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ORIGINAL RESEARCH

A morphometric study of larynx in Northwest Indian population& its clinical significance

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ABSTRACT

Introduction: The larynx, also known as the voice box or organ of phonation, is the upper, enlarged portion of the lower respiratory tract that is adapted to produce voice. Laryngeal morphometrics are crucial for providing landmarks during laryngoplasty and partial laryngectomies**. Material and methods:** The present study was carried out in the department of Anatomy of JNUIMSRC, Jaipur on 20 laryngeal specimens of unknown age and gender. Parameters measured were: height of the larynx- from tip of epiglottis to the lower margin/border of arch of cricoid cartilage, height of the larynx- from tip of epiglottis to thyroid notch and height of the larynx- from thyroid notch to lower margin of arch of cricoid cartilage. **Result:** Mean of height from tip of epiglottis to lower border of cricoid cartilage was 46±5.12mm (range being 36-56mm) , mean of height from thyroid notch to lower border of cricoid cartilage was 35.7±4.98mm (range being 29-45mm). Mean of height from tip of epiglottis to thyroid notch was 25±2.3mm (range being 24-31mm)**. Discussion:** In the present study, the mean of height of larynx from tip of epiglottis to lower border of cricoid cartilage was was lower than the values reported in previous whereas the mean of height of larynx from thyroid notch to lower border of cricoid cartilage was slightly higher than that of that of others. The morphometry of the cartilages of the larynx can also be enlightening in the planning of surgical interventions of the larynx. It also has implications for placing the electrodes during the electromyography of the larynx and the interpretation of CT and MRI scans of the larynx. **Conclusions:** Detailed knowledge of the larynx's anatomy through morphological studies is essential for precise surgical intervention like laryngeal reconstruction or removal of laryngeal tumour.

INTRODUCTION

Stretching from the tongue to the trachea, the larynx is an airway, a sphincter, and an organ of formation[1]. The larynx, also known as the voice box or organ of phonation, is the upper, enlarged portion of the lower respiratory tract that is adapted to produce voice. It is located in front of the laryngopharynx in the anterior midline of the upper neck, above the trachea. It lies in front of the third, fourth, fifth, and sixth cervical vertebrae and stretches from the root of the tongue to the trachea. Three unpaired cartilages (thyroid, cricoid, and epiglottis) and three paired cartilages (arytenoid, corniculate, and cuneiform) make up the larynx's nine cartilages[2].

It is a cartilaginous tube that joins the vocal tract and mouth cavity superiorly and the respiratory system inferiorly. Members of the same species communicate with one another using a phonatory larynx, which is seen in many animals[3].

The leaf-like epiglottis extends into the hyoid bone, posteroinferior to the tongue, and the lumen of the pharynx. It is a laryngeal cartilage that is elastic. In order to adjust technical elements during surgery, doctors must be aware of the anatomical variations among races, genders, and age groups[4].

Determining the larynx's size and proportion is crucial since it helps with treatments including cricothyroidotomy, endoscopy, stenting, intubation, and surgical manipulations[2,3]. Laryngeal morphometrics are crucial for providing landmarks during laryngoplasty and partial laryngectomies.[5]

MATERIAL AND METHODS

The present study was carried out in the department of Anatomy of JNUIMSRC, Jaipur on 20 laryngeal specimens of unknown age and gender. Sagittal section of the head and neck region was taken from the cadavers & specimens were numbered from 1 to

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20. Along with the tongue, the specimen of the larynx was removed by cutting the muscles of the soft palate, muscles of the posterior pharyngeal wall and fascia. Larynx was separated from the tongue at the level of hyoid bone to 3rd tracheal ring. Dissection was performed using standard dissecting instruments. The measurements were taken with the help of the manual Vernier calliper to the nearest 0.01mm as shown in figure 1.

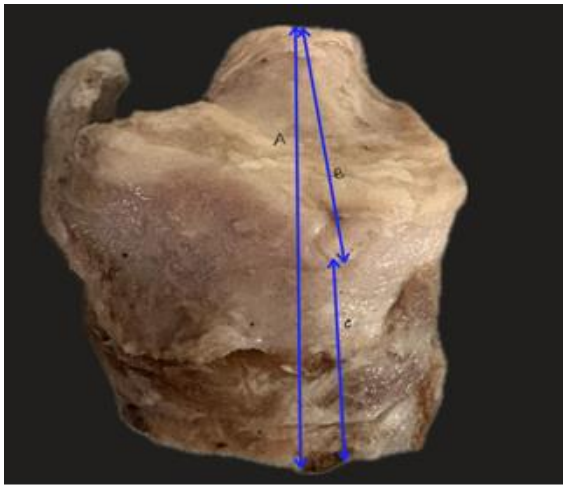

Figure 1: Showing distances measured: A: Height of the larynx- from tip of epiglottis to the lower margin/border of arch of cricoid cartilage, B: Height of the larynx- from tip of epiglottis to thyroid notch, C: Height of the larynx- from thyroid notch to lower margin of arch of cricoid cartilage

The following measurements were taken:

1. Height of the larynx- from tip of epiglottis to the lower margin/border of arch of cricoid cartilage (A in figure 1).
2. Height of the larynx- from tip of epiglottis to thyroid notch (B in figure 1).
3. Height of the larynx- from thyroid notch to lower margin of arch of cricoid cartilage (C in figure 1).

Data collected was analysed and scruitinized. Mean, standard deviation and range was calculated by MS Excel version 1808.

RESULTS

In present study, height of larynx was measured at three different levels. Mean of height from tip of epiglottis to lower border of cricoid cartilage was 46±5.12mm, mean of height from thyroid notch to lower border of cricoid cartilage was 35.7±4.98mm (Table 1). Mean of height from tip of epiglottis to thyroid notch was 25±2.3mm (Table 1). Range of all these parameters is also shown in Table 1.

Table 1 showing heights of larynx from different levels

Name of Parameter	Mean[mm]	Standard deviation	Range[mm]
Height from tip of epiglottis to lower border of arch of cricoid cartilage	46	5.12	36-56
Height from thyroid notch to lower border of arch of cricoid cartilage	35.7	4.98	29-45
Height from tip of epiglottis to thyroid notch	25	2.3	24-31

DISCUSSION

Understanding laryngeal anatomy is useful for a variety of reasons, including in clinical settings when diagnosing patients and during procedures like manipulations and surgeries, as well as for professionals like singers, who can benefit from speech therapy by using the relevant anatomy to train their voices.[6] The morphometry of the cartilages of the larynx can also be enlightening in the planning of surgical interventions of the larynx. It also has implications for placing the electrodes during the electromyography of the larynx and the interpretation of CT and MRI scans of the larynx.[7] The measurements of cartilages of the larynx are also essential to manage the subglottic and post-intubation stenosis of the lower respiratory tract.[8]

In the present study, themean of height of larynx from tip of epiglottis to lower border of cricoid cartilage was 46±5.12mm whereas value for the same was reported to be 57.3±7.32 by Joshi et al.[9]Our study results were slightly lower than theirs. The mean of height of larynx from thyroid notch to lower border of cricoid cartilage was 35.7±4.98mm which was slightly higher than that of that of Joshi et al who found the same height as 32.42±3.41 mm. This significant difference in values could be attributed to the geographical variations.

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Mean of height from tip of epiglottis tothyroid notch was 25±2.3mm. Unfortunately, no data could be traced in literature for comparison. Thus, our study results could serve as baseline data for future researches and clinicians.

CONCLUSION

It is important to keep in mind that even within the same community, patient's laryngeal morphology varies greatly. The dimensions of the majority of the parameters varied greatly among individuals. Detailed knowledge of the larynx's anatomy through morphological studies is essential for precise surgical intervention like laryngeal reconstruction or removal of laryngeal tumour.

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