

# Chapter 5: Swallowing, Smelling and Tasting After a Laryngectomy

Many patients have reported it is harder to swallow following their laryngectomy surgery. That may be true. How the swallow works after a laryngectomy is very different from how someone with a larynx will swallow.

With the larynx in place, there are several structures in the throat that assist in the swallow process. Many of these are removed during the laryngectomy surgery which means *how* you swallow really *is* different. In some cases, this can take some time to adjust. In order to better understand why swallowing is different after laryngectomy surgery, it is important to understand how we swallow before surgery.



Fiberoptic Endoscopic Examination of Swallowing (FEES) in a person with a larynx



## **View Normal Swallowing**

To view normal swallowing, go to: [http://youtu.be/MU5e-9\\_p210](http://youtu.be/MU5e-9_p210)  
or scan the QR code

## Swallowing with a larynx:

Swallowing is a complex and coordinated activity that requires various muscle groups and other structures, including the larynx, to function in a swift and coordinated manner. When this doesn't happen, often it can result in food or liquid falling into the trachea, known as "aspiration." This is what happens when a person chokes.

To briefly describe how people with a larynx swallow, of course it begins in the mouth. This is referred to as the *oral phase* of swallowing. A standard laryngectomy surgery should not impact this phase of swallowing. During this phase, you chew any solid food and your tongue works in coordination with your lips and cheeks to organize the material in your mouth and move it, all together, to the back of the mouth, or the *oropharynx* (where the mouth joins the throat).

Once this happens, the *pharyngeal phase* of swallowing occurs. During this phase is when much of the work of swallowing is accomplished. (This is usually what most laryngectomy patients notice has changed following their surgery.)

The tongue base pushes backward and downward, making contact with the superior pharyngeal constrictors. These are the highest muscles in the throat. This begins the downward movement of the food material toward the esophagus. As this happens, material fills the *vallecula*. This is a "pocket" in your throat that is created on one side by the tongue base and by the *epiglottis* on the other side.

As the tongue base pushes downward, the pharyngeal constrictors begin to contract, like a purse string, from the top of your throat downward in a wavelike manner. At the same time, muscles connected to the larynx and hyoid bone, pull the larynx upward and slightly forward. The vocal cords also close during this to protect the windpipe from food going in.

The closing of the vocal cords also plays a very important role in the swallow process. By closing, they prevent any air from leaving the lungs during the swallow. This *subglottic pressure* is important for driving a strong swallow.

As the larynx moves upward, two other very important things happen. The epiglottis flips backward or *retroflexes* over the opening to the larynx, like a lid covering the larynx and trachea during the swallow. While this helps to protect the airway from food material entering, it also allows for the tongue base to now clear the food out of the vallecula. As the epiglottis flips backward, the vallecular pocket turns into a smooth slide, deflecting the food material past the protected larynx and downward toward the esophagus.

Another important action happens when the larynx moves upward and forward during the swallow. This action also pulls open the *cricopharyngeus*, or "upper esophageal sphincter" which remains closed except during swallowing, burping or vomiting. This is a small muscle at the top of the esophagus that opens to allow food and liquid to pass, then closes to prevent reflux or regurgitation back into the throat. At rest, the cricopharyngeus is closed.

The pharyngeal constrictors work in conjunction with these other actions, squeezing in a purse string manner from top to bottom. The middle pharyngeal constrictors are active when moving the food past the larynx. The inferior pharyngeal constrictors help to squeeze the food material past the cricopharyngeus and into the esophagus.

Once into the esophagus, the *esophageal phase* of swallowing begins. It is not uncommon for laryngectomy patients to experience problems in the esophageal phase, especially affecting the uppermost portion of the esophagus exposed to radiation.

The esophagus is a "tube like" muscular structure that squeezes from the top downward in a wavelike manner called *peristalsis*. This action is what moves the food into your stomach. Although problems may arise in the lower esophagus and duodenum, this is not impacted by the laryngectomy surgery.

## Swallowing After a Laryngectomy:

During the laryngectomy surgery, many of the structures in the throat, useful in swallowing before the surgery, are removed. This does not mean a laryngectomee cannot swallow, but the process of swallowing is certainly different.

During the laryngectomy surgery, in addition to the vocal cords and “voice box” being removed, the epiglottis and hyoid bone are also removed. The muscles of the throat are also reconstructed in a way that changes what happens when they contract.



Throat before laryngectomy

Throat after laryngectomy

After learning how the movement of the larynx and hyoid assist in the pharyngeal phase of swallowing, it becomes easier to understand why swallowing feels so different after the laryngectomy surgery. Also keep in mind that the movement of these structures also helps to open the cricopharyngeus to allow food into the esophagus. As these structures are removed, the mechanical help to open the cricopharyngeus is also lost.

All of this contributes to why the trachea or “windpipe” is diverted, sewn to the neck, creating the stoma a laryngectomee breathes through. Without all the structures to drive the swallow and protect the trachea from food entering, it would become impossible to swallow anything, including saliva, without it entering your lungs, creating a very dangerous situation.

This is also, however, why a laryngectomee can no longer choke during meals.

*This is very important to remember. A laryngectomee will not choke* or strangle, even if it feels as if the food is “stuck” in the throat. Anxiety over a fear of choking may create more tension in the throat and make it even more difficult for the food material to pass.

*“It’s so good to know I can’t choke. If it feels like food is stuck I have to bring it up or get it down, but I’m not worried about choking on it anymore.”*

*-BC, Fort Worth, TX*

Many patients and family members are often questioning how a laryngectomee can swallow once all the “parts” have been removed. It’s important to understand that swallowing is very different following a laryngectomy, but it can also be very effective.

Practice and proper instruction can often speed the process of returning to a more normal diet and way of eating. Essentially, the oral phase will be unchanged in a standard laryngectomee patient. It is the pharyngeal phase of swallowing that is most disrupted, as well as the cricopharyngeal opening, or passage through the top of the esophagus.

In the beginning of the pharyngeal phase in a laryngectomee, the tongue base serves to push the food downward toward the esophagus. Many reconstruction techniques may limit the tongue base movement to some degree. If the tongue base is not able to contact the posterior pharyngeal wall, the downward movement of the food material becomes less effective. In these cases, gravity will help quite a bit in getting the food to the base of the throat. For this reason, it is important that a laryngectomee eat and drink in an upright posture.

During the pharyngeal phase, the pharyngeal constrictors squeeze from the top down in a purse string, wavelike manner. This serves as the driving force for how a laryngectomee moves food from the throat into the esophagus. BUT, there is no longer a pressurization of the swallow as the lungs are now open to the outside air or “atmospheric pressure.” The negative pressure that usually exists to help, like a vacuum, to pull air and food material into the esophagus, is lost to a large extent. This means the throat muscles must do the work of driving the food past the cricopharyngeus.

The cricopharyngeus is also impacted as a result of the laryngectomy surgery. The structures used to pull this muscle open, allowing food to pass into the esophagus, have been removed. Many times, a *myotomy* is performed during the laryngectomy surgery, which serves to relax the uppermost region of the esophagus, including the cricopharyngeus and thus, eases the passage of food through this region.



### View Swallowing after Laryngectomy

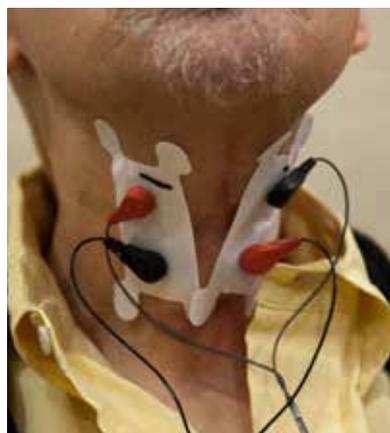
To view swallowing after a laryngectomy, go to: <http://youtu.be/vCnEMNKkXBA> or scan the QR code

## Radiation Treatment and Swallowing

Radiation, as well as flap reconstruction, can both negatively impact the strength and effectiveness of the pharyngeal constriction. *Radiation fibrosis* is a process where dense, tough fibers develop between the muscle fibers in the throat and other exposed tissues. When this occurs within a muscle, these fibers can limit how much the muscle is able to contract, thus resulting in a degree of weakness during the swallow that can make it difficult to effectively move food material through the throat.

There is evidence to suggest the best way to minimize the potential effects of radiation fibrosis on the muscles of swallowing is to regularly use them, even “exercise” them. A speech pathologist can help you with techniques and treatment which may help to minimize the effect of radiation fibrosis if consulted before radiation treatment begins. In many cases, therapy can help improve the overall strength and effectiveness of the swallow, after radiation as well, although this will first need to be evaluated by a speech pathologist.

When radiation treatment is used to treat laryngeal cancer, the radiation can also affect the upper portion of the esophagus that is located behind the uppermost portion of the trachea. The esophagus is a flexible structure that is designed to stretch or expand around the food material being swallowed, allowing for more solid foods to be swallowed effectively and comfortably. Consider a snake eating its prey and how its body expands around its food. The esophagus functions in a similar manner. When radiation fibrosis affects the esophagus, it often becomes stiff and resistant to stretching. In many cases, it can even become more narrow, as well as stiff, making food passage very difficult unless it is smooth or liquid-like. In this case, the esophagus may be able to be stretched or “dilated.” It may even require several dilations to achieve an esophagus that is a typical or “functional” size.



Neuromuscular electrical stimulation (NMES) is one way to treat dysphagia (swallowing disorder)

## Flap Reconstruction and Swallowing

In the case of flap reconstruction, it is important to understand what “flap reconstruction” means. A “flap” consists of tissue that is borrowed from a different part of the body and used to reconstruct/replace tissue that is lost during the laryngectomy surgery. There are various types of flaps used and reconstruction always varies from one patient to another. What is most important to remember is that a flap, regardless of the type, is “donor” tissue. A flap will never function as the original tissue/muscle functioned. The purpose of a flap is to provide a structure to replace what was lost. In the case of a laryngectomy, a flap may be used to replace portions of the pharyngeal tissue that is removed in order to reconstruct the throat. When this also includes muscle tissue that is removed, the flap will replace the structure of the throat, but the function of the muscle tissue will not be replaced.



Laryngectomee with a flap reconstruction

As such, flap reconstruction can present some additional changes to the swallowing function. The remaining portions of the pharynx that are not flap will be required to perform the entire job of swallowing. It is important to understand, the more muscle that is replaced with flap, the more challenges there may be to swallow effectively. Despite this, there are techniques and exercises that may be helpful in allowing a person to swallow very effectively, even if somewhat different from before surgery.

It is very important to tell your doctor or speech pathologist when you feel you are not swallowing well or are noticing changes in your swallow ability. You can be evaluated to determine if there may be ways to help you swallow more effectively. If you are not able to swallow many types of foods, you should inform your doctor or speech pathologist. Never “settle” with a limited food selection because you are unable to swallow other things. Many patients assume this is part of their “new normal,” although until your swallow function has been properly evaluated, there may be several methods to help improve how well you are able to eat.

## Changes in Swallowing

Changes in swallow function are possible even long after a laryngectomy. Some changes are normal, others may not be. “Normal” or not, there may be ways to help you swallow better. It is important to always tell your doctor or speech pathologist if you notice you are not able to swallow as well as before. The best way to understand if this is happening is to pay attention to any particular foods you are having difficulty swallowing. If you know you were swallowing these well before, but now have difficulty, this change should be mentioned to your doctor. Regardless of the reason for the change, it is usually much easier to improve your swallow at an early stage of difficulty than after swallow dysfunction has become more severe.

Most swallowing changes in laryngectomees do not occur because something worrisome is causing them, although following a cancer diagnosis, it can be a common fear among laryngectomees. Although all swallowing changes should be reported to your doctor, some symptoms may be more concerning and should always be reported immediately:

- Any sudden change in swallowing (i.e., not gradual in nature but a big and sudden change)
- Pain when swallowing, either in the throat or in the ear
- A feeling of “blockage” or obstruction

Although any/all of these symptoms can occur for various reasons that are NOT concerning for cancer or disease, they should be thoroughly and promptly evaluated to determine the cause and appropriate treatment options.

## Smelling after Laryngectomy

Following a laryngectomy, the sense of smell, or *olfaction*, remains intact. In a standard laryngectomy surgery, there is no impact from the surgery to the nerves of olfaction that allow for smelling scents, aromas and odors. What *has* changed, however, is the pathway of airflow during respiration. Prior to the laryngectomy, air would flow into the body through the nose and mouth. This movement of air through the nose allowed for scents and aromas to be detected as the smells came in contact with the tiny nerve endings in the nasal passages that are responsible for the sense of smell.

Following a laryngectomy, however, there is no longer an active flow of air through the nose during breathing, since the smells surrounding you are no longer being actively inhaled into the nasal passages where the olfactory nerve endings are, -how we smell. This can be perceived as a loss of smell.



In a sense, this is partially correct as laryngectomees are no longer smelling the scents, aromas and odors around them as they did before. However, since the *ability* to smell is intact (all the nerves and organs are intact to be *able* to detect smells), it is very important laryngectomees learn how to smell the world around them again.

Many patients “settle” with their diminished sense of smell as part of their “new normal,” but this **SHOULD NOT HAPPEN!** It is very important to be able to smell for a variety of reasons and one should never resign themselves to not smelling again. It is particularly important for a laryngectomee to smell odors that could represent dangerous situations. For example, smoke from a fire, gas odor, spoiled food, etc. And smelling can add to the pleasure of our daily life. Being able to smell the flowers and nature while taking a walk, the smell of a fresh spring rain or dinner cooking are all part of enjoyable experiences in life. Restoring the quality of life to as near normal as possible is a primary goal in modern laryngectomee rehabilitation.

Your speech pathologist can help you learn a technique that can allow you to smell in a similar manner as before the laryngectomy. Although the technique is described here, it will take a bit of practice and perhaps even direct instruction from a speech pathologist in order to perfect your ability.

## The “Polite Yawn” Technique

The “polite yawn technique” has become a standard in helping laryngectomees regain their capacity to smell, much thanks to a Dutch speech pathologist, Corina van As-Brooks. A speech pathologist skilled in laryngectomee rehabilitation will be very good in helping patients master this technique although home exercise and regular practice is key to developing this skill.

With this technique, you create a vacuum within the upper airway (where respiration takes place before a laryngectomy). This serves to draw air into the nasal passages and by doing this, similar to how smelling occurred before the laryngectomy, during normal breathing. As this happens, the sense of smell in a laryngectomee is then enhanced with the new airflow into the nose.



**View the “polite yawn” technique**

**To see a demonstration of the polite yawn technique, go to: <http://youtu.be/2ZwdksPy4Z0> or scan the QR code**

It is known as the “polite yawn” technique because the movements involved are similar to what happens when you attempt to yawn with a closed mouth. Swift, downward movement of the lower jaw and tongue, while keeping the lips closed, will create a subtle vacuum, drawing air into the nasal passages. There are two key factors in being successful with this technique:

1. You **MUST** keep your lips closed
2. Your tongue needs to remain on the floor of the mouth (not pressed against the roof of your mouth).

If the lips are not closed during this technique, air from outside the body will enter the mouth and prevent a vacuum effect as the jaw moves downward. This vacuum is required to draw the air into the nasal passages. If your tongue is not following the jaw, but rather touching the roof of the mouth instead, it will also interfere with the ability to generate a vacuum when the jaw moves downward.

The more exaggerated movement, the greater the vacuum effect will be, therefore allowing for more airflow at a faster rate into the nasal passages. Although the technique may seem awkward at first, many laryngectomees become quite skilled in doing this very easily. With practice, you will be able to achieve the same vacuum using more subtle (but effective) movements. A trained speech pathologist can be very helpful in providing training of this technique.

## Tasting After a Laryngectomy

One of the most common, and often unexpected findings laryngectomees may experience is their apparent loss of taste when they begin eating again after surgery. It is important to remember that in a standard laryngectomy, the sense of taste remains intact. Nothing is done as a result of the surgery that would impair your sense of taste. So then why do laryngectomees complain their food doesn't taste right? To better understand this, it's important to understand how it is we taste our food. How can we tell (even blindfolded), when we are eating an orange or a hamburger?

Although common sense tells us our taste buds are responsible for this, the taste buds on the tongue only account for ~30% of how we taste our food. In fact, the taste buds on the tongue are only able to taste 5 things:

- Sweet
- Sour
- Salt
- Bitter
- Umami (Savory: tells us we are eating steak and not a piece of pie)



That's it! That's all the taste buds do for us in tasting the foods we eat. How can that be? There are over a hundred flavors of jelly beans and yet all the tongue is tasting is sweet. So how can we tell we are eating a tutti frutti jelly bean and not a lemon one?

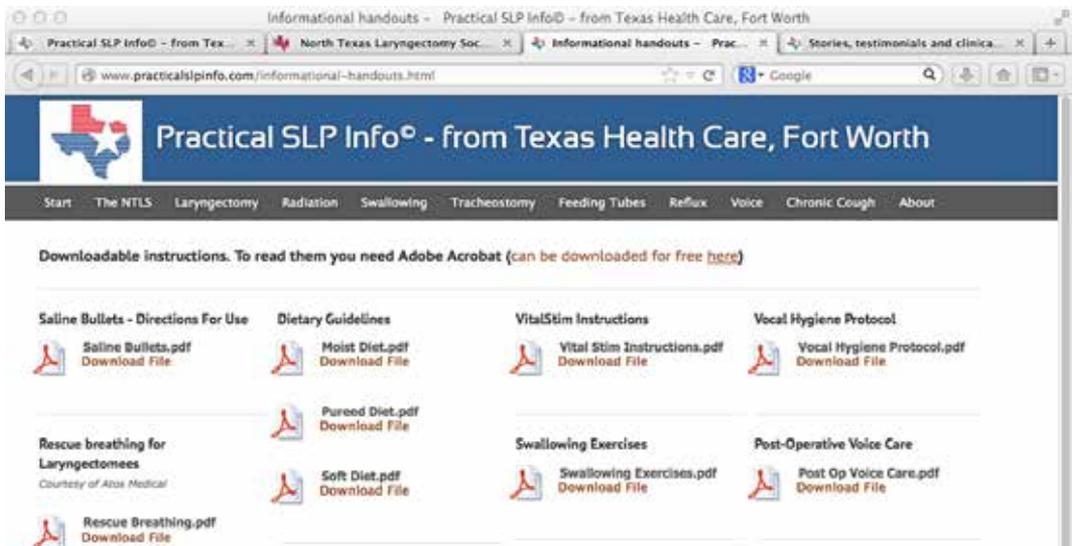
The majority of our sense of taste, actually about 70%, comes from our ability to smell. It's the aromas in the foods we eat that provide the rest of the taste "input" as we eat. Understanding now how a laryngectomee's ability to smell is greatly altered with the redirection of airflow allows us to better understand why a laryngectomee also feels their sense of taste is altered. The faster a laryngectomee can master the technique allowing them to smell, the sense of taste becomes greatly enhanced. Again, it is never acceptable to "settle" for diminished taste as a part of your "new normal." Although how you smell and taste will be different following a laryngectomy surgery, with proper rehabilitation, these abilities can be restored to near-normal levels, also helping to improve your overall quality of life.

## Radiation, Chemotherapy and Taste

When foods don't taste right, it's very common for calorie intake to decrease, many times, significantly, leading to weight loss and malnutrition. In some cases, the most severe *dysguesia*, or altered sense of taste, may occur during the course of radiation and/or chemotherapy treatment or post-operatively, when nutrition is critical to proper healing and recovery.

Although the tongue may not have much exposure to the radiation field used to treat laryngeal cancer, many patients may still report an altered sense of taste that is more pronounced than what was noted immediately following their surgery. If the taste buds are being affected by radiation, it may become very difficult to taste food as you did before, although this is typically a temporary condition. Every person is different in how they respond to radiation. Recovery from radiation also varies greatly from person to person. Because of this, it is difficult to predict how long the sense of taste may be altered. There are tips at the end of this chapter to help you cope with the altered sense of taste although, because dysguesia can affect patients differently, some may be more helpful for you than others.

Chemotherapy also can result in an altered sense of taste. Depending on the form of chemotherapy you are receiving, these taste changes may be very short-term (lasting only a day or two following treatment) or these may continue throughout the entire course of treatment and beyond. Even when the changes are longer-lasting, they are typically still temporary and most patients can look forward to their sense of taste returning to normal at some point following completion of their treatment.



The screenshot shows a web browser displaying the 'Practical SLP Info' website. The page title is 'Informational handouts - Practical SLP Info - from Texas Health Care, Fort Worth'. The URL is 'www.practicalslpinfo.com/informational-handouts.html'. The website header includes a navigation menu with links for 'Start', 'The NTLS', 'Laryngectomy', 'Radiation', 'Swallowing', 'Tracheostomy', 'Feeding Tubes', 'Reflux', 'Voice', 'Chronic Cough', and 'About'. Below the header, there is a section titled 'Downloadable instructions. To read them you need Adobe Acrobat (can be downloaded for free here)'. This section contains a grid of links to various PDF files, each with a red Adobe Acrobat icon and a 'Download File' button. The links include: 'Saline Bullets - Directions For Use', 'Dietary Guidelines', 'VitalStim Instructions', 'Vocal Hygiene Protocol', 'Rescue breathing for Laryngectomees', 'Pureed Diet.pdf', 'Soft Diet.pdf', 'Swallowing Exercises', and 'Post-Operative Voice Care'. The 'Rescue breathing for Laryngectomees' link includes the text 'Courtesy of Atlas Medical'.



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## When Foods Don't Taste Right

Here are some ways to help cope with dysgeusia in an effort to maintain proper nutrition and hydration.

- Room temperature or even slightly chilled foods may taste better than hot foods, especially during radiation treatment.
- Rinse your mouth with salted water before eating, as this will clear residue from the taste buds, which may otherwise contribute to an altered sense of taste.
- Avoid using metal dishes and utensils as these can make a metallic taste in the mouth even worse. Try using plastic utensils instead.
- Cooking with metal utensils and cookware can contribute to a metallic taste. Try using oven/stove safe glass cookware and plastic or wooden utensils when cooking.
- Avoid storing foods in aluminum foil as this can contribute to a metallic taste. Store foods in plastic ware. Using plastic wrap and wax paper is also good in this case.
- Never force yourself to eat anything that tastes very bad. Look for alternatives that are not as offensive to your sense of taste.
- Meats can often taste very bad, especially during radiation. Fish and eggs are excellent alternatives that usually are better tasting, especially during radiation.
- Milk and other dairy products are often well tolerated: *These will NOT make your mucous production worse but they may coat any existing mucous. Clear/rinse as much of the mucous as possible before taking dairy products.*
- Pasta is usually very well tolerated.
- Vegetables usually taste good, especially during radiation. Avoid tomatoes.
- Salt can help foods taste better, but it is important to follow your doctor's guidelines regarding a healthy amount of salt intake.
- Rinse your mouth or suck on a hard candy to clear a bad taste. Lingering bad tastes can impact the tastes of other foods you may be eating.

Although all foods/liquids may taste different from normal, it is important to find nutritious foods/drinks that you can tolerate well. It is very important that good nutrition be maintained at all times. Also, continuing to eat by mouth as much as possible can help to preserve your ability to swallow. If you are having difficulty finding foods that taste ok, your doctor or speech pathologist can guide you further in this regard.



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