to person.

The overall goal is to restore the voice to the best possible condition. Therapeutic techniques vary from clinician to clinician and sometimes a combination of techniques is appropriate. Several approaches are outlined below. This is by no means a complete list of therapeutic approaches.

### ARONSON PSYCHOGENIC APPROACH

All voice disorders display muscular tension. Musculoskeletal tension is the result of medical problems or of improper singing and speaking. Aronson believes that functional voice disorder patients are able to have a healthy pitch but only after the larynx has resumed a healthy position.

The following principles underlie therapy for musculoskeletal tension: The abnormal voice is due to tight extrinsic and intrinsic laryngeal muscles. When these muscles are tight, the larynx is not able to produce a normal speaking voice. When the muscles are massaged properly, the tension is minimized and eventually released. When the voice is injured, the larynx is in a raised position and the lowering of this position enables the

voice to speak in a healthy manner.

The Aronson Pressure and Massage Techniques begin with identification of the tips of the hyoid bone and use a circular pressured movement. The hyoid bone is found at the top of the larynx on either side of the cartilage. Move into the thyrohyoid space and massage in a circular motion. Massage posterior borders of the thyroid cartilage. With fingers, move along the upper border of the thyroid cartilage exerting pressure in a downward manner in order to move the larynx down. Ask the patient to massage the throat while trying to speak until a positive change is produced. Then ask the patient to produce this sound without the massaging of the throat.<sup>38</sup>

#### INSTANT VOICE PRESS

Instant Voice Press is a technique developed by Dr. Morton Cooper that enables an individual to find his or her individual tone focus, pitch level or the sound of their real voice. The first step is to have the patient put his hand at the bottom of the breastbone area where the solar plexus area is located. Next, ask the patient to keep breathing normally and notice that the breathing goes in and out. The patient must then make a humming sound and at the same time press on the solar plexus using light quick pressure. The patient is asked to make one long humming sound but because of the gentle jiggling pressure, the humming sound will be broken up into detached separate sounds. The

patient should then repeat the exercise.

Next, the patient should repeat this sound while closing the mouth and pressing the center of the rib cage in the same repetitive jiggling pattern. This should cause a sensation of buzzing around the mouth. The patient should then speak while maintaining the buzzing sensation.

The patient should then repeat the Instant Voice Press on the sound "ahhhhhh." Next, the patient starts every phrase with "hmm-hmm-one, "hmm-hmm-two," "hmm-hmm-three," and so on. The next step is to repeat the same process using the sounds "ahh-ahh-one," "ahh-ahh-two," "ahh-ahh-three," and so on. Then the patient should try to learn to speak in such a way that the buzzing sensation on the lips and mouth remains. He or she will say "Ahh-my-ahh-name-ahh-is."

#### FRÖECHAL'S "CHEWING METHOD"

Professor Emil Fröechal developed a "chewing method" which normalized phonation and articulation. In this method, a patient is asked to chew, protruding the tongue in an exaggerated way, so that the tongue is outside the mouth as well as moving the tongue in a chewing fashion from side to side. In so doing, many of the throat muscles are exercised, loosening the tight muscles locking the larynx, which has been in a rigid, unhealthy position. There are several benefits of this therapy for the patient. First, by



having the patient exaggerate the chewing, there is more space at the back of the teeth.

This causes a rigid larynx to release and fall into a healthier more flexible position.

Making or creating more space at the back of the teeth takes more time, which in turn counteracts the tendency to involuntarily squeeze the already impaired laryngeal area.

Creating more space opens or widens the tightened or injured area. These movements are essential for a complete recovery. Therapies of speech pathology, which base their recovery on manipulated resonance and speech exercise, seem to have overlooked one main obstacle. In order for a therapy to be successful, an exercise must be able to reach the root of the problem and teach the correct pattern of muscular relationships. A patient must be able to repeat these exercises correctly outside the therapist's office.

It is very important to help the patient imitate the chewing act properly. The tongue must move constantly and exaggeration of the chewing muscles is also important. The patient will need some guidance so that the chewing is done in a proper and exaggerated way. While still chewing, the patient should add words, sounds and phrases and gradually reduces the exaggerated movements of the mouth. The patient should be watched so that the tongue is in constant movement while the chewing continues.

## THE MCCLOSKEY TECHNIQUE

The McClosky method is effective in helping the impaired voice as well as maintaining the health of an unimpaired voice. McClosky emphasizes getting the flow of air to move through the vocal cords first, without a further tightening of the laryngeal area. Some of the main exercises include gently massaging the throat and laryngeal area. The jaw wiggle is an exercise whereby the hands move the jaw by opening and closing the jaw. In addition, the thumbs can be placed gently on the swallowing muscles underneath the lower jaw. The thumbs can then feel if the tongue tightens when talking or singing. McClosky also emphasizes teaching a patient or singer how to incorporate proper breathing with speaking and singing.<sup>39</sup>

## THE RELATIONSHIP BETWEEN SINGING AND SPEAKING

How do we breathe for singing and speaking? Jean Westerman Gregg defines “support” as “optimal breath pressure for whatever pitch and volume is being sung.”<sup>40</sup> It is important to understand how breathing occurs.

Breathing occurs by specific muscular activity. A partial vacuum is created which causes pressure and air rushes into our lungs to fill the vacuum.

The diaphragm, the main muscle of inspiration, is a muscular shelf that divides the body. The relaxed position of the diaphragm is dome shaped and it flattens as it

contracts. There is a gentle rise and fall of the abdomen as inspiration and expiration occur. This action is under the control of the automatic respiratory center located in the brain stem. When we sing long phrases the breath is under cerebral control. The main muscles involved are the abdominal muscles, including the rectus abdominus, the transversus, and the internal and external obliques.

The area below the floating ribs is of particular importance because this is where singers can achieve refinement in expressiveness. This is the same area used with the Heimlich maneuver. For speaking and singing, a column of air is directed upward in order for the vocal folds to vibrate. This column of air must be under a singer's voluntary control so air pressure is adjusted for a particular pitch or loudness.<sup>41</sup>

#### THE ALEXANDER TECHNIQUE IN VOICE THERAPY

The Alexander Technique is a process for retraining muscles involved in posture, breathing and movement. This retraining encourages an ease of movement and has been used by many musicians, artists, dancers, and actors to enhance their performance abilities. The Alexander Technique is about discovering new ways to respond to stimuli and create new habits. Frederick Alexander developed exercises and movements that gave new freedom and ease to ordinary movements such as sitting, standing, breathing or repetitive muscular activities.

Some aspects of the Alexander Technique have beneficial effects both for the injured voice and for breathing for singers. These Alexander ideas are very helpful in healing the injured voice. The ideas of muscle patterning and isolating specific muscle groups help singers to improve.

The tool of observation is a powerful tool that Frederick Alexander describes in his first book about the Alexander Technique.<sup>42</sup> There can be hidden problems in the jaw, neck, abdomen, chest or other areas. It is important to watch these muscle groups individually, as well as watch the entire process of breathing. Sometimes most of the problems are in the inhalation process. Sometimes there are locked muscles in the back of the head or back. It is important to identify muscle groups that are causing faulty phonation and to develop specific exercises to help specific areas. The vocal folds are only perhaps three-quarters of an inch long and yet problems in other areas, such as the shoulder, hip or abdomen or many other combinations can significantly affect vocal production. Muscles can be compared to the layers of an onion in that there are many layers of muscles and one layer at a time needs to regain flexibility.

Another important Alexander idea that has helped many students is the understanding that the focus and attention for breathing is placed on the integration and coordination of several areas of the body including the jaw, tongue and abdomen. Often

in singing it is possible to overuse specific muscles in an attempt to try to sing better. We use the wrong muscles and end up isolating muscle groups that cause technical problems in singing. Singers tend to try very hard to succeed. Directing the effort to achieve success is critical. Singers can try so hard that they injure themselves. Often the process of proper breathing and singing will achieve good results. It is often far more productive to look at the reason behind an error in technique and address that issue. Ignoring the result and focussing on the solution often solves the problem.<sup>43</sup>

Voice therapists have always recognized the need for improved posture and relaxation for proper tone production. Voice therapists Carol Harris and Sheila Pehrson have developed specific Alexander exercises that can help the injured voice recover.

In a series of six lessons, their clients were encouraged to become aware of different body tensions in sitting, standing, and lying down. The pupil was taught to release neck tension as well as other muscular constrictions in the body. Harris and Pehrson report good results with the combination of voice therapy and Alexander exercises.<sup>44</sup>

#### DR. DANIEL R. BOONE VOICE TREATMENT

Dr. Daniel R. Boone uses a combination of approaches and tailors the exercises to the specific needs of his patients. He states that the goal for each person is different

but that generally the goal of therapy is to restore the voice to the best of its ability. An accurate diagnosis is essential. The following is an incomplete list of the types of therapies employed by Dr. Boone.

The techniques include altering the tongue position by use of whispering with alveolar consonants such as t, d, s, and z. After some success with whispering, then the patient begins to add the voice lightly. The patient begins then to work on changing how loudly they speak. Some speech pathologists use a machine called Visi-pitch to help a patient with pitch and volume. Ear training can also help a patient restore his or her voice. A combination of pitch discrimination and recognizing his or her healthy voice is used. A patient also learns to eliminate vocal abuse. This can also include the elimination of hard glottal attacks. A new pitch level for speech can be established by using a tape recorder. Other pitch retraining tools include the Visi-Pitch, Tunemaster 111 and Tonar 11 machines. Pitch, quality and loudness can be monitored with the use of panensoscope. This device gives feedback on the velopharyngeal closure using a television monitor. Relaxation can be monitored with the use of the electromyography (EMG). Complete or partial voice rest is also used. The yawn-sigh can also be used to help establish pitch and quality. Chewing can loosen laryngeal muscles. Digital manipulation helps to establish a lower pitch. The patient places fingers on the external

larynx and creates upward and downward movements of the larynx. The patient is asked to maintain the position of the larynx and the pitch. A patient is asked to reproduce his old speech patterns and then repeat new speech patterns. The use of open mouth approach includes teaching a patient to watch for facial and neck tension when he is talking. Pitch inflection is also taught.

The pushing approach is a technique that helps with proper support when talking. A patient's fists are raised to shoulder height and then the arms are suddenly pushed down as he talks. Many methods of relaxation can also be used. Respiration training includes using an exaggerated breath or the use of a prolonged breath. Voice production is discussed and strategies to obtain a good pitch quality encouraged.

## Chapter 4. Care of the Voice

It is important to keep the singing and speaking voice healthy. If the voice is used improperly in speaking, singing will be more difficult. A singer who sings with unnecessary tension can injure the singing voice as well as the speaking voice. If the outside (extrinsic) muscles are relaxed, the inside (intrinsic) muscles will be able to function better and in a healthier way. (Table 1 identifies seven areas of the body to help accomplish this objective.)

All of the above areas should be relaxed when silent but it is important to maintain these areas of relaxation while speaking and singing.<sup>45</sup>

### ESTABLISHING GOOD VOCAL HEALTH

Other activities that promote vocal health are summarized in Table 1 below.

#### ADEQUATE HYDRATION

One of the most important vocal health considerations is maintaining adequate hydration while avoiding caffeine. To accomplish this, the singer should drink eight or more glasses of water a day. It is also important to avoid drinking caffeine before heavy voice use in rehearsals, performances, lectures, sermons, or teaching. A third caffeine safeguard is for the singer to drink a glass of water for every cup of coffee or soda.



Area Number	Procedure
1	While sitting in a chair, focus on the chest, shoulder, neck, and face.
2	Slowly massage the face with both hands, starting at the hairline and working your way to the jaw. Let the jaw hang in a completely relaxed manner.
3	The tongue is the most important area of relaxation. Stretch the tongue outside of the mouth and then let it fall back into the mouth. A fat floppy wide tongue is a sign of a healthy throat. A groove or retraction is a sign of tension.
4	Begin massaging the swallowing muscles (suprahyoid muscles). Gently massage the muscles behind the jaw. The jaw should be very relaxed as you do this.
5	Slowly move the jaw up and down with the thumbs and index fingers of both hands, making sure that the teeth touch when the jaw closes. Your hands do the work and not the jaw. Your jaw may resist a great deal. Breathe in and out very slowly as you move the jaw. At some points it may be difficult to keep the jaw moving. Try to relax these areas which are tight.
6	Place your hand on your larynx and gently move the larynx from side to side. It should move easily. A larynx that is rigid or tense when you are silent, singing or speaking usually indicates tongue or neck tension or, most likely breathing which is being done improperly.
7	It is important to relax the neck and shoulder area. A good exercise for relaxing the neck and shoulder area is to move the head from side to side gently and easily without feeling tension or soreness of the neck muscles.

**Table 1. Seven Areas of Relaxation for McClosky Technique**

#### VOCAL REST VERSUS EXCESSIVE TALKING

Vocal rest helps minimize vocal damage. The singer should schedule rest periods and observe at least twenty minutes of silence two to three times a day. It is also wise to limit the time talking to others and interrupting others. Being a good listener also helps.

## AVOIDING LOUD TALKING OR YELLING

Excessive vocal volume can cause vocal damage. There are several techniques that can be used to avoid this. Where possible, consider the use of amplification. It is also possible to use facial or other gestures instead of raising the voice. Another technique is to use a whistle or bell to gain attention. It is vital to recognize the limits on one's vocal ability.

## VOCAL WARM-UPS

Proper vocal warm-ups can prevent vocal damage. It is important to first warm up the entire body with walking or stretching. The next stage is to gently massage the head, neck, and jaw areas. The last step is to do breathing exercises such as hissing on an "s" sound for as long as can be sustained.

## POSTURE

It is important to maintain a comfortable posture when speaking and singing. Singers should avoid postures that will negatively effect the speaking and singing voice. When reading orally, it is important to be expressive and avoid using a monotone voice.

## SYSTEMIC DRYNESS

To correct a dryness problem, use a humidifier. Since air travel occurs in a low-humidity environment, singers should drink an excessive amount of water when flying in

an airplane. It is also important to minimize talking in an airplane.

#### INADEQUATE SLEEP PATTERNS

To correct a problem with inadequate sleep time, a singer should get more rest prior to heavy voice use. It is also important to allow time for a short nap before a voice commitment.

#### THROAT CLEARING

It is important to eliminate throat clearing. There are several techniques which can be used. These include a dry swallow, taking small sips of water, or using a silent cough. Another technique is to pant lightly, then swallow. A third technique is to laugh gently or giggle lightly, then swallow. It is also possible to talk through mucus to aid this problem.

#### STRESS MANAGEMENT STRATEGIES

Alleviating stress is very important. There are several techniques. Talk more slowly. Learn to control the pace of a situation. Use physical exercise. Read a familiar passage out loud. Use meditation or prayer, when applicable. Consider formal training in stress management. Use warm-up exercises.

## Chapter 5. Conclusion

The human voice is a gift most of us take for granted. For singers, the human voice is trained beyond what we do ordinarily in our daily life. For those that use the voice professionally or use the voice to communicate in daily life, it is a tool that needs to be able to assist us in our path in life. Vocal damage can make life difficult.

Acid reflux, in particular, can have an enormous impact on singers. Even mild irritation can cause problems for high notes or in the ability to sustain a tone or sing expressively. There is no one solution for a cure for reflux. There is a huge variation of symptoms of reflux. Several clients have had either total or partial loss of voice. Some have displayed similar symptoms that mimic spastic dysphonia. Some have appeared to have allergies or asthma. Some clients reported no discomfort in their stomachs. Almost all of the clients with reflux have had some kind of hoarseness and when singing there has been an unevenness in the quality of their vowels. An “e” vowel may sound focussed and resonant but an “ah” vowel will be raspy. Depending on where a singer is singing in their range, the voice may or may not be able to sustain a tone consistently. When a singer has varied symptoms and the symptoms don’t fall into a pattern, the author suspects reflux as a source of the problem.

For singers experiencing vocal problems, medication alone rarely solves the complete problem. Medication, dietary and lifestyle modifications provide good results. The best results have occurred when the client is able to follow a medical regime along with dietary and lifestyle changes, as well as practice exercises that relax the laryngeal and abdominal areas. For some, even when it is not possible to take medications due to pregnancy or breastfeeding, it is possible to compensate with dietary and lifestyle modifications. For some, making dietary changes has not helped very much. Others have experienced good results.

This report has presented a new approach to managing reflux. There is a new combination of speech pathology, otolaryngology, singing, physical therapy, based on muscle patterning ideas. Traditionally, reflux may be treated with speech pathology. The author has developed additional exercises for the abdomen that specifically help singers or those who have completely lost their speaking voice. There is also a unique approach to coordinating the problems of the jaw and abdominal muscles. Some singers have resumed their careers because of this unique approach.

This report defines various vocal injuries and methods of rehabilitation. Healing the injured voice is now a team effort from doctors, speech pathologists and vocal and singing coaches. Sometimes surgery is necessary and can have miraculous results. In

other cases, voice therapy is necessary and surgery can be avoided altogether.

The human voice is a complex device. The untrained singer, the professional singer, and the injured voice all have muscles in common. The condition of the muscles is partially what separates these categories. Because of the extraordinary abilities of our muscles, and the ability to allow muscles to become flexible in places we do not ordinarily use, the human voice is capable of healing and developing musically.

Great singers are not created when they come out of the womb. Successful singers are not necessarily lucky. They have conditioned and patterned their muscles in places not ordinarily used in daily life. Muscles that have become tight or injured are able to become flexible again, if the right areas are identified and proper exercises are used or created for specific problems. Every person that the author has ever helped has had a unique problem and needed very specific help. In a group of forty singers with nodules, each singer will need help in unique areas of the head, neck, jaw or abdomen.

Breathing and speaking are complicated activities. Often working with only one or two areas at a time brings faster results. Small steps add up quickly. Breathing irregularities can often take months to completely retrain especially if the neck and jaw muscles are tight. William Vennard states in his *Singing the Mechanism and the Technic*<sup>46</sup> that if a student cannot breathe properly after two lessons, then the student is

probably not practicing. This is not necessarily true, especially with an injured voice or a voice with bad habits.

If a student is having trouble with some aspect of singing, training a specific muscle group or groups that are interfering with the singing technique will often solve the problem. The author's experience indicates that such a student will rarely refuse to practice or try hard to improve. Many singers are overachievers who very much want to sing well. If there is a problem in vocal technique, fixing the muscular problem is often the solution. Our muscles communicate what they are able to do or not able to do. With the injured voice, it is imperative to start the healing process with what the muscles are able to do with as much ease or comfort as possible. This will begin the retraining and muscles will again become flexible.

Healing methods that deal with muscular retraining and patterning produce better results in most cases. It is important to hear and watch for muscular and air flow difficulties in the speaking and singing voice. Injury does not just occur at the site of the vocal cords. Retraining of the muscles needs to occur in the neck, jaw, chest and abdominal area. If there is tension in the shoulders, neck and jaw, there is also tension and inefficient breathing in the abdominal or hip areas.

The severity of the vocal injury is generally reflected in a likewise complicated breathing pattern, which struggles to be automatic and involuntary. Some of the leading otolaryngologists believe that botox injections are appropriate for spastic dysphonia. Drugs are not required in all cases. Sometimes this particular injury can be helped by intensive muscular repatterning in the abdominal, head and neck areas.

In many cases, nodules can also be corrected by the retraining of jaw and abdominal muscles. For some vocal problems, surgery can usually be avoided. In general, muscles can be very forgiving given the chance to become flexible again. A lack of flexibility in unusual places of the head and abdomen are usually the main cause of many vocal injuries. It is a matter of identifying the specific areas of tension. Sometimes these areas portray themselves as muscle knots or muscles with varying degrees of tension.

If an injured singer is motivated to overcome his or her injury, it is more likely that healing will occur more quickly. The love of music can inspire people to overcome great obstacles.



## Appendix A. Correspondence

### CLIENT A

The author referred this client to Dr. Dray. Here is a copy of that correspondence:

### REFERRAL TO PHYSICIAN

**Robin McKee Williams C.M.V.T.  
Mezzo- Soprano  
Voice Instructor  
211 6<sup>th</sup> Street  
Pacific Grove, Ca 93950  
(831) 375-5372**

**October 12, 2001**

Dear Dr. Dray,

I have asked my student <Client A> to have her voice evaluated as a routine part in her voice recovery. She is a conductor, singer and voice instructor. I began working with her several years ago when vocal strain was very pronounced due to several problems. She had nodules, reflux and a working schedule that demanded many hours from an already injured voice. She has a back condition I believe involves curvature of her spine. Despite a less than optimal situation for her speaking and singing voice, she has dramatically improved because of her diligence in reeducating her speaking and singing habits. There is still a slight hoarseness, which seems to vary daily and she has stated that one spot of her throat feels sore some of the time. This could possibly be due in part to a problem with reflux.

Thank you very much for your help.

Yours truly,

**Robin McKee Williams C.M.V.T.**

## CLIENT A'S STATEMENT

To Whom It May Concern:

I have a Bachelor's degree in Choral Music Education from Brigham Young University. I have studied with nearly a dozen voice teachers since I was 16 years old, including 4 years of private study with various faculty members and professors at Snow College, Utah State University and Brigham Young University.

During my Senior year at BYU, I was assigned to take lessons with one of the top three voice professors at the university. I had completed nearly all my coursework but was having difficulty passing vocal juries at a level required of music education majors. After a year of master class and 5 months of private study with this professor, I was still unable to pass the juries. They allowed me to graduate (in August of 1997) only because I was so far along in the program and in spite of the fact that they felt my singing was not up to par.

A year later, in August of 1998, I began studying with Robin McKee Williams. I found her initially because I was having a serious problem with hoarseness and extreme discomfort and irritation in my throat. I had been teaching choir and Spanish classes at the high school level since I graduated from BYU in 1997. By the fall of 1998, my vocal fatigue was so bad that I would consistently lose my voice by Thursday and Friday of each week.

From the first lesson Robin heard that there could be serious vocal damage to my voice. She recommended that I see Dr. Arstein, an ENT in San Jose, which I did. He found that I had vocal nodules on each vocal chord. At Robin's suggestion, I also asked my MD. to test me for a possible digestive disorder, which may have been causing or irritating my throat. The Dr., after ordering some X-rays, found that I had acid reflux and gave me a medication to keep it under control.

Meanwhile, I continued to teach full time and to study with Robin. She taught me how to breathe correctly and help me to relax the jaw and tongue as I

spoke and sang. This is something I had been instructed to do by most of my previous voice teachers; however, Robin was the only one who made it possible for me to do what they had all been asking of me for ten years.

She taught me to prepare the muscles so that when I sang vocalizes and songs, I was helping to heal and build the voice instead of adding to the tension and stress that was already there because of the reflux and nodules.

By the end of that school year (spring of 1999) the hoarseness was almost gone. I auditioned for a Master's program and was accepted. By the fall of 1999, when I returned to Dr. Arstein, the nodules were much smaller.

At that point I was diagnosed by a physical therapist who informed me that I had not only a curvature of the spine, but a rotation (scoliosis). This was yet another physical limitation that had been influencing my speaking and singing. It was quite literally impossible for me to stand with 100% correct posture without tightening the very muscles that needed to remain flexible in order to sing. Once again, Robin trained my voice in spite of the limitations. Instead of explaining over and over the correct way to stand and breath, as my previous teachers had, she adapted the positions I sang in so that I could learn to do what I needed to without having perfect posture.

As I continued to study with her, I began to feel inside my body what all of my other voice teachers had told me I should feel. The reflux was less extreme at this point, but continued to be an issue. My voice was very inconsistent, but I have learned how to "trouble-shoot" to the point that I can almost always get things to line up and be ready to sing.

Currently, I rarely experience hoarseness caused by vocal fatigue. I have sung arias from the Messiah as well as soloed with college level choirs. My range has gone from barely one octave to well over two. The fast, tight vibrato that always came up in my vocal juries has been replaced with one that is natural and easy to listen. The unique tone of my voice can be heard for the first time in my life. I consider all of this to be largely due to Robin's training

and skill at taking the voice from where it is, one small step at a time, to where it needs to be.

#### CLIENT B

The author referred <Client B> to Dr. Arnstein. Here is a copy of that correspondence:

#### REFERRAL TO PHYSICIAN

Robin McKee Williams, C.M.V.T.  
211 6th Street  
Pacific Grove, California 93950 (831) 375 - 5372

November 29, 2001

Dear Dr. Arnstein,

I was recently remarried and am no longer Robin Luscombe. I also received certification from the McClosky Institute of Boston as a voice specialist in 2000. I am writing also on behalf of my student <Client B>. She has studied with me a short time and has formerly sung professionally in recording studios. I wanted her voice to be examined because there are vocal fatigue issues, which may be caused by tension in her singing, possible reflux and thyroid problems. She is responding well to exercises, which relax the vocal mechanism.

Yours truly,

Robin McKee Williams, C.M.V.T.

PHYSICIAN'S DIAGNOSIS

**DAVID P. ARNSTEIN, M.D., F.A.C.S.**

**OTOLARYNGOLOGY- HEAD & NECK SURGERY**

15861 WINCHESTER BOULEVARD  
LOS GATOS, CALIFORNIA 95030  
TELEPHONE (408) 395-6121

December 6, 2001

Robin McKee Williams, C.M.V.T.  
211 6th Street  
Pacific Grove, CA 93950

RE: <Client B>

Dear Robin,

Thank you for your kind referral of < Client B>. As you recall, she is a 50 year-old singer who is complaining of hoarseness after singing for the past year. She has early fatigue with singing and her hoarseness also affects her speaking voice. Her voice seems to recover after rest but recurs whenever she sings even a moderate amount. She also complains of a foreign body sensation in her throat. She denies heartburn or other symptoms of gastroesophageal reflux. Her past medical history is significant for Grave's disease for which she is currently on Tapazole with only fair control.

On physical examination she was a healthy-appearing 50 year-old in no obvious distress. Her voice was clear and without hoarseness during the examination. Ears were clear. Nasal cavity revealed a moderate septal deviation and minimal inferior turbinate hypertrophy. Her cervical examination showed some fullness in the area of the thyroid bilaterally. Fiberoptic laryngoscopy revealed scarring in her nasopharynx, likely from her prior adenoidectomy causing likely clinically insignificant stenosis. Oropharynx was clear. Her laryngeal examination showed marked soft

tissue swelling and mild erythema of both arytenoids with slight erythema of both true vocal cords. Vocal cord motion was grossly normal.

In summary, this is a 50 year-old who has hoarseness and early fatigue which is likely due to swelling induced by gastroesophageal reflux. I recommended a treatment regimen including elevation of head of bed, early p.m. meals, and Prevacid, as well as some dietary changes. She was given a booklet of instructions and she will follow up again in two months. I recommended she not sing extensively during this time to allow the swelling to diminish.

Thank you again for the kind referral.

Best wishes,

David P. Arnstein, M.D.

#### CLIENT B'S STATEMENT

Robin is the first person able to diagnose the cause of my vocal problems of limited range and hoarseness. The cause being acid reflux. Her unique vocal exercises and supportive encouragement have enabled my vocal range to increase an octave and a half and the tone and resonance have returned. I've been a professional studio vocalist and have sung with such artists as Elvis Presley, Linda Ronstadt, Joan Baez, and also radio and TV commercials for McDonalds, Kelloggs and United Airlines.

CLIENT C

The author referred <Client C> to Dr. Arnstein. Here is a copy of that correspondence:

REFERRAL TO PHYSICIAN

Robin McKee Williams, C.M.V.T.  
211 6<sup>th</sup> Street  
Pacific Grove, Ca 93950 (831) 375-5372

August 15, 2002

Dear Dr. Arnstein,

I have referred < Client C> to your office for a thorough evaluation. She is a professional soprano singing the baroque repertoire and is well known in the San Francisco area for her singing. I have begun working with her only very recently. She is no longer able to control the pitch around and above the passagio where most of her singing lies. When she is singing, her head tilts slightly to the left and there is noticeable laryngeal tension especially visible at the base of the larynx and probably at the base of the tongue. When she inhales there is also tension at the back of her throat. Her breathing technique lacks proper coordination in part because of a caesarian section for her first and only child whom is approximately 2 years old. She has several very demanding contracts coming up one of which is with the San Francisco Symphony. I am concerned that there is muscular injury of some sort and that upcoming singing may further injure her voice. She is however responding very well to exercises, which relax laryngeal tension. In time the tension and technique can be corrected.

Sincerely,

Robin McKee Williams, C.M.V.T.

PHYSICIAN'S DIAGNOSIS

**DAVID P. ARNSTEIN, M.D., F.A.C.S.**

**OTOLARYNGOLOGY- HEAD & NECK SURGERY**

15861 WINCHESTER BOULEVARD  
LOS GATOS, CALIFORNIA 95030  
TELEPHONE (408) 395-6121

**VIDEOSTROBOSCOPY REPORT**

Patient: < Client C >

Date: 9//30/02

Preoperative diagnosis:                   1. Hoarseness.  
  2. Chronic laryngitis.

Postoperative diagnosis:                1. Hoarseness.  
  2. Chronic laryngitis.

**HISTORY OF PRESENT ILLNESS:** Patient is a 35 year-old vocalist who is complaining of increased vocal tension and difficulty reaching her high pitch range. She has also had problems with vocal fatigue. Prior examination suggested inflammation consistent with gastroesophageal reflux. She has been only partially compliant with the regimen. She did elevate the head of bed and observed early p.m. meals but did not take the H2 blocker. On this regimen alone she has had some improvement.

Video examination shows a normal oral cavity, oropharynx, base of tongue, epiglottis. Both arytenoids were mildly erythematous and had a moderate degree of soft tissue swelling. There was also soft tissue swelling and mild erythema in the intra-arytenoid space. The true vocal cords were pearly white with no evidence of polyps, nodules, cysts, or other mucosal or submucosal lesions. There is mild pooling of secretions in the piriform sinuses.



Vocal cord motion was normal on abduction and adduction with good symmetry.

Stroboscopic evaluation revealed a fairly normal mucosal wave with normal amplitude and good symmetry. There is no obvious aperiodicity or adynamic segments. She had a slightly larger than normal glottic gap during phonation.

In summary, this is a 35 year-old singer who is having dysphonia likely secondary to chronic laryngitis. Her laryngitis is likely induced by gastroesophageal reflux. She has been noncompliant with her medical regimen. I strongly urged her to continue with the elevation of head of bed and early p.m. meals, but also take Nexium 20 mg 30 minutes prior to dinnertime. She will return in three months for repeat evaluation.

David P. Arnstein, M.D.

SUSAN SCHULMAN, M.S., C.C.C., SP/A

**SPS**

**Speech Pathology Services**

Susan Shulman, M.S., C.C.C., SP/A  
(972) 233-4660

Holly L. Sullivan, M.C.D., C.C.C.  
(972) 385-0836

Jean Garrett, M.S., C.C.C.  
(972) 458-0459

Maria L. D'Antoni, M.A., C.C.C.  
(972) 233-0450

April 15, 2003

To whom it may concern:

Robin Luscombe and I worked together to solve problems concerning the speaking and singing voice from 1992 to 1997. I would refer clients to Robin for singing lessons to strengthen or improve their speaking and/or singing voice. Robin also referred singing students to me who needed to work with dysfunction of the speaking voice. We also worked with a local laryngologist if a medical referral was necessary. If nodules were present, we would work together to obtain the best voice possible.

Robin is a very knowledgeable singing teacher and it was a mutually beneficial collaboration when she was in Dallas. I appreciate the opportunity that we had to help our clients together.

Sincerely,



Susan Shulman, MS, CCC, Sp/A

12700 Hillcrest Road, Suite 258, Dallas, Texas 75230

DR. JEREMY JONES, DPT

Dr. Jeremy Jones, DPT.  
Physical Therapist  
3465 Tuscany Drive  
Idaho Falls, ID 83404

April 30, 2003

To whom it may concern:

My name is Jeremy Jones. I received my Doctoral degree in physical therapy in 1999 and I now act as director of physical therapy at the Blackfoot Medical Center in Blackfoot, Idaho. I am acquainted with Robin McKee Williams through my wife, who was Robin's student for many years. I have observed my wife's lessons and seen the physical results of the techniques used. Physical results included: decreased muscle tone (tension), improved biomechanics, and increased muscle control. Many of the techniques I observed parallel manual therapy techniques that I use in my daily practice. Based on the physiologic goals of vocal performance, I find her therapy to be sound in theory and practice.

Sincerely,

A handwritten signature in black ink, appearing to read 'J. Jones', with a stylized flourish at the end.

Dr. Jeremy Jones, DPT

DR. DAVID P. ARNSTEIN, M.D., F.A.C.S.

**DAVID P. ARNSTEIN, M.D., F.A.C.S.**

**OTOLARYNGOLOGY- HEAD & NECK SURGERY**

15861 WINCHESTER BOULEVARD

LOS GATOS, CALIFORNIA 95030

TELEPHONE (408) 395-6121

April 10, 2003

To whom it may concern:

This is to verify that Robin McKee Williams, CMVT has referred voice students to me for several years. I have examined these singers. I was aware that Robin McKee Williams continued to work with these singers to improve their specific problems.

Sincerely,

A handwritten signature in black ink, appearing to be 'DA' with a stylized flourish.

Dr. David P. Arnstein, M.D.

## Notes

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<sup>1</sup> THE VOICE FOUNDATION, <<http://www.voicefoundation.org/>>.

<sup>2</sup> Arnstein, Dr. David, Private communication, page 66.

<sup>3</sup> McClosky Institute of Voice, <<http://www.indiana.edu/~mcclosky/>>.

<sup>4</sup> McClosky, David Blair, *Your Voice at its Best* (Boston: The Boston Music Company, 1978).

<sup>5</sup> Murry , Thomas, Ph.D., Rosen, Clark A., M.D., Branski, Ryan C., M.S., *Voice Therapy*, <<http://www.emedicine.com/ent/topic683.htm>> (Omaha: The Voice Foundation, 2001).

<sup>6</sup> See letter from Susan Shulman on page 64.

<sup>7</sup> Koufman, James A., *Reflux and Voice Disorders*, <[http://www.thevoicecenter.org/reflux\\_voice.html](http://www.thevoicecenter.org/reflux_voice.html)>, 2001.

<sup>8</sup> Boone, Daniel, *Is Your Voice Telling on You?* (San Diego: Singular Publishing Group, 1991).

<sup>9</sup> Shanahan, Donal, PhD, CyberAnatomy, <<http://anatomy.ncl.ac.uk/tutorials/larynx/text/1.html>>, Used by permission. Part of Health on the Net. The HON copyright policy:

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- <sup>10</sup> Brown, Oren, *Discover Your Voice* (San Diego: Singular Publishing Group, 1999), 171.
- <sup>11</sup> Shanahan, Donal, PhD, op. cit.,  
<<http://anatomy.ncl.ac.uk/tutorials/larynx/text/m3.html>> Used by permission.
- <sup>12</sup> McClosky, David Blair, op. cit., 117.
- <sup>13</sup> McClosky, David Blair, op. cit., 115.
- <sup>14</sup> Shanahan, Donal, PhD, op. cit.,  
<<http://anatomy.ncl.ac.uk/tutorials/larynx/text/p1ot.html>>, Used by permission.
- <sup>15</sup> Sataloff, Robert, *Vocal Health and Pedagogy* (San Diego: Singular Publishing Group, 1998), 10.
- <sup>16</sup> McClosky, David Blair, op. cit., 117.
- <sup>17</sup> Brown, Oren, *Discover Your Voice*, (San Diego: Singular Publishing Group, 1999), 17.
- <sup>18</sup> McClosky, David Blair, op. cit., 119.
- <sup>19</sup> Sataloff, Robert , op. cit., 12.
- <sup>20</sup> McClosky, David Blair, op. cit., 118.
- <sup>21</sup> Brown, Oren, op. cit., 178.
- <sup>22</sup> Shanahan, Donal, PhD, op. cit., <<http://anatomy.ncl.ac.uk/tutorials/larynx/text/1.html>>  
Used by permission.
- <sup>23</sup> Brown, Oren, *Discover Your Voice*, (San Diego: Singular Publishing Group, 1999),  
177.

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- <sup>24</sup> Hudson, Barbara, *The Effects of the Alexander Technique, Part I, Journal of Singing* volume 59. Sept. 2002, 16.
- <sup>25</sup> Miller, Richard, *The Structure of Singing*, (New York: Schirmer Books, 1986), 265.
- <sup>26</sup> Sataloff, Robert, op. cit., 21.
- <sup>27</sup> Nebel OT, Fornes MF, Castell DO. *Symptomatic gastroesophageal reflux: Incidence and precipitating factors. Am J Dig Dis.* 1976;21(11):953-956.
- <sup>28</sup> Spechler SJ. *Epidemiology and natural history of gastro-oesophageal reflux disease. Digestion.* 1992;51(suppl 1):24-29.
- <sup>29</sup> Van Dam, Jacques, *Digestive System, Harvard Medical School Family Health Guide*, p. 743-746.
- <sup>30</sup> International Foundation for Functional Gastrointestinal Disorders (member HON), <<http://www.iffgd.org/GIDisorders/GImain.html>> Illustration Copyright © 2003 International Foundation for Functional Gastrointestinal Disorders. All rights reserved. Used by permission.
- <sup>31</sup> Arnstein, Dr. David, Private communication, 9/30/02, page 62.
- <sup>32</sup> Pandolfino, John E. and Kahrilas, Peter J., *Gastroesophageal Reflux Disease, Conn's Current Therapy*, 2002, pp. 524-525.
- <sup>33</sup> *Gastroesophageal Reflux Disease*, edited Roy Orlando, (2000: Marcal Dekker, Inc. New York, New York) pp. 101-136.
- <sup>34</sup> Arnstein, Dr. David, Private communication, 12/06/01, page 59.
- <sup>35</sup> Pandolfino, John E., M.D. and Kahrilas, Peter J., M.D., *Gastroesophageal Reflux Disease, Conn's Current Therapy*, 2002, p. 525-526.

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<sup>36</sup> Jones, Jeremy. See private communication, page 65.

<sup>37</sup> Shulman, Susan, private communication, page 64.

<sup>38</sup> Aronson, David, *Aronson Psychogenic Approach*,  
<<http://mick.murrystate.edu/cdi624/fall97/aronson.htm>> 1 September 97.

<sup>39</sup> McClosky, David Blair, op.cit.

<sup>40</sup> Gregg, Jean Westerman, *How Do We Breathe for Speech and Song?*, *Journal of Singing*, volume 55, no.2 (1998), 61-62.

<sup>41</sup> Gregg, Jean Westerman, op. cit.

<sup>42</sup> Alexander, Frederick, *Man's Supreme Inheritance*, (New York: E.P. Dutton, 1918).

<sup>43</sup> Hudson, Barbara, *The Effects of the Alexander Technique, Part 1*, *Journal of Singing*, volume 59. Sept. 2002, 9-17.

<sup>44</sup> Harris, Carol, Pehrson, Shelia, *Using the Alexander Technique in Voice Therapy*,  
<<http://www.speechmag.com/archives/carolharris.html>>, December 27, 2002.

<sup>45</sup> McClosky, David Blair, op. cit.

<sup>46</sup> Vennard, William, *Singing the Mechanism and the Technic*, (New York: Carl Fischer, 1967) 18.