



Understanding the Original Shape of the Macintosh Laryngoscope

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Letter to Editor

71 years ago, the most popular curved laryngoscope in the world - the Macintosh laryngoscope was designed by Sir Robert Reynolds Macintosh, which was expected to expose the larynx more easily under lighter anesthesia than that with the straight laryngoscope by elevating the epiglottis indirectly [1]. Although the design process of the Macintosh laryngoscope was mentioned in 1944, detailed features of the original design have not been well described [2]. The prototype of the Macintosh laryngoscope had a markedly flattened midportion, which contributed to improving the laryngeal view [3] (Figure 1a).

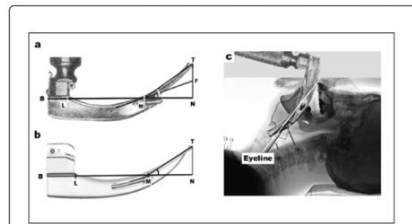


Figure 1: a) The prototype of the Macintosh laryngoscope. b) The current English Macintosh laryngoscope (size 3). Reference lines and points: line LN, a horizontal line drawn from the handle-mounting block; point T, the blade tip; line TN, a line drawn from the point T perpendicular to the line LN; point M, a point of intersection of the line LN and under surface of the midportion and point F, a point of intersection of the line TN and extended line of the midportion. The line BN is the length of the laryngoscope. c) The overlaying image of the original design of the Macintosh laryngoscope on the radiograph laryngoscopy image. The black eyeline: with the current Macintosh laryngoscope; the white eyeline: with the prototype of the Macintosh laryngoscope.

Unfortunately this feature disappeared in 1956, when the manufacturer started making the Macintosh laryngoscope of stainless steel from brass [4]. To easily understand differences in the shape between the original and current Macintosh laryngoscopes, scanned images of the prototype and English Macintosh laryngoscopes were digitally analysed and compared at matched size (size 3, length: line BN=130 mm). An angle and ratio were introduced to describe the two basic features of the Macintosh laryngoscope. In original design, the angle between line TM and MN ($\angle TMN$) is approximately 36° ; the ratio of MN to LM is 0.62 (i.e. a golden ratio). Furthermore, the flattened midportion (37 mm) starts at 35 mm from the blade tip and the angle between line FM and MN ($\angle FMN$) is approximately 20° . The current Macintosh laryngoscope (Figure 1b) keeps the similar ratio of MN to LM with an entire curved spatula, the $\angle TMN$ is approximately 32° . Overlaying the image of the original Macintosh laryngoscope on the radiograph laryngoscopy image with the current Macintosh laryngoscope in the patient with difficult laryngoscopy [5] (Figure 1c), it was noted that the original design with the larger $\angle TMN$ and flattened midportion might theoretically contact the hyoid more easily to improve the laryngeal view.

The author suggests these measurements can provide a better understanding of the original design and changes in the shape of the Macintosh laryngoscope during the past 70 years. Furthermore, these features should be sufficiently considered to design the video laryngoscope in the future for optimizing its dynamic and optical functions.

References

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