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Hoarseness

What is the voice trying to tell you?

Background

Most episodes of hoarseness are benign and self limiting.

Objective

This article describes the causes and management of hoarseness in adults, outlines the features of common causes of voice disturbance in adults, and highlights a number of red flags that should trigger urgent referral.

Discussion

Patients with hoarseness lasting more than 3 weeks require specialist assessment to visualise the larynx.

■ **Voice disorders typically present with hoarseness or more subtle symptoms such as loss of vocal range, change in pitch, tremor, breathiness or pain on phonation. The pathophysiology of voice change is usually due to oedema, stiffening or a discrete lesion of the vocal cord(s) interfering with the mechanics of vocal cord vibration. Normal laryngeal anatomy is shown in Figure 1 and Figure 2. A large epidemiological study estimated the prevalence of voice disorders in the general population to be 6.2% and almost double this (11.0%) in professional voice users.¹**

Aetiology

Aetiologies include irritant or infective laryngitis, benign vocal cord lesions related to voice abuse or misuse, neuromuscular disorders and possible neoplastic causes. *Table 1* outlines the differential diagnosis according to Murtagh's safe diagnostic strategy model.²

Red flags that should trigger urgent referral are outlined in *Table 2*. Any patient with voice change persisting beyond 3 weeks despite voice rest and vocal hygiene measures should be referred for specialist assessment (*Table 3, 4*).

Common causes of voice disturbance in adults

Laryngitis

Acute nonspecific laryngitis is a common condition resulting from:

- voice abuse or misuse
- infection (mostly viral), or
- irritants such as smoke and other chemicals.

Presentation may include hoarseness, sore throat, globus sensation (feeling of a lump in the throat), postnasal discharge and sometimes aphonia.

Management consists of vocal hygiene measures (*Table 3*). Antibiotics are not effective in the treatment of acute laryngitis,³ however they are occasionally prescribed if there are severe signs of bacterial infection (copious purulent green/yellow exudate), if the patient is immunocompromised or if there is culture proven group A



streptococcus infection. Symptoms are expected to resolve over a number of days to a few weeks.

Chronic laryngitis is invariably associated with a more persistent irritative factor – typically smoking or laryngopharyngeal reflux. Persistent hoarseness warrants referral for endoscopic assessment of the vocal cords to exclude malignancy.

Laryngopharyngeal reflux

Laryngopharyngeal reflux (LPR) is becoming increasingly accepted as a clinical entity contributing to voice disturbance. It often overlaps with other voice conditions. Koufman⁴ assessed 113 patients consecutively referred to his voice clinic and found evidence of LPR on dual probe ambulatory pH monitoring in 50% of subjects. Laryngopharyngeal reflux may be asymptomatic, however common symptoms include:

- hoarseness
- dysphagia
- globus sensation
- chronic cough and throat clearing
- acid brash and heartburn.⁵

It should be noted that the traditional symptom of heartburn is often absent in LPR. Initial treatment by an otolaryngologist involves a 2 month trial of a proton pump inhibitor (PPI), vocal hygiene measures, and lifestyle modification such as weight loss, elevating the bed head while sleeping, avoiding meals within 1 hour of bed and avoidance of alcohol and smoking.

Benign vocal cord lesions

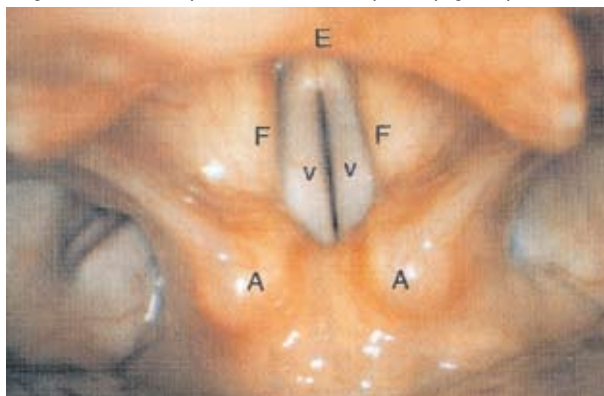
Half of all patients presenting with a voice complaint have a benign lesion of the vocal fold.⁶ The pathogenesis is related to phonotrauma and the resultant localised tissue response – the major three being nodules, polyps and cysts.

Nodules are the most common in both children and women. In men, they are rare. They are likened to an epithelial callous,⁷ correlate strongly with voice abuse or misuse and appear as bilateral, smooth, rounded lesions at the junction of the anterior third and posterior two-thirds of the cord (*Figure 3*). This is the location of maximal cord amplitude when phonating. Management is with vocal hygiene and speech therapy. Microsurgical resection is only warranted if the symptoms are significant, conservative measures fail or if there is doubt of the diagnosis (*Table 5*).

Polyps are more common in males, are strongly related to smoking and are usually unilateral.⁸ They can be sessile or pedunculated. Polyps may cause hoarseness only, however if large they can rarely cause airway compromise and stridor necessitating urgent referral. While the vocal symptoms may respond to conservative management, surgery is preferred both for rapid resolution of symptoms and to obtain histology to exclude malignancy.

Laryngeal cysts are usually obstructed mucous glands or epithelial inclusion cysts and will cause voice change if occurring on or near the free edge of the cord. They appear as a smooth submucosal swelling on laryngoscopy and are frequently accompanied by a swelling on the opposite cord due to contact trauma. This may cause their confusion

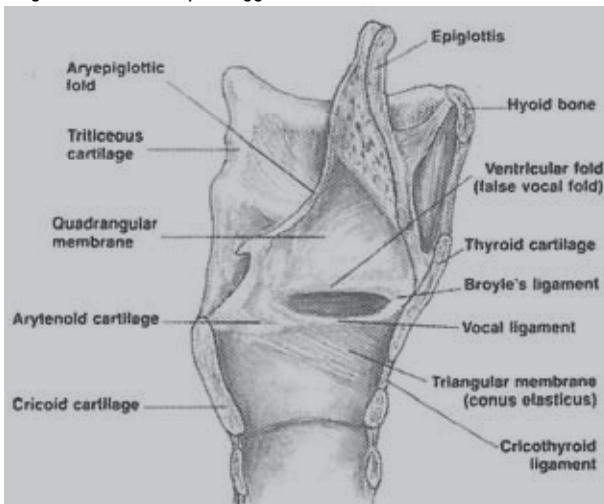
Figure 1. Normal larynx viewed via fiberoptic laryngoscope



V = true vocal chords, F = false vocal cords, A = arytenoid cartilages, E = epiglottis

From: Rubin JS, Sataloff RT, Korovin GS. *Diagnosis and treatment of voice disorders*, 3rd edn. San Diego: Plural Publishing, Inc., 2006. Reprinted with permission

Figure 2. Normal larynx sagittal view



From: Rubin JS, Sataloff RT, Korovin GS. *Diagnosis and treatment of voice disorders*, 3rd edn. San Diego: Plural Publishing, Inc., 2006. Reprinted with permission

with a diagnosis of nodules and lead to inappropriate treatment. If the symptoms warrant treatment, cysts only respond to surgery.

Reinke oedema is a generalised oedematous process of both vocal cords with redundant ballooning of the mucosa.⁹ It is more common in women causing lowering in the pitch of the voice rather than hoarseness (such that women are mistaken for men over the telephone).¹⁰ It usually resolves with smoking cessation.

Recurrent respiratory papillomatosis

Papillomatosis is an uncommon condition of viral, ie. human papilloma virus, origin usually affecting children under 5 years of age and characterised by multiple exophytic warty lesions in the aero-digestive tract. The natural history is variable – spontaneous remission occurs when the patient's immune system is able to clear the virus.

Management is with initial biopsy to exclude malignancy and repeated debulking procedures. In general, treatment is challenging and often disappointing – both the scarring from treatment and the disease itself are responsible for poor voice outcomes.

Table 1. Voice change – comprehensive diagnosis strategy model

Probability diagnosis
<ul style="list-style-type: none"> • Infective/inflammatory <ul style="list-style-type: none"> – laryngitis: viral, irritant, bacterial, candida • Benign cord lesions <ul style="list-style-type: none"> – nodules – polyps – cysts
Serious disorders not to be missed
<ul style="list-style-type: none"> • Imminent airway obstruction <ul style="list-style-type: none"> – anaphylaxis – foreign body – epiglottitis • Malignant <ul style="list-style-type: none"> – squamous cell carcinoma (95% of patients) – verrucous carcinoma – neuro-endocrine carcinoma – adenoid cystic carcinoma • Benign <ul style="list-style-type: none"> – papillomatosis • Neurological <ul style="list-style-type: none"> – central lesion: Parkinson disease, stroke, multiple sclerosis – peripheral lesion: (vagal/RLN palsy), iatrogenic postoperative, malignancy • Granulomatous disease <ul style="list-style-type: none"> – sarcoidosis – Wegener granulomatosis
Pitfalls (often missed)
<ul style="list-style-type: none"> • Laryngopharyngeal reflux <ul style="list-style-type: none"> – benign cord lesions – Reinke oedema – vocal process granuloma – scarring after previous laryngeal surgery • Infective <ul style="list-style-type: none"> – fungal laryngitis/candidiasis secondary to inhaled corticosteroids – tuberculosis (for both above consider HIV) • Inflammatory <ul style="list-style-type: none"> – rheumatoid arthritis (crico-arytenoid joint fixation) • Endocrine <ul style="list-style-type: none"> – hypothyroidism – hyperandrogenism • Degenerative <ul style="list-style-type: none"> – age related presbyphonia

Neuromuscular conditions

Spasmodic dysphonia is a nonvoluntary isolated dystonic reaction of the laryngeal musculature. Its adduction form (90%) is characterised by an intermittently halting, strangled voice (voice breaks) as a result of uncoordinated excess adduction during phonation. Abduction dysphonia (10%) results in periods where the voice is suddenly breathy or absent. Botulinum toxin injection into affected laryngeal muscles every 3–4 months causes a dose titrated weakness of the adductor muscles with a high success rate of voice improvement.¹¹ Side effects are uncommon but include transient aphonia or aspiration.

Muscle tension dysphonia differs from spasmodic adduction dysphonia in that it is not paroxysmal. Patients are often anxious individuals and present with hoarseness, vocal fatigue and often a feeling of tightness in the throat. There is an abnormally high amount of tension in their cords and this sets up a vicious cycle of local injury and often development of benign cord lesions such as nodules or polyps. It is not a voluntary or psychiatric condition. The mainstay of treatment is vocal hygiene, speech therapy, laryngeal massage and biofeedback methods to reduce cord tension.

Vocal cord immobility

Unilateral vocal cord immobility presents with hoarseness or a weak and breathy voice. It is diagnosed on laryngoscopy where the affected cord usually lies in a para-median position and does not abduct on inspiration. It may be due to neural involvement or rarely, fixation of the crico-arytenoid joint. A recurrent laryngeal nerve (RLN) or vagal palsy should be suspected if the voice change coincided with recent surgery near the course of these nerves (any neck surgery, especially thyroid surgery, carotid end-arterectomy, anterior cervical disc fusion and thoracic surgery).

Other causes include idiopathic – the commonest presumed viral – malignancy with local invasion of the vagus or RLN, neurological disorders, and crico-arytenoid joint fixation from rheumatoid arthritis, malignancy or trauma (including iatrogenic).

Bilateral cord immobility typically presents with stridor – the voice may be relatively normal as the cords are opposed yet immobile. Most are idiopathic but other causes include those listed for unilateral immobility with central causes playing a larger role. Depending on the severity, this should trigger urgent referral to an ear, nose and throat (ENT) surgeon or a hospital emergency department. Investigations for cord immobility include a computerised tomography (CT) neck and chest, with the addition of magnetic resonance imaging (MRI) brain for bilateral causes.

Traumatic

Direct laryngeal trauma can fracture the laryngeal cartilages causing local haematoma or nerve impingement. Patients with stridor or voice change after trauma should be sent immediately to an emergency department for ENT review as airway compromise can rapidly develop.

There are two major anaesthetic causes of a hoarse voice. Immediate and persistent hoarseness upon emergence suggests



Table 2. Red flags indicating urgent referral

History	<ul style="list-style-type: none"> • Direct laryngeal trauma or neck trauma resulting in hoarseness or stridor – immediate referral. Consider domestic violence • Voice change lasting >3 weeks despite voice hygiene measures • Risk factors for malignancy – smoking, alcohol, previous malignancy or irradiation, advanced age • Significant loss of weight, dysphagia, haemoptysis • Deepening voice in female – consider endocrine dysfunction • Professional voice user – consider referral for specialist management given career implications for patient
Examination	<ul style="list-style-type: none"> • Signs of anaphylaxis (angio-oedema/urticaria, hypotension, wheeze). Give adrenaline intramuscularly every 5 minutes. Adults: 0.5 mg, children 10 µg/kg.¹² Call an ambulance • Stridor – if significant with airway compromise give steroids and call an ambulance • Hoarseness with evidence of neck trauma (lacerations, ecchymoses, subcutaneous emphysema) • Suspicion of malignancy – thyroid or head and neck lumps

Table 3. Vocal hygiene measures

Things to do	<ul style="list-style-type: none"> • Voice rest • Maintain good hydration of 6–8 glasses water/day • Air humidification (steam only; additives such as eucalyptus/menthol have a drying effect and don't help)
Things to avoid	<ul style="list-style-type: none"> • Prolonged or loud speaking • Repetitive throat clearing • Shouting, singing or loud whispering • Irritants: tobacco or marijuana smoke • Medications: caffeine, antihistamines and anticholinergics (drying effect)

Table 4. What should my patient expect when referred to an ENT surgeon?

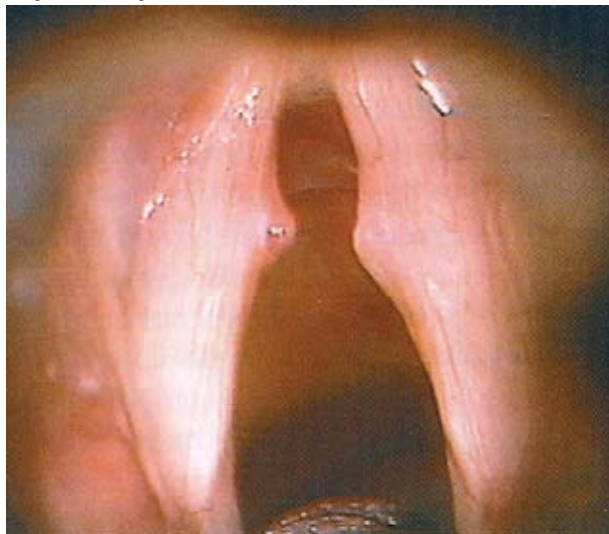
- Thorough history and examination
- Visual assessment of the larynx with laryngoscopy – usually fibre optic flexible nasendoscopy after topical nasal anaesthetic spray
- If a benign cord lesion is identified the patient may either be referred for a period of speech therapy before repeat laryngoscopy, or consented for surgery

crico-arytenoid joint dislocation. This is more commonly seen after urgent or 'crash' intubations, and is caused by the forward pressure of the laryngoscope on the arytenoid cartilage. Delayed development of voice change especially after prolonged intubation raises the possibility of a vocal process granuloma. Granulomas are usually treated conservatively with PPIs. Antibiotics may also be prescribed, as there is often an underlying arytenoid perichondritis. Resection may be required in refractory cases and recurrence is not uncommon.

Endocrine

Endocrine causes of voice change typically produce a deepening of the voice. The main endocrine differential is hypothyroidism. A female patient with signs of virilisation (hirsutism, acne) and voice change should raise the suspicion of an androgen producing tumour. Mononeuritis multiplex in diabetes may present as RLN palsy but should be fully investigated as above.

Figure 3. Benign vocal cord nodules



From: Rubin JS, Sataloff RT, Korovin GS. Diagnosis and treatment of voice disorders, 3rd edn. San Diego: Plural Publishing, Inc., 2006. Reprinted with permission

Laryngeal malignancy

The incidence of laryngeal carcinoma is roughly 4 per 100 000. Ninety-five percent of these are squamous cell carcinomas (SCC) – heavily associated with smoking and excess alcohol intake (Figure 4).

Figure 4. Laryngeal carcinoma



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Table 5. Surgery for benign vocal cord lesions

- Surgery involves a general anaesthetic and is usually a day procedure
- The larynx is visualised and an operating microscope is used to magnify the surgical field. Dissection is via microlaryngeal instruments and requires a microsurgical technique. Occasionally a laser is utilised
- Typically strict vocal hygiene continues and a period of strict voice rest for 1–5 days may be prescribed.¹³ Prolonged voice rest is harmful as the laryngeal muscles may undergo disuse atrophy

Benninger undertook a prospective randomised trial to assess if laser or cold steel surgical management was superior. No difference was seen between the two modalities, but results did differ with the experience of the operator.¹⁴ For this reason some ENT surgeons advocate management of professional voice users by subspecialist laryngologists only¹⁵

Their site is classified as either supraglottic (involving laryngeal structures above the true vocal cords), glottic (at the level of the true vocal cords) or subglottic (more than 1 cm inferior to the true vocal cord to the lower level of the cricoid cartilage). Supraglottic tumours are often advanced when they typically present with a neck lymph node metastasis, haemoptysis or dysphagia. Glottic tumours often come to medical attention at an earlier stage due to their impact on the voice. Staging is by imaging, panendoscopy and surgery. Treatment options are determined by staging and include surgery, radiotherapy and chemotherapy. These decisions will usually be made in consultation with the patient after a complete work up and a multidisciplinary head and neck cancer clinic review.

Conclusion

The general practitioner needs to be aware of the various causes of voice change and the role that a speech therapist and ENT surgeon

can play in assisting with the management of voice complaints. The majority of presentations will be due to a benign cause, however if symptoms do not settle with voice hygiene measures (Table 3), then referral to an ENT surgeon for laryngoscopy is appropriate.

Conflict of interest: none declared.

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