

**TITLE: USING THE LARYNGEAL INDICES CALIPER TO PREDICT DIFFICULT INTUBATIONS**

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**Introduction:** The "anterior Larynx" has been implicated as a causative factor in difficult intubation<sup>1</sup>. This study (1) describes the Laryngeal Indices Caliper (LIC), a device to measure relative laryngeal position, (2) establishes reproducibility of its measurements, and (3) correlates results with laryngoscopic appearance.

**Methods:** The LIC defines a co-ordinate system with the X-axis (Laryngeal Indices Line) passing through the external auditory canal with the origin at the upper teeth. 11 variables were measured on 101 patients prior to general anesthesia for renal lithotripsy. All measurements were taken with the patient supine (no pillows under the head) on a horizontal surface.

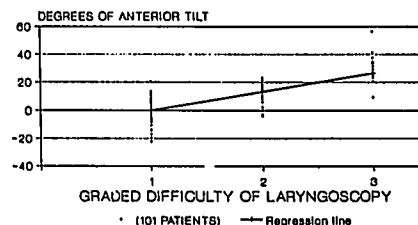
To assess reproducibility, each of eight observers performed measurements on a subject on eight occasions. The results were subjected to analysis of variance.

The variables were compared to difficulty of laryngoscopy graded as follows:

- Grade 1: All the vocal cords visible
- Grade 2: Part of the vocal cords visible
- Grade 3: None of the vocal cords visible

**Results:** Analysis of variance demonstrated good reproducibility of results obtained from repeated measurement of distance from upper teeth to thyrohyoid membrane. Of the eleven variables measured only laryngeal tilt (LT) demonstrated significant correlation with grade of laryngoscopy.

**ANGLE OF THYROID CARTILAGE FROM A PERPENDICULAR TO THE LARYNGEAL INDICES LINE (LIL)**



1-ALL, 2-HALF, 3-NONE OF CORDS SEEN

**Discussion:** Many anatomical features have been cited as predictive of difficult intubation. Prior to this study, the 'anterior' larynx has been implicated but not quantified.

Our results indicate that the 'tilt' of the larynx is more important than its 'anteriorness' in the prediction of difficult laryngoscopy.

Reference: Wilson ME, Spiegelhalter D, Robertson JA, Lesser P. Predicting Difficult Intubation. Brit J Anes 61:211-216, 1988.

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**TITLE: WHY CERVICAL FLEXION FACILITATES LARYNGOSCOPY WITH A MACINTOSH LARYNGOSCOPE, BUT HINDERS IT WITH A FLEXIBLE FIBERSCOPE**

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The ideal position for endotracheal intubation using direct laryngoscopy entails partial flexion of the cervical spine and extension of the head at the atlanto-occipital (A-O) joint.<sup>1</sup> The aim of this positioning is to align the axis of the mouth, pharynx and larynx. If direct laryngoscopy proves difficult, further flexion of the cervical spine improves the view of the vocal cords. Our experience with oral fiberoptic laryngoscopy suggested that extension of the cervical spine improved visualization of the laryngeal inlet. In this study, we examine changes in laryngeal position during flexion-extension movements of the cervical spine. **Methods:** Laryngeal position was determined with the Laryngeal Indices Caliper (LIC). Each of 20 patients lay on a firm horizontal surface: (1) initially with the cervical spine in the neutral position (no blankets under the head); (2) with the cervical spine flexed (two blankets under the head); and (3) with the cervical spine submaximally extended (2 blankets placed under the shoulders). An

attempt was made throughout to limit movement at the atlanto-occipital joint.

To examine our hypothesis in another way, the head and neck of a cadaver was dissected photographed in both neutral and extended cervical spine positions.

**LIC measurements:** During cervical flexion, the anterior tilt of the larynx is decreased and the larynx is displaced posteriorly relative to the body axis and the laryngeal indices line (LIL). During cervical extension, the converse is true.

**Cadaver study:** In the neutral position, the epiglottis lies against the posterior pharyngeal wall while in the extended position the larynx is tilted anteriorly and the epiglottis is lifted off the posterior laryngeal wall.

Flexing the cervical spine facilitates direct laryngoscopy by decreasing laryngeal tilt, but hinders flexible fiberoscopy by forcing the epiglottis against the posterior pharyngeal wall.

The optimal position for fiberoptic laryngoscopy is with cervical extension, rather than the flexed cervical position recommended for direct laryngoscopy. While cervical extension does help to separate the epiglottis from the posterior pharyngeal wall, it is not as effective in this regard as A-O extension. Reference: (1) Salem MR, Mathrubhutham M, Bennett EJ: Difficult intubation. NEJM 295(16):879-881,1976.