Chapter 1: Methods of examination of the pharynx and larynx

M. S. McCormick

History

Most diseases of the upper aerodigestive tract have an uncomplicated history. However, the duration of symptoms may give some indication as to the origin, or aggressiveness of the disease process. Leading questions relating to dysfunction are asked.

Mouth disorders may cause:
- pain, swelling or ulceration
- loose or ill-fitting dentures
- bleeding, numbness or weakness of the tongue and lips
- difficulty with speech or swallowing if tongue movement is faulty or tethered.

Pharyngeal lesions may present with:
- dysphagia (difficulty in swallowing) which may be
  - acute, progressive or recurrent
  - for solid only
  - for solids and liquids
- odynophagia, that is pain on swallowing
- weight loss
- voice alteration or hoarseness when the larynx is invaded
- referred otalgia
- a dry swallow is often noted in globus pharyngeus
- hypernasal speech and regurgitation of food into the nose results from velopharyngeal incompetence.

Laryngeal disorders may give rise to:
- altered voice production, that is abnormalities of strength, pitch, tone and quality
- hoarseness (a rough voice) - the commonest disorder
- stridor or noisy breathing
- dysphagia if the extrinsic larynx is invaded.

A lump in the neck is a common symptom with many causes.

The patient's response to questions will also give the otolaryngologist an indication of the disability caused by the disease. Knowledge of the patient's general condition and attitude to his symptoms must also be obtained at this point. Most important is the patient's cardiorespiratory reserve. Direct questions about exercise tolerance, angina, cough and sputum production will usually reveal whether the patient's management will be determined by his general health or whether the disease can be treated on its own merits. Note should also be taken of diseases which might complicate management, for example diabetes, specific allergies, or any regular medication. It should be remembered that the patient will also be assessing his attending surgeon so that these early exchanges may dictate the future conduct of the examination and management of the problem.
Armed with this information regarding general and specific illness the otolaryngologist may now proceed to examine the patient's upper respiratory tract.

**Examination**

**Lighting**

The fundamental prerequisite for this examination is adequate lighting. The standard concave head mirror is 9 cm in diameter with a central aperture of 2 cm and a focal length of 18 cm. The light source for this mirror is normally positioned about 30 cm behind and lateral to the patient's ear, the side being determined by the surgeon's preference. The normal arrangement is shown. This system provides brilliant illumination of the area under study and also leaves both hands free for use in the examination.

Alternatives to the reflective head mirror include various types of head lights which obtain their light from either low voltage DC bulbs or even fibreoptic systems. Preference for each particular lighting system is personal, but it is customary to use one of the latter type of head lights in the operating theatre, as much greater independence of movement of the surgeon's head is necessary.

**General**

It is customary to examine the patient in the sitting position unless this is impossible for some reason. The patient should be comfortable in the examination seat, bending slightly forward with the hands resting on his knees. With the use of a good light, a relaxed cooperative patient and, if necessary, a darkened room, the examiner is now able to proceed to gain maximum information from the examination.

The various aspects of examination taught by surgical tutors such as the site, size, shape, texture as well as other physical characteristics appropriate to each specific pathology should be remembered. Cysts should be transilluminated. The scientific method also encourages accurate recording of the observations so that the effect of treatment or any change in physical characteristics can be assessed, for example size of surface ulceration, 'mobility' of neck masses, etc.

It is important to obtain adequate exposure of the area to be examined. It is probably best to have the patient remove enough clothing to expose the neck and shoulder tips. This allows the examiner not only to observe but also to palpate any area under suspicion. Induration associated with ulceration may be assessed, as can fixity of tumours to bone. The obscure origins of some neck swellings can be confirmed or refuted using bimanual palpation with a gloved finger in the mouth. Biopsy of suspicious mouth ulcers can be performed under direct vision using local anaesthesia if necessary. When taking a biopsy it is important not to crush or distort the specimen. The biopsy, whether obtained by scalpel and dissecting forceps or punch biopsy forceps should be placed directly, without over manipulation, into the specimen pot which usually contains formalin or other fixative according to the wishes of the histopathologist, some preferring an unfixed fresh specimen.
Examination of the mouth and oropharynx

Lips

The lips should be observed for pallor or angular stomatitis as these may indicate anaemia. The nature of ulceration of the lip is easily diagnosed by the history, site and its physical characteristics, for example an acutely painful aphthous ulcer, the recurring nature of herpes labialis, the persistent squamous carcinoma with raised rolled edges, etc.

Buccal cavity, teeth and tongue

A relaxed cooperative patient will usually permit examination of all parts of the oral cavity including the buccal mucosa, teeth and tongue. The examiner may wish to restrain the patient's head with his left hand while retracting the lip or cheek with a spatula in the right hand. Alternatively the nurse may support the patient's head from behind, thus freeing the examiner's other hand. Both sides of the mouth may be inspected by using wooden or metal spatulas, or special lip retractors. An orderly and thorough examination of the mouth is essential as so many disease processes affecting the mucosa may be systemic, for example Addison's disease; or multifocal, for example carcinoma in situ. The various fossae within the mouth should be inspected in a regular and systematic fashion. The author's preference is to examine the buccal surface of the lower lip followed by the lower buccogingival sulcus as far back as the last lower molar tooth on that side. The cheek is then retracted superolaterally to allow inspection of the upper buccogingival sulcus from posterior to anterior along the gingival surface of the upper lip and then the examination proceeds to the other side of the mouth. The opening of the parotid duct can be seen opposite the second upper molar tooth. Any thickening of the duct or abnormal secretions should be noted. The various forms of disease affecting the mucosa inside the mouth including stomatitis are dealt with in Chapter 4.

The examiner now turns his attention to the teeth and the surrounding structures of the upper and lower jaw. Loose teeth, unhealed sockets and ill-fitting dentures are common symptoms of an expansive lesion within the jaw. The patient can usually point accurately to any specific point of complaint in this regard.

Malocclusion of teeth of the upper and lower jaw should be noted. This is important as strain may be placed on the temporomandibular joints and cause referred otalgia. Poor dental hygiene may result in carious teeth in the younger patient or more commonly gingivitis in adults.

Next the patient is asked to open the mouth widely so that the dorsum of the tongue is seen. The shape and symmetry of the tongue should be noted as well as fasciculation, seen in motor neuron disease. The patient is asked to move the tongue voluntarily in all directions. Paralysis of a hypoglossal nerve may be easily overlooked in the early stages but becomes more obvious after disuse atrophy of the affected tongue muscles. The tongue may also be tethered by malignant infiltration.

The patient is then asked to raise the tip of the tongue to expose its ventral surface. This step leads naturally to examination of the anterior part of the floor of the mouth. On
either side of the frenulum may be seen the opening of the submandibular salivary gland duct which may be affected in stone formation within the salivary gland or in malignant disease of the floor of the mouth. The examiner now retracts the tongue gently to one side and applies countertraction to the cheek preferably using two spatulas. An adequate view of the glossogingival sulcus can not be obtained as far back as the area between the last molar and the lateral border at the base of the tongue. This area is known by some as 'coffin corner' as an early cancer in this site is easily missed unless a thorough examination is undertaken. The same might be mentioned for the area between the last upper and lower molar teeth, the retro- or interdental trigone. Palpation of this area is particularly easy and should not be omitted. This examination is repeated on the other side of the mouth. Finally the hard palate is inspected. Mouth breathing in children may be the result of nasal or nasopharyngeal obstruction and is often associated with a high arched palate.

**Oropharynx**

A tongue spatula is placed in the midline of the dorsum of the tongue and gentle pressure is applied so that the tonsillar pillars, tonsils, soft palate and uvula can be seen. Care is necessary at this point not to stimulate the posterior one-third of the tongue as this will usually induce a gag response even in those tolerant to examination. After observing the mucosa the otolaryngologist's main concern in this area is usually the oropharyngeal tonsil. There is tremendous variation not only in the appearance of tonsils, but also in the interpretation of this appearance by otolaryngologists. Most accept that the diagnosis of recurring acute tonsillitis is made on history alone, and therefore the appearance of the tonsil on the day of examination is probably of very limited value; for example size can vary with the degree of inflammation present and may be apparently altered by protrusion of the tongue.

**Soft palate**

The soft palate is a muscular curtain covered on both sides with mucosa. It can be functionally assessed by asking the patient to phonate or to sniff. Asymmetry of movement is seen in glossopharyngeal paralysis. Its posterior surface is examined by a nasopharyngeal mirror.

The posterior pharyngeal wall is also easily visible. Prominent lymphoid follicles are seen in pharyngitis. Mucopurulent discharge descending from the nasal cavities and nasopharynx may be seen in rhinosinusitis. It is now necessary to use reflective light mirrors to assess the nasopharynx and the remains of the oropharynx, hypopharynx and larynx.

**Nasopharynx, hypopharynx and larynx**

To view the nasopharynx it is necessary to see behind the soft palate. The mirror must be small enough to pass below and behind the soft palate, but large enough to reflect sufficient light to examine the area and to be able to orientate the image seen. To facilitate this examination the handle is offset and the mirror is angled on the handle. It is important to warm the glass surface of the mirror or condensation will take place and obscure vision. This is commonly undertaken with the flame from a spirit lamp, but other thermostatically controlled devices are available. It is reassuring for the patient to know that the mirror will
not burn him so it is usual for the examiner to place the back of the mirror on his own cheek or hand prior to proceeding with the examination.

With the patient sitting forward and relaxed, the tongue is depressed with a Lack's tongue depressor and the mirror passed behind the soft palate. By reflecting light from the head mirror on to the angled nasopharyngeal mirror a view can be obtained of the roof of the nasopharynx, the posterior choanae, the posterior aspect of the nasal septum and the posterior ends of the inferior turbinates. A view of the eustachian cushions can be seen by rotating the handle of the mirror. The posterior surface of the maxillary tuberosity can also be examined using this method. While introducing the mirror into the mouth the movement of the soft palate should be observed for asymmetry or whether it is unduly hyposensitive. These may indicate a glossopharyngeal dysfunction. Some patients automatically contract their soft palate against the posterior pharyngeal wall occluding any view. This can be overcome by asking the patient to breathe through the nose while keeping his mouth open. Topical local anaesthesia may be necessary for those with a hypersensitive gag reflex. This can be achieved by using either lignocaine spray or asking the patient to suck a benzocaine lozenge. This examination is one of the most difficult skills to acquire but, with practice, adequate information can be obtained for diagnosis. When in doubt, flexible nasendoscopy under local anaesthetic or examination under general anaesthesia may be necessary.

The posterior pharyngeal wall can be seen on depressing the tongue. However, it is necessary to use a mirror to examine fully the remainder of the oropharynx, hypopharynx and larynx including the base of the tongue, the lateral pharyngeal walls, the pyriform fossae and the aditus to the larynx. The size of the patient's mouth and soft palate should be examined so that the largest mirror that can be comfortably introduced in the mouth is used. This facilitates the use of the most light as well as giving a better overall view. In patients with a very sensitive gag reflex it may be necessary to use local anaesthetic as described previously.

The patient should be asked to protrude his tongue, and this is then held with a gauze swab either by the thumb and index finger or thumb and middle finger depending on the ability of the patient to protrude the tongue and also on the examiner's preference. It is advisable to be firm but not rough, quick without rushing, and thorough in the order of the clinical inspection permitted with the introduction of the mirror. Care should be taken not to catch the frenulum of the tongue over the cutting edge of the lower teeth. The patient's upper lip can be gently elevated with the free index or middle finger, and if necessary the patient may be asked to smile. This has the effect of pulling the oral commissure upwards and backwards and increases the area of vision.

A previously warmed laryngeal mirror is introduced into the mouth after testing its temperature as described previously. It is best held like a pen, and care is taken not to soil the surface of the mirror with saliva, etc. The mirror is then gently placed against the soft palate and uvula and using gentle steady pressure these structures are elevated bringing into view in the mirror the base of the tongue and epiglottis, and behind this the larynx and hypopharynx. It is now usually possible to view the anterior surface of the epiglottis, the vallecula divided by the glossoepiglottic fold and also the irregular surface of the base of the tongue. By tilting and raising the mirror the laryngeal aditus is seen comprising the epiglottis, the aryepiglottic folds and the arytenoids posteriorly.
It is common in children, but less so in adults, that the epiglottis may overhang the larynx obscuring the view. The white vocal cords stand out in contrast to the surrounding pink mucosa. They are seen to connect the arytenoids with the base of the epiglottis at the anterior commissure. The bulging false cords or ventricular bands appear to meet the true cords and obscure the ventricles. The cords are observed at rest, during quiet respiration and phonation. In the fully relaxed patient it is quite possible to see between the cords and down the trachea where two or three rings of the tracheal cartilages may be seen anteriorly.

Further rotation of the mirror shows the interarytenoid area and the posterior pharyngeal wall. Inferiorly lies the postcricoid region which can only be seen when the patient swallows and hence is not visible on indirect laryngoscopy. On each side of this lies the pyriform fossa. It is possible to see both medial and lateral walls and occasionally the apex of the fossa. 'Pooling' of secretions may be a sign of a tumour in the postcricoid space or cervical oesophagus. It is important therefore to ask the patient to swallow any retained secretions and then to re-examine.

Despite reassurance, local anaesthesia and deftness of movement of the examiner's hands it is sometimes impossible to obtain adequate information from indirect laryngoscopy and further information must be obtained either by flexible nasendoscopy or by direct examination of the larynx under general anaesthesia. Methods of grasping the epiglottis with Mackenzie's laryngeal forceps have been superseded to some extent by the fibreoptic instrument, but may well still find use when this equipment is not available.

It is sometimes necessary to perform a direct examination of the larynx under local anaesthesia, for example, the injection of Teflon into a paralysed vocal cord (see below), or to obtain a biopsy from a patient with a bulky friable tumour of the supraglottis. It is well known that a tracheostomy prior to definitive treatment is a bad prognostic factor in laryngeal cancer patients. Endoscopy under general anaesthesia could possibly precipitate complete obstruction of the airway and necessitate an emergency tracheostomy. The technique of local anaesthesia is relatively simple but with the more general use and increased safety of general anaesthesia, this technique described below is not used by many today.

After spraying the oropharynx with lignocaine (10%), pledgets of cotton wool soaked in cocaine (4%) are introduced into the pyriform fossae using Mackenzie's forceps, and held in place for 3-4 minutes on each side. The superior laryngeal nerve is anaesthetized here as it passes through the thyrohyoid membrane. A spray of cocaine is then applied directly to the vocal cords using an angled spray while observed with a laryngeal mirror. With a cooperative patient it is possible to perform direct examination of the larynx, hypopharynx, the postcricoid space and cervical oesophagus. It may also be necessary to apply some more anaesthesia directly to the vocal cords once the laryngoscope is in position.

**The neck and salivary glands**

While examination of the interior of the mouth, oropharynx and hypopharynx can give information as to the presence of disease, it is also of the utmost importance to examine thoroughly the external larynx and the areas of lymphatic drainage. The examiner should stand behind the patient who should remain comfortably seated with the head slightly flexed. Enough clothing should be removed so that the supraclavicular fossae and tips of the
shoulders can be seen. It is best to examine the neck in triangles and while each surgeon has his own preferences it is important to do this methodically. The examination should commence with the posterior triangle superiorly by defining the mastoid tip and then feeling for lymph nodes along the anterior border of the trapezius muscle. It is also possible to palpate under the muscle by gently pressing the fingers under the muscles so that the flesh between the thumb and fingers can be palpated. The examining fingers will eventually reach the clavicle. At this point the floor of the posterior triangle can be examined by rolling the tissues between the fingertips and the muscular floor of the triangle, gradually moving medially until the sternomastoid muscle is reached. It is now possible to feel the lymph nodes associated with the internal jugular vein by firmly pressing the fingers underneath the muscle. It is also possible to palpate the muscle mass itself using the thumb and fingers as described for the trapezius. The fingers eventually arrive once again at the mastoid tip. The medial side of the sternomastoid muscle as far as the suprasternal notch should then be examined again palpating for any pathological lymph nodes. The clavicle and the suprasternal notch are palpated, and at this point the trachea can be felt in the midline.

The external features of the larynx should also be assessed. The most prominent of the cartilages is the cricoid, and it may be just possible to palpate a normal thyroid isthmus overlying the second and third tracheal rings. The cricothyroid membrane, the alae of the thyroid cartilage, the thyrohyoid membrane and the hyoid itself should be palpated. Deep in the groove between the sternomastoid and the larynx lie the great vessels of the neck and associated with the internal jugular vein lies the deep cervical plexus of lymph nodes. Mobility of the larynx on the prevertebral fascia can be tested by grasping the thyroid alae between the thumb and fingers and then moving the whole structure from side to side. The gritty sensation so produced by this manoeuvre is termed 'laryngeal crepitus' and is absent in lesions which push the larynx forward, away from the prevertebral fascia, for example postcricoid carcinoma or retropharyngeal abscess. The examination is continued with the submental triangle bounded by the ramus of the mandible and the line that would represent the line of the omohyoid muscle to the point of the chin. In this triangle lies the submandibular salivary gland and as the fingers come gently forward, the facial artery crossing the mandible and the associated pre- and postfacial lymph nodes can be felt. The examiner stands behind the patient, cupping the fingers under the mandibular ramus and palpating the floor of the mouth for other lymph nodes or direct extension of intraoral tumours. Palpation is carried forward to the point of the chin and then finally the tissues of the anterior triangle are rolled against the muscles of the floor of the mouth. If swelling of the submandibular gland is felt, it is mandatory to examine the gland bimanually with a gloved finger in the mouth while externally supporting the gland with the fingers.

To examine the parotid gland adequately assessment should be made not only of the gland itself, but also of facial nerve function, of the neck for metastases and of the parotid duct. A swelling in the parapharyngeal space or soft palate may be of parotid origin. Both parotid glands should be palpated including the finger-like processes that extend up in front of the ear and posteriorly over the mastoid tip. Any swelling deep to the skin at this point must be considered to be parotid until proven otherwise. To examine facial nerve function completely it must be recalled that the facial nerve not only innervates the muscles of facial expression but also secretomotor fibres to the lacrimal and the submandibular glands, special sensory fibres to subserve taste to the anterior two-thirds of the tongue and also the motor fibres to the stapedius muscle. To test facial movements it is imperative to immobilize the
contralateral side of the face which is under assessment. Then each section of the face must be tested in turn: forehead, eye closure and corneal protection, the patient is asked to move the cheek with a smile or blowing, the nose with a sniff, the upper and lower lip with a whistle and the chin by imitating shaving movements.

**Special investigations**

The reader is referred to the appropriate chapters on radiology with regard to discussion of plain radiographs, tomograms, laryngograms, computerized axial tomography, magnetic resonance imaging and radio isotope scanning. Fibreoptic endoscopy and direct examination of the larynx and microlaryngoscopy are dealt with in Chapter 3.