BASIC LARYNGOLOGY

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An understanding and diagnosis of clinical conditions of the larynx
An understanding of the basic anatomy, physiology and pathological processes involved in the production of voice and altered production of voice resulting in hoarseness is essential to diagnosing and treating vocal conditions.

Unfortunately, with the general deskilling of general practice, techniques for examination of the larynx are now beyond the scope of most primary care physicians or pediatricians.

Traditionally, the larynx was examined in a static position by protruding the tongue and using a mirror to perform what was called indirect laryngoscopy. This afforded a good view of the base of the tongue, supraglottic larynx and larynx in most individuals provided that the examiner was skilled. Indirect laryngoscopy has almost totally been supplanted by techniques of direct laryngoscopy.

Direct laryngoscopy is undertaken using either a rigid telescope through the mouth or a flexible telescope through the nose.

RIGID TELESCOPE THROUGH THE MOUTH

Advantages. The telescope is wider. It has a 70, 90 or 120 degree angled lens at the tip of the telescope, which provides for clear and magnified view of the larynx.

Disadvantages. The larynx can only be examined in a static position or while the patient phonates on either an “EE” or “AA”. This allows for recognition of structural lesions of the larynx and or gross movements with regards to adduction or abduction.

Another disadvantage is that the telescope has to be introduced through the mouth. This involves having to anaesthetize the mouth and the pharynx and asking the patient to either hold their own tongue out or to have the operator hold the tongue out. Gagging, or difficulty in performing this examination is more common than when using a flexible transnasal scope.
FLEXIBLE TRANSNASAL LARYNGOSCOPY

This is usually performed without local anaesthesia in the larynx.

If, on examination, the lining of someone’s nose is very congested, then application of an alpha-adrenergic helps to shrink the lining and facilitate entry of the scope. The scope is very narrow, usually in the order of 4mm, and is well tolerated in most individuals, including children over the age of five.

A good view of the larynx is obtained, but because the scope is much thinner than a rigid scope, the image is not as magnified or as clear, basically due to the lack of fiber numbers within the physical instrument and the camera.

Advantages

- Well tolerated through the nose.
- Allows assessment of the larynx during jointed speech. So in addition to looking at the larynx statically or when the patient phonates on “AA” or “EE”, the larynx can be examined when the patient is talking, whispering and/or singing.
- The flexible scope allows examination of the anterior subglottic wedge and upper trachea.
- The flexible scope allows detailed examination of the post-cricoid mucosa and piriform fossa.
- The flexible scope allows examination of the cricopharyngeus muscle and the upper oesophagus.

Adult Males. The length of the adult male membranous vocal fold ranges from 22mm-28 mm. the normal, fundamental frequency is around 105 cycles per second, and the lining moves over the muscle creating a mucosal wave, which when viewed from above travels at least one half of the distance from the front to the back on the upper surface of the vocal folds.

Adult Female. The length of the adult female membranous vocal fold ranges from 16mm-20mm and as with the male, the mucosal wave should travel at least halfway from the front to the back on the superior margin of the vocal fold.

Infant. The length of an infant’s membranous vocal fold is between 8mm-10mm. The fundamental frequency is roughly 490 cycles per second, which is much higher than either a male or a female.
LARYNGEAL CONDITIONS

**Laryngitis Sicca.** Laryngitis Sicca is a common problem, particularly among professional voice users and people who travel extensively by plane.

Mucous is produced both above and below the vocal fold, and slowly migrates over the surface of the vocal fold during speaking to lubricate the free edge of the vocal fold.

Dehydration, secondary to diminished fluid intake, excessive caffeine or alcohol intake, drugs such as anti histamines, diuretics or anti-depressants can cause the mucous to become thicker and it tends to act more as an adhesive, sticking the vocal cords together, rather than a lubricant. People feel this as irritation in their larynx, which leads them to want clear their throats.

**Acute laryngitis.** Most cases of acute laryngitis are viral and in fact are a manifestation of laryngotracheitis. It is important to maintain hydration and exercise caution with speaking or singing excessively when the larynx is subject to a viral infection. The mucous becomes thicker; the blood vessels become dilated and so people with acute laryngitis are more prone to causing traumatic injury to their larynx, such as vocal fold hemorrhages, if excessive voice use is undertaken. The condition is self-limiting and there is absolutely no advantage of prescribing antibiotics.

The larynx appears reddened and there is slight swelling of the superior and free edge of the vocal fold.

LARYNGOPHARYNGEAL REFLUX

Laryngopharyngeal reflux is a very common disorder causing laryngitis. Contents of the stomach are very irritant to the larynx, and interestingly, bile more so than acid.

About half of those who suffer from reflux-induced pharyngolaryngitis are symptomatic of reflux, and the other half is what is known as occult, or silent reflux.

Reflux induced pharyngolaryngitis used to be treated by the use of acid suppressants, either by way of H2 antagonists, or proton iron pump inhibitors, but recent meta-analysis shows that their beneficial effect has been grossly overrated.

Appropriate treatment is diet and lifestyle modification It is important to avoid eating for 2-3 hours before going to bed, to elevate the head of the bed, and the use of Alginates such as Gaviscon liquid three times a day after meals and before retiring at night.
CHRONIC LARYNGITIS

Chronic laryngitis results from long-term exposure to irritants or inappropriate or misuse of voice. The most common irritants are tobacco, marijuana, alcohol, inhalants, and acid in reflux induced pharyngolaryngitis.

The condition is characterised by bogginess of the superior margin of the vocal folds and an irregularity of the free edge, as illustrated in the attacked photo.

BENIGN CONDITIONS OF THE LARYNX

Pre-nodular thickening. Pre-nodular thickening is more common in children of either sex, or post-pubertal females. Pre-nodules are thickening and swelling at the junction of the anterior third, and the posterior two thirds of the vocal folds. This gives the larynx an hourglass appearance on phonation. They are common after extensive voice use, like yelling, or singing. Usually, they require no intervention, and pre-nodular thickening tends to resolve with judicious voice use over a period of 48 hours-72 hours.

Chronic pre-nodular thickening may require speech therapy to retrain people in appropriate use of voice.

VOCAL NODULES

Vocal nodules are the most common cause of dysphonia in children and peri-pubertal young adults. They occur in the same location as pre-nodular thickening, but, as oppose to having interstitial fluid and mild swelling within the layers of the vocal fold, there is collagen laid down and some degree of fibrosis.

Nodules are classified by size as small, intermediate, or large, and by perceived thickness, as soft, intermediate or hard. It is important to note that even large, hard, nodules are never premalignant, do not progress to anything more sinister, and apart from the dysphonia they cause are not serious.

Most vocal nodules respond to appropriate speech therapy, but surgical intervention, especially for large, hard nodules, may be indicated. The lesions are excised from the free and inferior edge of the vocal fold using sophisticated microsurgical techniques.
VOCAL FOLD POLYPS

Vocal fold polyps occur somewhat more commonly in males than females and can occur anywhere along the free edge of the vocal fold, most commonly about the center, or the anterior third of the vocal fold. They are caused by a combination of irritants and inappropriate voice use. The most common irritant isolated is either smoking or gastroesophageal reflux.

Appropriate treatment of the polyps involves identifying and treating the irritant, and expert speech therapy to minimise inappropriate voice use. If the voice is used injudiciously, the polyp on one side can hit the vocal fold on the other side, causing a condition known as a contra coup injury. Although speech therapy is less successful in eliminating vocal polyps than nodules, speech therapy is nonetheless the first line of treatment. If, after treatment of irritants and appropriate speech therapy, the polyp persists, it is appropriately treated by microsurgical removal and with appropriate histopathological evaluation.

MALIGNANT CONDITIONS OF THE LARYNX

The lining of the larynx changes from normal though to frank cancer through a series of steps. Among these steps are; early dysplastic change, late dysplastic change, carcinoma in situ, micro-invasive carcinoma, and then frankly invasive squamous cell carcinoma of the larynx.

Despite all the education that has taken place, the prevalence of carcinoma of the larynx remains static overall. The prevalence in men is slightly diminishing, but unfortunately, the prevalence in women, especially younger women, due to their smoking, is increasing.

Smoking is the prime carcinogen in causing cancer of the larynx. Other irritants, such as alcohol, potentiate it.

The role of Human Papilloma Virus in the etiology of laryngeal cancers is coming to light, and with the increased prevalence of exposure to HPV it too must now be considered an initiating factor in all forms of laryngeal dysplasia and in cancer of the larynx.
CARCINOMA IN SITU

This is a superficial type of cancer that involves only the outermost lining of the vocal fold. As stated above, it comes from chronic irritation by tobacco, marijuana, reflux, and/or potentiated by inappropriate voice use and the use of alcohol. Carcinoma in situ is appropriately treated by excision plus or minus laser vaporisation of the superficial layer of the vocal fold. The carcinoma in situ in the attached photograph extends from the right vocal fold, around the anterior commissure and the free edge of the left vocal fold.

SQUAMOUS CELL CANCER OF THE LARYNX

Squamous cell carcinoma of the larynx is an invasive neoplasm of the epithelium of the vocal fold. The vocal folds do not have very good lymphatic supply; so early spread from laryngeal cancer is uncommon. The major presenting symptom for laryngeal cancer is persistent hoarseness, so an expert laryngologist/otolaryngologist must appropriately evaluate any case where hoarseness persists.

The treatment of squamous cell carcinoma of the larynx varies according to the stage. Small cancers, confined to one vocal fold, are often treated by excision and/or laser vaporisation. Even larger cancers that extend to the anterior commissure can be treated by this technique, but the anterior commissure tendon is where the lymphatic drainage of the larynx leaves the larynx and spreads to tissues outside of the voice box. As a result, if there is extensive involvement here, external beam radiotherapy is probably the option of choice.

Advanced cancers of the larynx, those that impair movement of the vocal fold or those that are starting to spread to adjacent structures are usually treated by planned combined therapy. This is either surgery followed by radiotherapy and/or chemo radiation for induction followed by surgery in those cases where tumour persists.

CONCLUSION

I have presented a brief overview of benign, pre-malignant, and malignant of the larynx. What is important to bear in mind is that as a primary care physician, as you do not have the benefit of being able to visualize the organ, you must have a heightened degree of suspicion for any symptoms. This is particularly important in those individuals at high risk of developing upper aerodigestive tract malignancies. Early referral, early diagnosis, and early treatment coupled with appropriate education about risk factors causing laryngeal cancer is the way we will make progress in treating this condition.