Hoarseness

Synonym: dysphonia

Hoarseness is a subjective term and usually refers to a weak or altered voice. Dysphonia is similar but may also mean difficulty making sounds. Some terms which may be used to describe a voice change are: breathy, harsh, tremulous, weak, reduced to a whisper, or vocal fatigue (voice deteriorates with use). [1]

NB: any patient with unexplained hoarseness persisting >3 weeks requires investigation to exclude malignancy (see 'Investigation and referral' section, below).

The first part of this article discusses hoarseness as a presenting symptom. The second part covers some common laryngeal conditions causing hoarseness.

Airway emergencies and hoarseness

Hoarseness may be a feature of laryngeal obstruction - so can be a warning of impending airway obstruction. This may occur in:

- Infections - acute epiglottitis, diphtheria, croup, laryngeal abscess.
- Inflammation/oedema - airway burns, anaphylaxis, physical trauma, angio-oedema, hereditary angio-oedema.
- Vocal cord immobility - laryngeal nerve palsy (depending on the position of the cords) or cricoarytenoid joint disease. [2]

Possible signs of laryngeal obstruction are:

- Dyspnoea, stridor, wheeze, exertional dyspnoea, anxiety or signs of hypoxia.
- Dysphagia or drooling.
- Facial or oral oedema.

Management:

- Do not examine the throat or attempt distressing procedures; allow the patient to find the most comfortable position.
- Obtain senior help/anaesthetist.
- Emergency procedures such as tracheostomy may be needed.
- Treat the specific cause where feasible.

Epidemiology

A retrospective analysis of data from a large American claims database found that of almost 55 million individuals, 536,943 patients (ages 0 to >65 years) were given a dysphonia diagnosis (point prevalence rate of 0.98%). [3]

One study screening hoarseness in children aged 6-10 reported a prevalence of 12.0% (7.8% of girls, 15.8% of boys). [4]

Risk factors for voice problems [5]

- Smoking (also the main risk factor for laryngeal carcinoma).
- Excess alcohol consumption.
- Gastro-oesophageal reflux.
- Professional voice use - eg, teachers, actors and singers.
- Environment: poor acoustics, atmospheric irritants and low humidity.
- Type 2 diabetes (neuropathy, poor glycaemic control). [6]

Anatomy and physiology [7]

Sound is produced in the larynx by vibration of the vocal cords. Resonance occurs in the pharynx, nose and mouth; articulation uses the mouth and tongue. Coughing requires adduction of the vocal cords to be effective.

Innervation of the laryngeal muscles is from the vagus nerve via its branches, the superior laryngeal and recurrent laryngeal nerves. The recurrent laryngeal nerve controls abduction and adduction of the vocal cords. This nerve has a long course, from the base of the skull to the mediastinum: on the left side it loops under the aortic arch and on the right under the subclavian artery.

The vocal cords are subject to high forces and so are vulnerable to voice overuse or misuse.
Aetiology[5,8]

Voice problems are often multifactorial and due to voice overuse. Serious pathology must be excluded (see 'Investigation and referral' section, below).

Causes of hoarseness

**Functional dysphonia**
- Where no organic cause is found - a diagnosis of exclusion.
- A common cause of hoarseness. There are various forms (below).

**Infections**
- Acute laryngitis (common), often with upper respiratory infection. Usually viral (may have secondary infection with staphylococci or streptococci).
- Other infections - fungal or tuberculous.

**Benign laryngeal conditions**
For details see last section 'Some specific voice disorders and their management'.
- Voice overuse - common.
- Benign lesions of the vocal cords - eg, nodules (singer's nodes), polyps and papillomas.

**Malignancy**
- Laryngeal cancer - smoking is major risk factor.
- Other neck or chest tumours - eg, lung cancer, lymphoma, thyroid cancer.

**Neurological**
- Laryngeal nerve palsy (see 'Some specific voice disorders and their management', below): this has various causes, including lung cancer, other tumours and thoracic aortic aneurysm.
- Stroke and other focal brain lesions.
- Parkinson's disease - voice change can be a presenting feature.
- Motor neurone disease.
- Essential tremor.
- Myasthenia gravis.
**Systemic**

- Endocrine: hypothyroidism, acromegaly.
- Rheumatoid arthritis affecting the cricoarytenoid joints.\(^{[11]}\)
- Granulomatous disease - eg, sarcoidosis, tuberculosis, syphilis, Wegener's granulomatosis.
- Autoimmune disorders can affect the larynx.\(^{[10]}\)

**Causes in children\(^{[5]}\)**

- Congenital - eg, laryngeal web, laryngomalacia, congenital cyst.
- Older children: vocal cord nodules, voice overuse, gastro-oesophageal reflux, papillomas (as for adults).
- Very rarely, malignancy.

**Other causes**

- Various rare causes of hoarseness, from case reports, are described by Ulis.\(^{[10]}\)

**Contributing factors**

- Drying of the laryngeal mucosa - from low humidity, nasal obstruction, smoking, and air pollution, or from medication (eg, antihistamines, inhaled steroids and anticholinergics).
- Upper respiratory tract infection.
- Voice overuse (see 'Some specific voice disorders and their management', below).
- Gastro-oesophageal reflux (reflux laryngitis or laryngopharyngeal reflux).
- Scarring - eg, after prolonged intubation.
- Age-related loss of pliability (normal ageing of the voice).

**Assessment\(^{[12]}\)**

**History**

- Symptoms - duration, onset and pattern of symptoms; check the patient's meaning of 'hoarseness'.
- Precipitating factors - recent upper respiratory tract infection, change in voice use - eg, shouting or singing..
- Occupation, normal pattern of voice use, impact of voice problem on the patient's life.
- Other ENT symptoms - dysphagia, aspiration, throat or ear pain, nasal blockage.
- Smoking, alcohol.
- Reflux symptoms - eg, acid taste in the mouth in the morning, throat clearing, cough or 'choking' sensation, sensation of a lump in the throat.\(^{[13]}\)
- Past medical history, particularly chest disease, thyroid surgery, neck trauma, and neurological symptoms.

**Examination in primary care\(^{[14, 15]}\)**

- Signs of airway obstruction - see 'Emergency' under 'Management', above.
- Laryngeal function - listen to the patient's voice and assess cough and swallowing.
- Examine the neck - scars, lymph nodes, thyroid gland. Localised tenderness suggests infection or abscess.
- Any signs of underlying cause - eg, fever, hypothyroidism, tremor, weight loss.
- Chest or neurological examination may be appropriate.

**ENT assessment\(^{[12]}\)**

- Inspection of the larynx - by indirect laryngoscopy and/or fibreoptic nasendoscopy.
- Voice quality can be evaluated using the GRBAS (= Grade (severity), Roughness, Breathy voice, Asthenia (weakness) and Strain) assessment.
- The Reflux Symptom Index can be used to identify likely gastro-oesophageal reflux.

**Investigation and referral\(^{[5]}\)**

**Initial investigations**

**Hoarseness persisting for >3 weeks requires investigation to exclude malignancy.\(^{[16]}\)**

- Carcinomas of larynx and lung must be considered, so CXR and/or laryngoscopy are indicated.
- National Institute for Health and Care Excellence (NICE) guidance on suspected cancer states that for patients with hoarseness persisting for >3 weeks, particularly smokers aged ≥50 years and heavy drinkers:
  - Arrange urgent CXR.
  - Refer patients with positive findings urgently to a team specialising in the management of lung cancer.
  - Refer patients with a negative finding urgently to a team specialising in head and neck cancer.
Further investigations
These depend on the clinical picture:

- Consider investigations for systemic causes where appropriate - eg, thyroid function.
- Fibreoptic laryngoscopy - does not require general anaesthetic, so enables examination of the larynx while using the voice.\[8\]
- Stroboscopy (videolaryngostroboscopy) uses fibreoptic images in slow motion to provide pictures of the working larynx.\[17\]
- Voice pathologists use various other techniques to measure aspects of voice production, such as amplitude, pitch, range and aerodynamic efficiency.

Management\[12\]
Management depends on the specific cause but voice therapy and other non-surgical management is the first-line treatment for most benign lesions of the larynx.

Non-surgical management

- Voice hygiene advice:
  - Adequate hydration.
  - Avoidance of vocal strain (shouting, throat clearing, excessive voice use).
  - Smoking cessation, alcohol reduction (both are irritants and alcohol is dehydrating).
  - Reduction in caffeine intake.

- Treat gastro-oesophageal reflux (if suspected):
  - Dietary advice.
  - Trial of a proton pump inhibitor.
  - Liquid alginate suspension was helpful in one small trial.\[12\]

- Voice therapy:
  - Teaches techniques to maximise vocal effectiveness.
  - Is effective for both organic pathology (eg, nodules and polyps) and non-organic causes (eg, muscle tension dysphonia).

- Referral to a specialist voice clinic:
  - Is appropriate if the larynx appears normal and there is no improvement with initial voice therapy. Provides detailed voice assessment and specialist investigations such as videostroboscopy.

- Other therapies:
  - Relaxation techniques and counselling may be helpful where psychological factors are contributing.
  - ‘Mental imagery’ and ‘laryngeal shaking’ treatments were used in one uncontrolled trial on patients where no organic cause had been found, with good reported outcomes.\[10, 18\]

Surgical management

- Laryngeal papillomas require surgery first-line.
- Persistent nodules and polyps may require surgery.
- There are various surgical techniques used to treat vocal cord paralysis.
- Voice therapy is often used as a adjunct to surgery.

Some specific voice disorders and their management

Laryngeal nerve palsy or vocal cord paralysis
This may cause a 'breathy' voice, an inefficient cough or airway narrowing. The clinical features depend on whether one or both cords are affected and the position of the cords - whether abducted or adducted. 'Semon's law' suggests that an incomplete paralysis of the recurrent laryngeal nerve affects the abductor muscles first, so that the vocal cord is in the midline. Complete paralysis affects the adductor muscles also, so the cord is fixed midway, in the paramedian position. Electromyography, however, has shown that the situation is far more complex. There is usually some activity, even if there is no detectable movement on laryngoscopy.\[19\]

Surgical techniques such as Teflon® injection or implants, combined with voice therapy, can restore function.\[20\]

Benign lesions of the vocal cords

- Vocal cord nodules (nodes or singer’s nodes). These are epithelial thickenings of the vocal cord, similar to calluses; they are often due to voice overuse. Voice therapy is the main treatment; surgery is occasionally needed.\[21\]
- Polyps of the vocal folds. These are unilateral (unlike nodules which are normally bilateral). They may need excision to exclude malignancy.\[21\]
- Papillomas of the larynx.\[12\] These are lesions caused by the human papillomavirus (HPV). If untreated and large, they may cause airway obstruction. Invasive carcinoma can occur (rarely). They are usually treated surgically. Intraleresional antiviral therapy (cidofovir) may be used for recurrent papillomas.
- Reinke's oedema. This is oedema of the vocal folds, which tends to give a deep, hoarse voice. It is usually linked to smoking plus voice overuse.\[22\] Smoking cessation and voice therapy may help; surgery has also been used.\[12\]
Voice overuse or misuse

This is a common problem in some occupations such as acting and teaching; it may also follow unaccustomed voice use, such as shouting at a football match. Vocal strain may be exacerbated when attempting to compensate for an acute respiratory infection.

Benign lesions such as nodules (‘singer’s nodules’), cysts, haemorrhages and varices can occur with voice overuse.

Management involves:

- Excluding other pathology.
- An accurate diagnosis (see investigation details above) - fibroptic laryngoscopy and stroboscopic techniques are useful.
- A specific programme tailored to the observed pathology can then be devised. Prescribing rest alone may not be effective.
- Persistent nodules can be excised.

Functional dysphonia

This is a diagnosis of exclusion, where there is neither a structural abnormality of the larynx nor cord paralysis. There are various types of functional dysphonia. Symptoms include vocal fatigue (voice becoming worse with use) and laryngeal discomfort. There may be various interacting causes, such as heavy demands on the voice, poor vocal technique and stress.

Voice therapy is the main treatment. Other treatments used include relaxation techniques, biofeedback and other methods such as mental imagery and laryngeal shaking or laryngeal massage.

Spasmodic dysphonia - this is a type of functional dysphonia. It is thought to be a focal dystonia of the laryngeal muscles. Symptoms are breaks in the voice or voice tremor. Some forms of spasmodic dysphonia can be treated with botulinum toxin injection or denervation. Selective laryngeal adductor denervation-re-innervation surgery (SLAD-R) offers a viable alternative for refractory patients.

Prevention

Prevention measures include:

- 'Vocal hygiene' measures (see under 'Non-surgical management', above).
- Recognising early warning signs of voice problems, such as an unintentional change in pitch, voice fatigue (the voice gets weaker with increasing use) and sore throat not due to infection.
- Biofeedback is sometimes a useful prophylactic measure for high-risk populations (eg, call centre agents).

Further reading & references

- About the voice; Lions Voice Clinic of the University of Minnesota

15. Bhattacharya Aet al; Pocket Tutor Otolaryngology, 2005.

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