ABC of ENT

HAROLD LUDMAN

HOARSENESS AND STRIDOR

Hoarseness and stridor in children

Obstruction of the airway in the small larynx and trachea is much more rapid and life threatening than in the adult. Stridor indicates airway obstruction and it may be associated with voice changes and swallowing difficulties causing failure to gain weight and respiratory infections. More serious signs of obstruction include cyanosis and pallor, dilatation of the nares, recession of the soft chest wall, downward plunging of the trachea with respiration, and use of the accessory muscles of respiration.

Causes of obstruction include (a) congenital abnormalities of the larynx—laryngomalacia, laryngeal stenosis, rare tumours; (b) inflammatory conditions such as acute laryngitis, acute epiglottitis, laryngotracheobronchitis; (c) neurological abnormalities—vagal or recurrent laryngeal nerve paralysis; (d) trauma to the larynx—birth injuries, intubation injury; (e) inhalation of foreign bodies.

Neonatal stridor

Assessing stridor in the neonate demands skilled examination of the larynx. An experienced paediatric laryngologist will usually perform the examination under general anaesthesia. The urgency of referral for examination depends on the degree of associated respiratory obstruction and failure to thrive.

Respiration may be helped by nursing the infant in a croupette, which provides a cool moist atmosphere. The need to preserve the airway may force either endotracheal intubation or tracheostomy while the cause is being treated in hospital.

Laryngomalacia (congenital laryngeal stridor) causes respiratory stridor that is particularly noticeable when the child is asleep. The noise persists for the first four or five years of life and the infant is slow to gain weight. There is no specific treatment. Problems may arise when there is incidental laryngeal infection.

Laryngeal paralysis from birth accounts for a quarter of the cases of stridor in infancy; it is probably due to stretching of the vagus nerve during a difficult delivery. The condition is usually associated with feeding difficulties, and again there is no specific treatment.

Congenital narrowing of the larynx, by webs between the cords or by restriction of the subglottic space with thickening of the cricoid arch, presents difficult laryngological problems requiring skilled surgery.

Infective causes

Stridor in a child with a previously adequate airway is usually caused by infective swelling, but inhaled foreign bodies, trauma from ingesting corrosive agents, and allergic oedema must be considered.

Acute laryngitis causes classical "croup" with a croupy cough and stridor at night. This common condition is usually managed at home with the standard treatment for upper respiratory tract infections supported by nursing in a humidified environment. If dyspnoea supervenes the more dangerous infective conditions must be considered—laryngotracheobronchitis, acute epiglottitis, and (rarely) diphtheria.

Laryngotracheobronchitis affects children aged 6 months to 3 years. In parts of the world where measles is common the measles virus is an important cause of laryngotracheobronchitis. Otherwise it is usually caused by the parainfluenza or respiratory syncytial viruses. The disorder is characterised by respiratory obstruction caused by narrowing of the subglottic airway and exudation into the trachea and bronchi of thick tenacious material. Initially it is indistinguishable from acute laryngitis with inspiratory stridor, but dyspnoea then increases with a rising temperature and dehydration. Referral to hospital is essential, where the throat and larynx must be examined with great care because of the risk of laryngeal spasm with total respiratory obstruction and cardiac arrest.

Treatment may often be expectant at first, with nursing in a croupette. Adequate intravenous fluids are essential, and antibiotics are usually given. If such treatment fails, as shown by a rising respiratory rate and increasing obstruction, the tenacious secretions need to be removed from the bronchi. It may be necessary to leave an endotracheal tube in place or to perform a tracheostomy.

Acute epiglottitis is a serious, often fatal, infection caused by *Haemophilus influenzae* type B, which produces localised oedema of the epiglottis and supraglottic larynx. Initially there is severe dysphagia and a high temperature. Rapidly developing respiratory obstruction is more noticeable than stridor. When epiglottitis is suspected, blood culture may yield the infecting organism more readily than a throat swab. Urgent relief for the airway is often needed and specific treatment is usually intravenous ampicillin together with steroids.

If there is a possibility of diphtheria, suggested by the typical pseudomembrane in the throat, antitoxin as well as penicillin should be given as soon as possible.

Relieving severe respiratory obstruction in children

The method of relieving obstruction will depend on the facilities available and the skill of the staff. Emergency tracheostomy is a difficult procedure with a high mortality. Intubation with a soft endotracheal tube is often tried but may prove impossible. If the instruments are to hand the laryngoscope used to try intubation may provide access for a bronchoscope. Tracheostomy may then be performed safely. If these facilities are not available an airway can be provided by inserting one or more small needles straight into the trachea.

Hoarseness and stridor in the adult

In the adult laryngeal problems more often cause voice changes than respiratory obstruction. Hoarseness occurs whenever a normal smooth vocal cord is not brought firmly into apposition with its fellow. The causes are irregularities of the surface of the cord or neuromuscular disorders affecting their movement.

Acute hoarseness may be caused by acute infective laryngitis; acute trauma from shouting, coughing, vomiting, or inhaling noxious fumes; or allergic swelling. Chronic hoarseness—arbitrarily defined as a change in the voice lasting more than three weeks—may be due to persistence of any of the acute causes; chronic laryngitis; vocal cord paralysis; neoplasia; and rarely, arthritis of the laryngeal joints.

Chronic laryngitis is usually caused by continuing irritation of the laryngeal mucosa. This is often due to vocal abuse, particularly when straining the voice during an acute attack of acute laryngitis, with submucosal haemorrhage and vocal cord oedema. Smoking, inhalation of spirits, dessication during mouth breathing, and frequent coughing or vomiting also cause persisting irritation. Specific infections of the larynx by tuberculosis and tertiary syphilis are also possible causes. Changes in the cords include persistent oedema of both or the development of

polypoid swellings. Vocal cord nodules ("singer's nodes") occur particularly under certain forms of voice strain and appear as tiny fibrous nodules at the junction of the anterior third and posterior two-thirds of both vocal cords. Chronic laryngitis may also be associated with keratotic changes in the surface of the cords, producing white patches (leucoplakia), which are sometimes premalignant. "Contact" ulcers sometimes occur at the posterior ends of the cords from trauma of one arytenoid hitting the other.

Vocal cord paralysis is usually caused by damage to the recurrent laryngeal nerve. An important cause is neoplasia affecting the left nerve at the hilum of the lung. It may also result from trauma during thyroidectomy and from any cause of neuritis. Often no cause can be found.

Neoplasms of the larynx

Among neoplasms of the larynx the malignant tumours are usually squamous cell carcinomas, which are commoner in men than in women. They may arise from the vocal cords (glottic) or from above or below them (supraglottic or subglottic). Glottic carcinomas have the best prognosis because they cause hoarseness earlier (and thus present earlier) and spread to the lymphatic nodes in the neck much later than the other two types. Carcinomas of the pyriform fossa cause hoarseness by invading the muscles of the larynx, but this occurs late in the development of the tumour, although early in its presentation.

All patients with hoarseness persisting for over three weeks should be referred for indirect laryngoscopy to diagnose the cause of the voice change. Skilled laryngologists rarely fail to see the larynx well with a mirror, but the information may need to be supplemented by direct laryngoscopy under anaesthetic. This also offers an opportunity to biopsy abnormal tissue. Further investigations may include tomography of the larynx and a chest radiograph.

Treatment

In general chronic laryngitis must be treated with voice rest and elimination of the irritating factors. Humidification of the home may be useful, as may steam inhalations with Friar's balsam. Innocent swellings of the larynx may need removing by microlaryngoscopy using the binocular microscope. Malignant tumours are treated by combinations of external irradiation, cytotoxic drugs, and surgery.

Relieving airway obstruction in the adult

Airway obstruction in the adult may result from gradual narrowing by large exfoliative tumours, bilateral recurrent laryngeal paralysis, and inhalation of foreign bodies—particularly lumps of food aspirated into the larynx. Urgent relief of laryngeal obstruction is best achieved by laryngotomy. An incision is made over the cricothyroid membrane and any available tube inserted. This procedure is much simpler and safer in unskilled hands than tracheostomy, since the cricothyroid membrane is just below the surface of the skin, whereas the trachea plunges deep to the vascular thyroid gland as it descends.

In hospital the respiratory obstruction of a slowly developing tumour will usually be managed by tracheostomy. Respiratory embarrassment from bilateral recurrent laryngeal nerve paralysis can be helped by removing the arytenoid and displacing the cord laterally (arytenoidectomy).

Mr Harold Ludman, MA, FRCS, is consultant otolaryngologist, King's College Hospital, and neuro-otological surgeon, National Hospital, Queen Square, London.