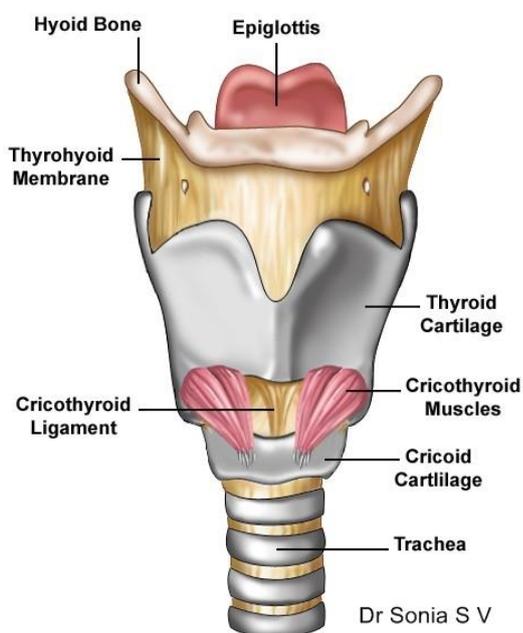
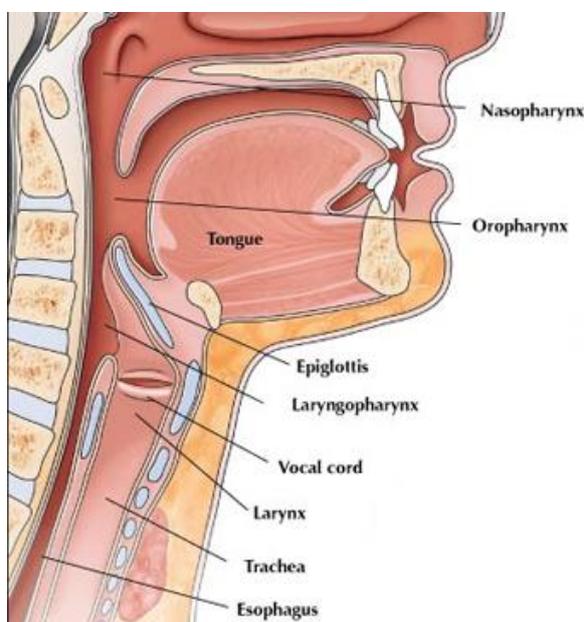


Introduction

Laryngeal cancer is a disease in which malignant (cancer) cells form in the tissues of the larynx. Laryngeal cancer (also called cancer of the larynx or voice box – commonly referred to as the Adam’s apple) is a type of head and neck cancer.

[Picture Credit: Head & Neck]



Larynx

The larynx is an organ in the neck of amphibians, reptiles and mammals (including humans) involved in breathing, sound production and protection of the trachea against food and liquid aspiration. It manipulates pitch and volume of sounds produced by the vocal chords which are found inside the larynx. In adult humans the larynx is situated in the front of the neck at the level of the 3rd to 6th neck vertebrae. It connects the lower part of the pharynx (throat) with the trachea (wind pipe).

[Picture Credit: Larynx]

In newborn infants the larynx is initially at the level of the 2nd to 3rd neck vertebrae and is further forward and higher relative to its position in adults. The larynx descends as the child grows.

Laryngeal Cancer

Laryngeal Cancer is a disease in which cancer cells grow in the larynx. Cancer of the larynx, can also be called laryngeal cancer, can develop in any part of the larynx, but most begins in the glottis. The inner walls of the larynx are lined with cells called squamous cells. Almost all laryngeal cancers begin in these cells.

If cancer of the larynx spreads, the cancer cells often spread to nearby lymph nodes in the neck. The cancer cells can also spread to the back of the tongue, other parts of the throat and neck, the lungs, and other parts of the body. When this happens, the new tumour has the same kind of abnormal cells as the primary tumour in the larynx .

Incidence of Laryngeal Cancer in South Africa

According to the outdated National Cancer Registry (2017), known for under reporting, the following number of laryngeal cancer cases was histologically diagnosed in South Africa during 2017:

Group - Males 2017	Actual No of Cases	Estimated Lifetime Risk	Percentage of All Cancers
All males	482	1:332	1,21%
Asian males	12	1:456	1,24%
Black males	258	1:434	1,96%
Coloured males	88	1:189	1,83%
White males	124	1:260	0,58%

Group - Females 2017	Actual No of Cases	Estimated Lifetime Risk	Percentage of All Cancers
All females	94	1:2 052	0,22%
Asian females	1	1:4 211	0,08%
Black females	47	1:3 026	0,24%
Coloured females	15	1:1 267	0,33%
White females	31	1:1 016	0,17%

According to **Bruni, et al.**, (2019), the burden of Laryngeal cancer for South Africa for 2018 is estimated as (based on Globocan estimates):

- Annual number of Laryngeal cancer cases 1 004
- Annual number of Laryngeal cancer deaths 550

The frequency of histologically diagnosed cases of laryngeal cancer in South Africa for 2017 was as follows (National Cancer Registry, 2017):

Group - Males 2017	0 – 19 Years	20 – 29 Years	30 – 39 Years	40 – 49 Years	50 – 59 Years	60 – 69 Years	70 – 79 Years	80+ Years
All males	0	3	7	35	146	192	83	16
Asian males	0	0	0	1	1	5	5	0
Black males	0	2	6	29	90	94	29	8
Coloured males	0	0	1	3	32	36	14	2
White males	0	1	0	2	23	57	35	6

Group - Females 2017	0 – 19 Years	20 – 29 Years	30 – 39 Years	40 – 49 Years	50 – 59 Years	60 – 69 Years	70 – 79 Years	80+ Years
All females	0	1	6	11	26	31	16	3
Asian females	0	0	0	0	0	0	1	0
Black females	0	1	5	6	12	16	5	2
Coloured females	0	0	0	2	3	3	4	1
White females	0	0	1	3	9	12	6	0

N.B. In the event that the totals in any of the above tables do not tally, this may be the result of uncertainties as to the age, race or sex of the individual. The totals for 'all males' and 'all females', however, always reflect the correct totals.

Risk Factors for Laryngeal Cancer

The following risk factors for laryngeal cancer has been recognised:

- use of tobacco products – there is a strong link between tobacco product use and the incidence of laryngeal cancer
- alcohol consumption – there is a link between the drinking of alcohol and the incidence of laryngeal cancer
- medical conditions and infections – persons with the following have an increased risk for laryngeal cancer:
 - gastro-oesophageal reflux disease - a recent meta-analysis concluded that a diagnosis of gastro-oesophageal reflux disease increases risk of laryngeal cancer by two–three times
 - immunosuppression - a meta-analysis reported an almost three-fold increased risk of laryngeal cancer in people with HIV/AIDS
 - transplant recipient – a meta-analysis reported a two-fold risk increase in transplant recipients for laryngeal cancer suggesting a role of immunosuppression
 - human papillomavirus infection - an increased risk of laryngeal cancer has been shown for people with evidence of human papillomavirus-16 (HPV-16) infection in the larynx (up to 19-fold risk increase) or in blood samples (up to a three-fold risk increase)
 - *helicobacter pylori* infection - a meta-analysis showed a doubling in risk of laryngeal cancer in people infected with *helicobacter pylori* infection
- personal history of previous cancers – There is a six-fold increased risk for laryngeal cancer in people with a history of previous head and neck cancer(s)
- family history of head and neck cancers - case-control studies showed a doubling in risk of laryngeal cancer in individuals with a history of head and neck cancer in first-degree relatives
- a high intake of red and processed meat – there is an associated increased risk for laryngeal cancer in case-control studies
- poor nutrition - as with all head and neck cancers, poor nutrition may increase the risk of laryngeal cancer. This heightened risk may be due to vitamin deficiencies, which are common among people who abuse alcohol and may partially explain the increased risk for these cancers among heavy drinkers
- genetic syndromes - some inherited genetic mutations, which cause different syndromes in the body, carry a high risk of laryngeal cancer. These include:
 - *Fanconi* anaemia - this blood condition is caused by inherited abnormalities in several genes. Problems can begin at an early age and often lead to leukaemia or aplastic anaemia. People with *Fanconi* anaemia have a higher risk of getting cancers of the throat

- *dyskeratosis congenita* - this genetically linked syndrome can also cause aplastic anaemia, and carries a very high risk of mouth and throat cancer occurring at an early age
- paan (betel quid) - immigrants from Southeast Asia who use paan (betel quid) in the mouth should be aware that this habit has been strongly associated with an increased risk. Paan, via Hindi from Sanskrit *parṇa* 'feather, leaf' is a stimulating, psychoactive preparation of betel leaf combined with areca nut and/or cured tobacco. *Paan* is chewed and finally spitted or swallowed. Paan has many variations. Slaked lime paste is commonly added to bind the leaves. Some South Asian preparations include katha paste or mukhwas to freshen the breath. It is mostly consumed in Asia, and elsewhere in the world by some Asian emigrants, with or without tobacco, in an addictive and euphoria-inducing formulation with adverse effects (Wikipedia). A *Lancet Oncology* publication claims that *paan masala* may cause tumours in different parts of the body and not just the oral cavity as previously thought (Sharma)
- maté - consumption of maté, a tea-like beverage habitually consumed by South Americans, has been associated with an increased risk of cancers of the mouth, throat, oesophagus, and larynx
- preserved or salted foods - consumption of certain preserved or salted foods during childhood is a risk factor for nasopharyngeal cancer.
- oral health - poor oral hygiene and missing teeth may be weak risk factors for cancers of the oral cavity
- radiation exposure - radiation to the head and neck, for noncancerous conditions or cancer, is a risk factor for laryngeal cancer

Signs and Symptoms of Laryngeal Cancer

Most laryngeal cancers start on or near the vocal cords. Laryngeal cancer is often diagnosed in its early stages because even a very small tumour can stop the vocal cords from vibrating properly and cause your voice to change. Sometimes, the tumour may start in a part of the larynx that is not close to the vocal cords. Then the first sign may be difficulty swallowing or a lump in the throat or neck.

Possible symptoms of laryngeal cancer include:

- changes to the voice, such as hoarseness
- difficulty or pain when swallowing
- a sore throat or feeling that something is stuck in the throat
- a cough that doesn't go away
- o an earache
- o difficulty breathing or noisy breathing
- Other health problems can cause some of the same symptoms. Testing is needed to make a diagnosis.

Diagnosis of Laryngeal Cancer

The doctor will examine the throat and feel the neck for lumps, swelling, or other problems. One or more of the following tests may be done:

- indirect laryngoscopy - the doctor uses a small mirror with a long handle to look at the throat and larynx. The doctor will check whether the vocal cords move normally when the person makes certain sounds
- direct laryngoscopy - the doctor uses a lighted tube (laryngoscope) to look at the throat and larynx. The lighted tube can be flexible or rigid:
 - flexible: The doctor puts a flexible tube through the nose into the throat under local anaesthesia.
 - rigid: The doctor puts a rigid tube through the mouth into the throat. A tool on the rigid tube can be used to collect tissue samples. It is usually done under general anaesthesia
- biopsy - the removal of a small piece of tissue to look for cancer cells is called a biopsy. Usually, tissue is removed with a rigid laryngoscope under general anaesthesia. A pathologist then looks at the tissue under a microscope to check for cancer cells. A biopsy is the only sure way to know if the abnormal area is cancer
- imaging tests - imaging tests use x-rays, magnetic fields, or radioactive substances to create pictures of the inside of your body. Imaging tests are not used to diagnose laryngeal or hypopharyngeal cancers, but they may be done for a number of reasons both before and after a cancer diagnosis

Ng, C., Mentias, Y. & Abdelgalil, A. 2020 Imaging features of non-epithelial tumours of the larynx. 2020 Feb 21[Online ahead of print]. PMID: 32093865. DOI: [10.1016/j.crad.2020.01.013](https://doi.org/10.1016/j.crad.2020.01.013)

“Neoplasms of the head and neck most commonly seen within the larynx are likely malignant and epithelial in origin. Although uncommon, non-epithelial types are occasionally encountered in clinical practice. Owing to the rare nature of these entities, they can lead to diagnostic and treatment uncertainty. We present our two-centre experience of nine different types of non-epithelial laryngeal tumours in this review, highlighting characteristic imaging features and discussing the recommended management strategies emerging.”

Types of Laryngeal Cancer

The following types of laryngeal cancers occur:

- cancers that start in the skin like tissue (squamous cell cancer) - about 95 out of every 100 cancers of the larynx (95%) are this type. The cancer develops in the flat, skin like, squamous cells that cover the surface of the epiglottis, vocal cords and other parts of the larynx. Squamous cells are resistant to hot liquids and sharp foods and can heal quickly if damaged. But the more they are damaged, the more new cells have to be made. And the greater the chance that cells may gradually change into cancer cells
- cancers that start in gland cells (adenocarcinoma) - adenocarcinoma is uncommon compared to squamous cell laryngeal cancer. It starts in the adenomatous cells that are scattered around the surface of the larynx. Adenomatous cells are gland cells that produce mucus
- connective tissue cancers (sarcoma) - sarcomas are cancers that start in the body's connective tissues. These are the supporting tissues of the body, such as bone, muscle, and nerves. Cartilage is the supporting tissue of the larynx. Cancers that develop from cartilage are called chondrosarcomas. Sarcomas of the larynx are extremely rare
- other types of cancer found in the larynx - very rarely, other types of cancer occur in the larynx. It is possible to get lymphoma or plasmacytoma (a type of myeloma) in the larynx

Lowering the risk of Laryngeal Cancer

It is not possible to totally prevent the incidence of laryngeal cancer. Case-control studies, however, have shown up to an 80% reduced risk in people with the highest intakes of fruit and vegetables or fruit and vegetable fibre. In addition, eating a greater diversity of fruits and vegetables has been shown to reduce the risk of laryngeal cancer (Cancer Research UK).

Laryngeal cancer can be further prevented by avoiding the following risks:

- *tobacco use* - tobacco use is the greatest risk factor for laryngeal cancer, and for all other head and neck cancers. Most people who get laryngeal cancer have a history of smoking or other tobacco use or prolonged exposure. The risk of cancer increases with the frequency of tobacco use. Long-term exposure to second-hand smoke may also be a risk factor for these types of cancers, although studies are not yet conclusive
- *alcohol* - heavy drinkers are many times more likely to develop laryngeal cancer than are non-drinkers. Combined use of tobacco and alcohol increases the risk for these cancers multifold
- *human papilloma virus infection* - human papilloma viruses, or HPV, include about 100 similar viruses. Many HPVs cause warts, but some are involved in cancer. Most noteworthy, HPV is tied to the development of cervical cancer. More recently, HPV has been linked to oral cancer. HPV may also be a risk factor for some cancers of the hypopharynx. Estimates of the percentage of patients with laryngeal infected with the same HPVs range from 6 percent to 47 percent, but so far infection of this virus does not appear to be a direct factor in the development of laryngeal cancer.

Staging of Laryngeal Cancer

Staging is a way of describing where the cancer is located, if or where it has spread, and whether it is affecting the functions of other organs in the body. Doctors use diagnostic tests to determine the cancer's stage, so staging may not be complete until all of the tests are finished. Knowing the stage helps the doctor to decide what kind of treatment is best and can help predict a patient's prognosis (chance of recovery). There are different stage descriptions for different types of cancer.

Prognosis (Outlook)

Throat cancers can be cured in 90% of patients if detected early. If the cancer has spread to surrounding tissues or lymph nodes in the neck, 50 - 60% of patients can be cured. If the cancer has spread (metastasised) to parts of the body outside the head and neck, the cancer is not curable and treatment is aimed at prolonging and improving quality of life.

After treatment, patients generally need therapy to help with speech and swallowing. A small percentage of patients (5%) will not be able to swallow and will need to be fed through a feeding tube.

Treatment of Laryngeal Cancer

The treatment of laryngeal cancer is as follows:

Radiation therapy - external beam radiation therapy is a common form of treatment for laryngeal cancer. A machine is used to carefully aim a beam of radiation at the tumour. The radiation damages the cells in the path of the beam – normal cells as well as cancer cells. Small tumours may be cured by treating them with radiation only. For larger tumours, external radiation is often used together with chemotherapy.

Radiation therapy may also be combined with surgery to destroy microscopic cancer cells that may remain in the area after surgery. Radiation therapy also may be used for tumours that cannot be removed with surgery.

Burr, A.R., Harari, P.M., Haasl, A.M., Wieland, A.M., Bruce, J.Y., Kimple, R.J., Hartig, G.K., McCulloch, T.M. & Witek, M.E. 2020.

Background: To evaluate disease control, toxicities, and dose to dysphagia/aspiration risk structures (DARS) using a direct gross tumor volume (GTV_{70Gy}) to planning target volume expansion (dPTV_{70Gy}) for patients with squamous cell carcinoma of the larynx (LSCC).

Methods: A retrospective review was performed on patients with LSCC treated between 2003 and 2018. Clinical outcomes, toxicities, and dosimetric data were analyzed.

Results: Seventy-three patients were identified. Overall survival at 5-years was 57.8%. Five-year local and regional control was 79.8% and 88.2%, respectively. Distant metastatic-only failure was 2.7%. Eighty percent of failures were 95% contained within the dPTV_{70Gy}. Mean dose and the volume of DARS receiving 70 Gy was significantly lower for dPTV_{70Gy} compared to a consensus-defined PTV_{70Gy}.

Discussion: Judicious reduction in high-dose target volumes can preserve high tumor control rates while reducing dose to normal surrounding structures underscoring the potential benefit of this approach in enabling local therapy intensification to improve locoregional control.

Chemotherapy - For laryngeal cancer, chemotherapy is most commonly used together with radiation therapy for large tumours and tumours that have spread to the lymph nodes. Chemotherapy may be given as pills or by injection. Chemotherapy drugs interfere with the ability of cancer cells to grow and spread, but they also damage healthy cells. Although healthy cells can recover over time, patients may experience side effects from treatment like nausea, vomiting, loss of appetite, fatigue, hair loss and an increased risk of infection.

Surgery - a decision to have surgery depends on the size of the tumour and where it is. During the operation, all or part of the tumour and some healthy tissue around the tumour are removed. Surgery is done under general anaesthetic.

An operation to remove all or part of the larynx is called a laryngectomy. The surgeon may also remove nearby lymph nodes in the neck. Sometimes, the thyroid gland is also removed.

For a partial laryngectomy, the surgeon removes the part of the larynx affected by the tumour. Usually one or both of the vocal cords are left in so that the patient can still speak. The voice may be different than it was before.

For a total laryngectomy, the surgeon removes the entire larynx. A tracheostomy is done at the same time to create an opening in the lower part of the neck for the patient to breathe through. Air enters and leaves the windpipe and the lungs through the hole (called a stoma). This opening is permanent. After a total laryngectomy, patients will have to learn to speak in a different way.

Vocal cord stripping - with this technique, a long surgical instrument is used to remove the outer layers of tissue on the vocal cords. This approach may be used for a biopsy, or to treat some stage 0 cancers confined to the vocal cords. Vocal cord stripping rarely impacts speech after the operation.

Cordectomy - in a cordectomy, part or all of the vocal cords are removed. This approach may be used to treat glottic cancer that is very small or located only on the surface tissues. Patients who receive a cordectomy may experience changes in speech. Removing part of a vocal cord may lead to a hoarse voice. If both vocal cords are removed, speech would no longer be possible.

Laser surgery - laser surgery uses an intense, narrow beam of light to remove cancerous tissue with little or no damage to surrounding healthy tissue. It is usually done under general anesthetic. Laser surgery may be used for very small laryngeal tumours. Laser surgery may not be available at all cancer centres or hospitals.

Biological therapy - biological therapies are drugs that have an anti-cancer effect but work differently from chemotherapy. Each drug works in a different way, but they all affect the way cancer cells grow or divide. A drug called cetuximab (Erbix[®]), which is a monoclonal antibody, can be used for some people with cancer of the larynx.

Monoclonal antibodies are drugs that recognise and bind to specific proteins (receptors) that are found in particular cancer cells or in the bloodstream. Some cancer cells have receptors known as epidermal growth factor receptors (EGFRs). When growth factors attach to the receptor, the cancer cell is stimulated to grow and divide. The monoclonal antibodies lock onto the EGFR and may prevent the cancer cells from growing and dividing. They may also make the cancer cells more sensitive to the effects of radiotherapy.

Cetuximab has been recommended by NICE (National Institute for Health and Clinical Excellence) and the SMC (Scottish Medical Consortium) as a treatment for some people with a laryngeal cancer. It can be used with radiotherapy for people with laryngeal cancer that has spread into surrounding tissues (locally advanced cancer) who are unable to have chemotherapy. Cetuximab is given by drip (infusion) into a vein.

Mechanical Speech

Mechanical speech is a method of speech used after surgery for laryngeal cancer. An electrolarynx is held against the neck and produces a hum that vibrates up towards the mouth where one can articulate words. It does not require much learning to use this method and is often used while learning oesophageal speech.

[Picture Credit: Electrolarynx]



An electronic larynx (electrolarynx) is a battery operated machine that produces sound for one to create a voice. There are many different makes and types, but they are usually about the size of a small electric

razor. One holds the machine against the neck, or fit a small tube into the corner of the mouth. When the button is pressed on the machine, it makes sound. By moving one's tongue and mouth one can form the sounds into words. This method of speech after laryngectomy may be best if:

- The person is not able to have a voice prosthesis (TEP) for medical reasons
- The patient did not have a voice prosthesis put in at the time of the laryngectomy but is waiting to have one put in later



To be able to use this method one needs training from a speech and language therapist and plenty of practice. The speech has a mechanical sound to it but most people can make themselves understood.

[Picture Credit: Using Electrolarynx]

Some of the machines have buttons to vary the pitch or tone of the sound made by the electronic larynx. This will make the voice sound more varied. A speech and language therapist will advise on the best type for every situation.

Tracheo-oesophageal Speech

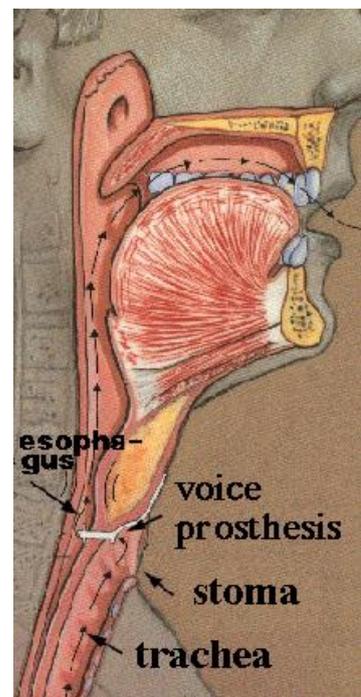
Tracheo-oesophageal speech is a method of speech that can be used after surgery for laryngeal cancer. This involves surgically making an opening between the oesophagus and trachea. Sound is made by covering the stoma and redirecting the air through the oesophagus where the sound vibrates off of the throat walls.

One of the most effective techniques for speaking following a laryngectomy is tracheo-oesophageal speech (TE speech). To understand how TE speech works, one has to be familiar with the anatomy of the neck after laryngectomy. Briefly after a laryngectomy the end of the trachea (windpipe) is brought out to the front of the neck. This opening is called the stoma, and one breathes in and out of the stoma. No speech is possible as one exhales through the stoma, since air just travels out without causing any vibration or sound.

Just behind the trachea is the oesophagus, which is the tube through which food travels from the mouth to the stomach.

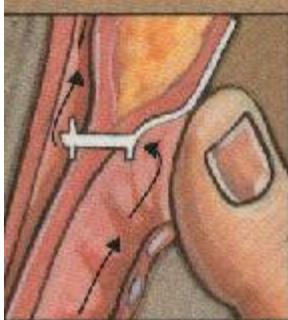
The principle in TE speech is that during exhalation, air is diverted into the oesophagus. The air eventually flows out the mouth. That air flow causes the oesophagus to vibrate, which produces a sound. By moving the lips and tongue, the sound is articulated into speech.

In order to divert air to the oesophagus during exhalation, a small opening called a fistula is created between the trachea and the oesophagus. A small valved tube is placed into the opening or fistula to



keep it open and to prevent swallowed food and liquid from getting down the trachea. This tube is usually called a voice prosthesis.

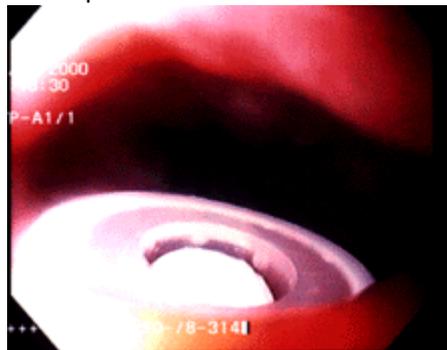
The fistula can be created at the time of the original laryngectomy, or at a later time. It is a relatively minor operation.



The diagram shows a side view of the stoma and the voice prosthesis in position. Note that the prosthesis connects the trachea (windpipe) and the oesophagus. The prosthesis is constructed with a small valve on the end that goes into the oesophagus. This is done to prevent swallowed food from going into the trachea and causing lung problems.

In order to talk, the stoma must be covered with one's thumb during exhalation. This process is shown to the left.

Notice tightly covers the stoma, air will and into the oesophagus. With this air vibrate the walls of the produces a sound that is then tongue through normal quite normal sounding speech.



that when the thumb pass from the trachea practice, one can make oesophagus. This modified by the lips and articulation to produce

The photo to the right was taken scope at the upper portion of the oesophagus and shows the part of the TE prosthesis that extends into the oesophagus. This particular type of prosthesis is called an "indwelling prosthesis" and it can stay in for up to 6 months.

with a flexible fiberoptic

Advantages and Disadvantages of Tracheo-oesophageal Speech

Advantages

The sound quality with TO speech is very good, probably most closely resembling normal laryngeal speech. In contrast, speech using an electrolarynx has a very mechanical sound.

Since the air for the speech is coming from the lungs, one can speak for a fairly long time between breaks. With plain oesophageal speech, the air comes from the stomach and speech segments are short. There also is better control of the air flow with TE speech.

Disadvantages

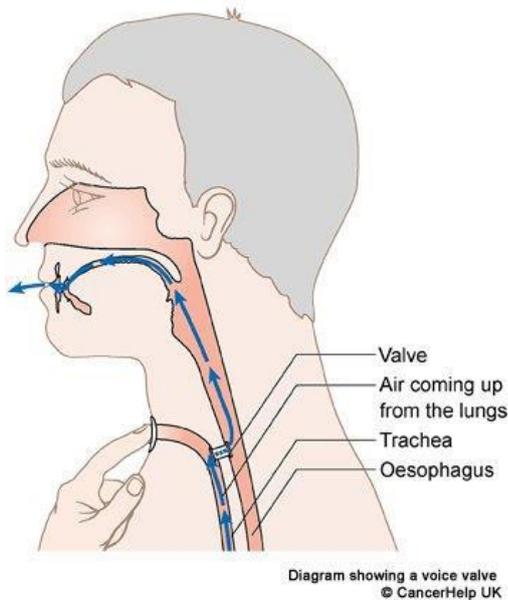
Not everyone can do TO speech. In some cases the walls of the oesophagus are too tight to allow passage of air. In those cases, when one exhales and covers the stoma, air just can't escape. It is like trying to blow against a sealed tube. There is a test that a speech pathologist can do prior to placement of a TE fistula to see if the oesophagus will tolerate TE speech.

The voice prosthesis must be removed and cleaned periodically. This requires a moderate amount of dexterity, especially in putting it back in the right spot. However, there are now prostheses called "indwelling" that are designed to stay in for weeks or months at a time.

The stoma must be tightly covered during exhalation in order for air to get into the oesophagus. This requires good arm and hand movement, and this may be difficult after a spinal cord injury. There are valves that can be placed over the stoma that divert air into the oesophagus, but they do not always work.

There can be food that leaks into the trachea.

The prosthesis can fall out and the hole will seal over in about 24 hours. If it does seal over, a second operation must usually be done to make a new hole. If the prosthesis falls into the trachea, it must be removed to prevent aspiration.



Voice Prosthesis (Tracheo oesophageal puncture – TEP)

Tracheo oesophageal puncture (TOP) is the most common way to restore speech after laryngectomy, but it is not suitable for everyone. A patient usually has TOP as part of the operation to have their larynx removed. One can also go back for a minor operation to have it done later. This is usually at least 8 weeks after the original surgery to remove the larynx.

In TOP, the surgeon makes a tiny hole called a fistula at the back of the stoma. The hole creates an opening between the windpipe and food pipe (oesophagus). The surgeon may put a tube (catheter) into the hole to keep it open or the/she may put a small valve (voice prosthesis) into the hole during the operation. If the patient does not have a catheter into the hole, he/she will need to have a feeding tube down the nose (nasogastric tube) for a while.

If there is a catheter into the puncture (hole), the patient may be able to have liquid food down the tube but once the area has healed and the patient is eating and drinking, the doctor takes the catheter out and will put a small, one way valve into the hole.

If the patient has the tracheo-oesophageal puncture some time after laryngectomy, the catheter will only need to be in place for a few days. The valve (voice prosthesis) can also be put in straight away.

The voice prosthesis is a valve that allows the patient to make sounds by pushing air from the lungs through the valve and up into the mouth. The person has to cover the stoma with the fingers so that the air goes through the valve and not out of the stoma. Once a person can use this type of voice prosthesis, he/she may be able to use other types of valves which are 'hands free'. They automatically close the stoma when using the speaking valve. Hands free valves are not suitable for everyone.

Using a voice prosthesis takes practice. After a while, the muscles deep in the throat will grow stronger and vibrate more easily as the air passes through.

3 main types of valve are used:

- Blom-Singer valve
- Provox valve
- Groningen valve

Blom-Singer valves and some Provox valves are external valves. This means that they are meant to be taken out to be cleaned and many people look after these themselves. The valve must be kept clean. If it gets blocked, air can't pass through it easily and the patient will not be able to speak.

Groningen and some types of Provox valve are internal valves. They are left in place until they need changing – about every 6 months, or sooner if they are leaking. A specially trained therapist, doctor or nurse must change them.

Sometimes a person may need to switch from one type of valve to another if their needs change. Occasionally people have difficulty speaking with a speech valve in place. This is usually because the muscles in their pharynx go into spasm. The speech and language therapist will help to try and overcome the spasm. The surgeon may also suggest a treatment to inject some botulinis toxin (Botox) into the muscle to relax it. Sometimes the problem with speech is caused by swelling of the area around the valve caused by acid indigestion. The doctor or specialist nurse can prescribe anti indigestion medicines if someone has acid indigestion.

Lifestyle Changes After a Diagnosis of Laryngeal Cancer

Lifestyle changes following an oesophageal cancer diagnosis can be helpful in a variety of important ways:

- strengthening the body so that one can withstand some of the rigors of treatment
- optimising the function of the immune system to aid in the fight against cancer
- improving one's emotional outlook, so one can enjoy life to the fullest, even during treatment for oesophageal cancer
- making healthful choices that will help to avoid other medical problems that could complicate health

Moors, T., Silva, S., Maraschin, D., Young, D., Quinn, J.M., de Carpentier, J., Allouche, J. & Himonides, E. 2020.

“Laryngectomy is the surgical removal of the larynx (voice box), usually performed in patients with advanced stages of throat cancer. The psychosocial impact of losing the voice is significant, affecting a person's professional and social life in a devastating way, and a proportion of this patient group subsequently must overcome depression (22-30%) and social isolation (40%). The profound changes to anatomical structures involved in voicing and articulation, as a result of surgery, radiotherapy or chemotherapy (separately or in combination with one another), introduce challenges faced in speech rehabilitation and voice production that complicate social reintegration and quality of life. After laryngectomy, breathing, voicing, articulation and tongue movement are major components in restoring communication. Regular exercise of the chest, neck and oropharyngeal muscles, in particular, is important in controlling these components and keeping the involved structures supple. It is, however, a difficult task for a speech therapist to keep the patient engaged and motivated to practice these exercises.”

General Guidelines

Stop smoking - smoking is a known risk factor for many cancers. It is never too late to stop smoking. Join CANSA's e-KickButt Programme or ask a doctor about programmes to help stop smoking.

Reduce the risk of infection - to decrease the risk of infection, avoid exposure to bacteria and viruses:

- try to avoid crowds, especially during cold and flu season
- ask a doctor about immunisation against the flu and pneumonia
- wash hands thoroughly and often. Hand washing is the most effective method of decreasing the chance of catching colds and flu. You may wish to carry hand sanitiser with you for occasions when washing is not convenient.
- follow a Nutritious Diet - Eating a healthful diet may help avoid other medical conditions linked to poor nutrition. Because cancer itself and some cancer treatment may have a dulling effect on one's appetite, it's important that one makes the most of the calories taken in. Strongly consider consulting a registered dietician (RD) to help learn more about the best kinds of foods to eat and how to eat other less healthful foods in moderation.
- rest when tired - The treatments for cancer can add to the fatigue patients may experience. Fatigue is the most frequently experienced symptom of cancer and cancer treatments. The fatigue can range from 'just feeling tired' to complete and utter exhaustion. It is important to allow the body time to rest. This will help the body have the strength to heal itself. Studies have shown a relationship between fatigue and an increased morbidity of cancer and cancer treatments as a result of fatigue's adverse effect on appetite, diminished quality of life, and loss of hope.
- seek support - The diagnosis of cancer is a life-defining event that is difficult to handle for anyone. Facing the uncertainty of a serious disease, feeling anxious about how one will feel during treatment, and worrying about the impact of both the diagnosis and treatment can take a devastating toll that no one should have to tackle on their own. Try to have access to the following:
 - family
 - friends
 - religious community
 - empathetic support groups for people with your type of cancer
 - professional support (social workers, psychologists, and/or psychiatrists who are trained to help support cancer patients and their families)

People who allow themselves to seek help while they are recovering from cancer can often maintain better emotional equilibrium, which will help them face the challenges of cancer and its treatment.

Johansson, M., Finizia, C., Persson, J. & Tuomi, L. 2020.

Introduction: Voice problems are common following radiotherapy for laryngeal cancer. Few studies exist covering the effect of voice rehabilitation, and no previous studies exist regarding the cost of said rehabilitation. This randomized controlled study aimed to analyze the cost-effectiveness of voice rehabilitation after radiotherapy for patients with laryngeal cancer.

Material and methods: A total of 66 patients with laryngeal cancer with follow-up data 12 months post-radiotherapy were included. Patients were randomized into receiving either voice rehabilitation (n = 32) or no voice rehabilitation (n = 34). The patient outcome was measured as quality-adjusted life years (QALYs). The index range between 0 and 1, where 0 equals death and 1 represents perfect health. The QALYs were assessed with the European Organization for Research and Treatment of

Cancer questionnaire QLQ-C30 mapped to EuroQoL 5 Dimension values. The cost of rehabilitation and other healthcare visits was derived from hospital systems. The patients reported the total amount of sick leave days during the first 12 months following radiotherapy. The cost-effectiveness of the voice rehabilitation was compared with no rehabilitation intervention based on the incremental cost-effectiveness ratio.

Results: The cost per gained QALY with voice rehabilitation compared to no rehabilitation from a societal perspective was - 27,594 € (SEK - 250,852) which indicates that the voice rehabilitation is a cost-saving alternative compared to no rehabilitation due to lower costs and a slightly better health outcome. From a healthcare perspective, the voice rehabilitation indicates a cost 60,800 € (SEK 552,725) per gained QALY.

Conclusion: From a societal perspective, i.e., including the costs of production loss, voice rehabilitation compared to no voice rehabilitation following radiotherapy for laryngeal cancer seems to be cost-saving. When analyzing only the healthcare costs in relation to health outcomes, voice rehabilitation indicates an incremental cost of 60,800 € per gained QALY, which is just above the threshold of the maximum willingness to pay level.

About Clinical Trials

Clinical trials are research studies that involve people. They are conducted under controlled conditions. Only about 10% of all drugs started in human clinical trials become an approved drug.

Clinical trials include:

- Trials to test effectiveness of new treatments
- Trials to test new ways of using current treatments
- Tests new interventions that may lower the risk of developing certain types of cancers
- Tests to find new ways of screening for cancer

The [South African National Clinical Trials Register](#) provides the public with updated information on clinical trials on human participants being conducted in South Africa. The Register provides information on the purpose of the clinical trial; who can participate, where the trial is located, and contact details.

For additional information, please visit: www.sanctr.gov.za/

Medical Disclaimer

This Fact Sheet is intended to provide general information only and, as such, should not be considered as a substitute for advice, medically or otherwise, covering any specific situation. Users should seek appropriate advice before taking or refraining from taking any action in reliance on any information contained in this Fact Sheet. So far as permissible by law, the Cancer Association of South Africa (CANSAs) does not accept any liability to any person (or his/her dependants/estate/heirs) relating to the use of any information contained in this Fact Sheet.

Whilst the Cancer Association of South Africa (CANSAs) has taken every precaution in compiling this Fact Sheet, neither it, nor any contributor(s) to this Fact Sheet can be held responsible for any action (or the lack thereof) taken by any person or organisation wherever they shall be based, as a result, direct or otherwise, of information contained in, or accessed through, this Fact Sheet.

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