LARYNGOGRAM

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Introduction :

Certain difficulties may arise during the examination of the larynx and hypopharynx which may prevent proper diagnosis of these conditions and hence their treatment. Radiology can help in diagnosis of these lesions. Laryngography has its proper place, among the different radiological techniques, in showing the anatomy as well as the pathological lesions of the larynx.

Aim of Work :

To define the normal anatomy of the larynx and hypopharynx using among other methods positive contrast laryngography.

REVIEW OF LITERATURE

ANATOMY OF THE LARYNX

The larynx which is the organ of phonation, as well as an air passage, extends from the root of the tongue to the trachea (Gray, 1969).

It lies opposite C_3 to C_6. In children and females its position is at a higher level than in males. After puberty, the male larynx shows a considerable enlargement of the cartilages with smaller angle between the thyroid laminae than that of the female (Eric Samuel, 1952) and (Grant and Basmajian, 1965).

Its average measurements in the adults are as follows :

	Male	Female
Length	44	36
Transverse diameter	43	41
Anteroposterior diameter	36	26

(Gray, 1969)

The skeletal framework of the larynx is formed of cartilages, which are connected by ligaments and membranes and are moved by a number of muscles, it is lined with mucous membrane continuous above and behind with that of the pharynx and below with that of the trachea.

This skelaton is divided into external framework and internal framework. (Maccomb & Fletcher, 1967), (Grant and Besmajian, 1965).

1) External framework

a- Thyroid cartilage

b- Cricoid cartilage

The hyoid bone is considered by Maccomb and Fletcher and by Sutton as one of the external framework.

2) Internal framework

a- Epiglottis

b- Arytenoids

c- Corniculates

d- Cuneiforms.

The last 3 are paired while the others are single.

The thyroid, the cricoid and most of the arytenoids and tracheal rings are composed of hyaline cartilage; these structures begin to ossify at the age of 20 years. The epiglottis, the corniculates and the cuneiforms as well as the apices and vocal processes of the arytenoids are made of elastic fibres which do not ossify (Eric Samuel, 1952), (Grant and Basmajian, 1965), (Hately, Enism and Samuel, 1965).

Thyroid cartilage :

Composed of 2 quadrilateral laminae, the lower part of the anterior borders are fused at an angle in the median plane to form a subcutaneous projection named the laryngeal prominence (Adam's apple). This prominence is most distinct at its upper part, and is well marked in males but scarcely visible in females. Immediately above it the laminae are seperated by a V-shaped notch, termed as the thyroid notch. Posteriorly the laminae diverge and the posterior border of each is prolonged as two slender processes, the longer superior and the shorter inferior horns (Gray, 1969).

The radiographic visualisation of the thyroid cartilage is largely dependent upon the degree of ossification which commences in early adult life; around the age of 20 years (Roncallo, 1948) (Keen and Wainuright, 1958) (Hately, Evison and Samuel, 1965). The ossification starts first in the inferior portion of the posterior part of the laminae, then extends through the lower horn, upwards through the posterior part and transverse across the lower border of the laminae, later it forms a fenestrated pattern sometimes 8-shaped, the superior horn is the last to ossify (Halely, Evison and Samuel, 1965). The triticeous

cartilages in the thyrohyoid ligament sometimes ossify and mistaken as a foreign body.

Cricoid Cartilage :

It is shaped like a signet ring, composed of a quadrate posterior lamina, and a narrow anterior arch with a horizontal lower border and an oblique upper border. There is a circular facet on the medial aspect of each inferior horn of the thyroid cartilage for articulation with a corresponding facet on the sides of the laminae of the cricoid.

Ossification of the cricoid also occurs around 20 years, begins at the upper posterior part and ends in the anterior arch (Hately, Evison and Samuel, 1965).

The epiglottis :

A solitary leaf shaped cartilage, which projects obliquely upwards behind the tongue and the body of the hyoid bone. The free, extremety is broad and rounded while the attached part or stalk is long and narrow. The latter to connected by an elastic ligament, named the thyro-epiglottic ligament, to the angle formed by the laminae of the thyroid, just above the vocal ligaments. From its lateral border a fibroelastic sheet, the quachangular membrane, curves backwards to the lateral border of the

arytenoid cartilage. The free upper end of the quadrangular membrane is slightly thickened, named the aryepiglottic ligament. The free lower border is markedly thickened to form the vestibular ligament or false cord.

The radiographic appearance of the epiglottis could be best seen in the lateral view of the larynx. In this view the delicately curved appearance can be clearly visualised and the aryepiglottic folds can be recognized. The valleculae are seen anterior to the upper end of the epiglottis.

The epiglottis does'nt ossify (Negus, 1949) although cases are reported (Drdran, 1965).

The arytenoids :

Each is pyramidal in shape with 3 angles and 3 surfaces. The anterior angle is called the vocal process, the superior is called the apex while the lateral angle is called the muscular process. The 3 surfaces are medial, posterior and anterolateral.

The arytenoids are placed on the lateral part of the upper border of the cricoid lamina.

The corniculates :

Each articulates with the apex of the arytenoid.

The Cuneiforms :

They are placed in the aryepiglottic fold.

Ligaments and Membranes

They are divided into extrinsic and intrinsic ligaments (Scott and Brown, 1971).

A) Extrinisic ligaments :

1. Thyrohyoid ligament.
2. Crico-tracheal.
3. Hyo-epiglottic and thyro-epiglottic
4. Medial crico-thyroid (conus elasticus)

B) Instrinsic ligaments :

The elastic membrane is the membranous covering of the interior of the larynx. It comprises the quadrangular membrane and the cricovocal membrane.

1) The quadrangular membrane had an upper thickened free border, the aryepiglottic ligament, from the lateral edge of the epiglottis to the anterior edge of the arytenoid, and a thickened lower border which is called the vestibular ligament or false cord. The fissure between the false cords is called the rima vestibuli.

2) The cricovocal ligament, a triangular membrane between the upper edge of cricoid and thyroid infront and vocal

process of the arytenoid. It has a free thickened upper border called the vocal ligament or the time vocal cord. The fissure between the true cords is called the rima glottidis.

The Internal of the Larynx

It is divided into 3 parts :

1) The vestibule : between the inlet and false cords.
2) The ventricle (or the sinus) : between the false and true cords.
3) The subglottis : from the true cords to the lower border of the cricoid.

The rima glottidis is composed of 2 parts, an anterior intermembranous part between the vocal cords, and a posterior intercartiligenous past between the 2 arytenoids. Its average length is 23 mm in males and 16 mm in females. The size of the rime glottidis differs during the different states of the larynx.

Deep inspiration (full abduction)	19 mm
Quiet respiration	13 mm
Cadaver (all muscles paralysed)	7 mm
Phonation (full adduction)	Zero mm

(Scott and Brown, 1971)

The Muscles of the Larynx

They are divided into 2 groups, the extrinsic group connects the larynx to its neighbour structures and the intrinsic group connects the laryngeal parts together, it is subdivided into abductors , adductors and tensors (Gray, 1969).

The Laryngeal Part of the Pharynx

The laryngeal part of the pharynx reaches from the upper border of the epiglottis to the lower border of the cricoid cartilage, where it is continuous with the oesophagus. Its anterior wall present from above downwards, the inlet of the larynx, the posterior surface of the arytenoid cartilages and cricoid cartilage. A small recess termed the pyriform fossa, lies on each side of the laryngeal orifice; it is bounded medially by the aryepiglottic fold and laterally by the thyroid cartilage and thyrohyoid membrane. Posteriorly the laryngeal part of the pharynx is supported by the bodies of the 3rd, 4th, 5th and 6th cervical vertebrae.

The oesophagus starts at the lower end of the cricoid cartilage (Landman, 1970).