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Another way to perform tracheal intubation is using a macintosh curved blade laryngoscope

Abstract

Several devices have been described in recent years to assist with tracheal intubation. However, the laryngoscope remains the primary device for teaching intubation, with the advantage of allowing direct visualization of the vocal cords and reducing the risk of traumatic intubation. Under normal conditions, many difficult intubations may result from improper use of the laryngoscope. The sniffing position was described in 1930, the curved laryngoscope blade in 1943, and the three-axis theory in 1944. The use of a laryngoscope with a straight blade requires attention to essential aspects of patient preparation and positioning, which also apply when using a curved blade, including maintaining the lowest possible table height, positioning the patient with an appropriately sized pillow to keep the head elevated and facilitate mouth opening, and selecting the correct curved blade size. The aim of this article is to demonstrate a different way of using the laryngoscope through seven xeroradiographic images illustrating all the steps. Finally, it highlights the difference in laryngoscope direction between Macintosh's article, in which it is pointed towards the ceiling, and Gouveia's article, in which it is pointed towards the patient's feet and remains parallel to the patient's body.

Keywords: Intubation Tracheal, Laryngoscopes, Sniffing Position.

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Introduction

In 1913, Janeway developed the first laryngoscope specifically designed for tracheal intubation, with illumination and a slightly curved blade.[1] In 1941, an American anesthesiologist described a straight blade that anticipated the design of the modern laryngoscope.[2] Two years later, the first curved blade was described to improve laryngeal visualization during laryngoscopy.[3] The straight blade is positioned with its tip passing under the epiglottis and lifting it directly, whereas the curved blade is placed in the vallecula, allowing visualization of the vocal cords and facilitating tracheal intubation. The sniffing position (SP) has been recommended as the optimal head position for direct laryngoscopy with the curved blade described by Macintosh. It was described in 1930 by Ivan Magill as "sniffing the morning air" and was associated with improved glottic visualization during direct laryngoscopy.[4] In 1944, a new theory proposed the alignment of the three axes, oral, pharyngeal, and laryngeal, to provide an anatomical explanation for the sniffing position.[5]

New macintosh blade

In a book on intubation, the author recommended that, in some cases, the laryngoscope blade be advanced only until the epiglottis became visible, after which the endotracheal tube could be guided behind the epiglottis into the trachea.[6] In 1942, it was suggested that a curved laryngoscope could provide better exposure of the larynx without interfering with the anesthesiologist's view during tracheal intubation.[7] The new laryngoscope was designed so that, when its curved blade was in position, the tip would fit into the angle formed by the epiglottis and the base of the tongue, providing a direct view of the trachea.[3] With the new curved blade, the larynx could be exposed more easily and with less force than with a straight-blade laryngoscope.[3]

The sniffing position

For direct laryngoscopy, correct positioning of the head and neck is essential for optimal laryngeal visualization during tracheal tube insertion. The sniffing position, which resembles the posture assumed by a person smelling a flower, was first described in 1930.[8] This position is obtained by fully flexing the neck over the trunk and deflecting the head until the facial axis becomes vertical, simulating a person smelling a flower. The sniffing position has traditionally been considered the optimal head position for direct laryngoscopy and appears to provide advantages over other head positions. However, this concept has been questioned in recent years.

A reflection on laryngoscopy

Since its introduction by Macintosh, the curved blade has become the most widely used blade for direct laryngoscopy. Despite advances in tracheal intubation in recent years, direct laryngoscopy remains a widely used method for tracheal tube insertion, with the advantage of allowing direct visualization of the vocal cords. Direct laryngoscopy with a Macintosh blade has an overall success rate of over 95% and first-attempt success of approximately 85–95% in patients undergoing elective general anesthesia without predictors of difficult airway, when performed by experienced operators.[9] A search was conducted for images available online showing tracheal intubation by direct laryngoscopy with a curved blade. In the images identified, the laryngoscope was consistently directed towards the ceiling, with apparent contact with the upper teeth. Some photographs in textbooks

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on laryngoscopy intubation show that most patients use it pointing towards the ceiling, authors not identified (Figure 1). Likewise, several online images of intubation, without identification of the professionals performing the procedure, showed the laryngoscope directed towards the ceiling (Figure 1). In 1991, Gouveia obtained xeroradiographs during intubation procedures to assess the relationship between the laryngoscope blade and the upper teeth, using the lowest possible table height and a vertical direction of intubation (from ceiling to floor) to obtain the best glottic view and allow a photograph to be taken.[10]

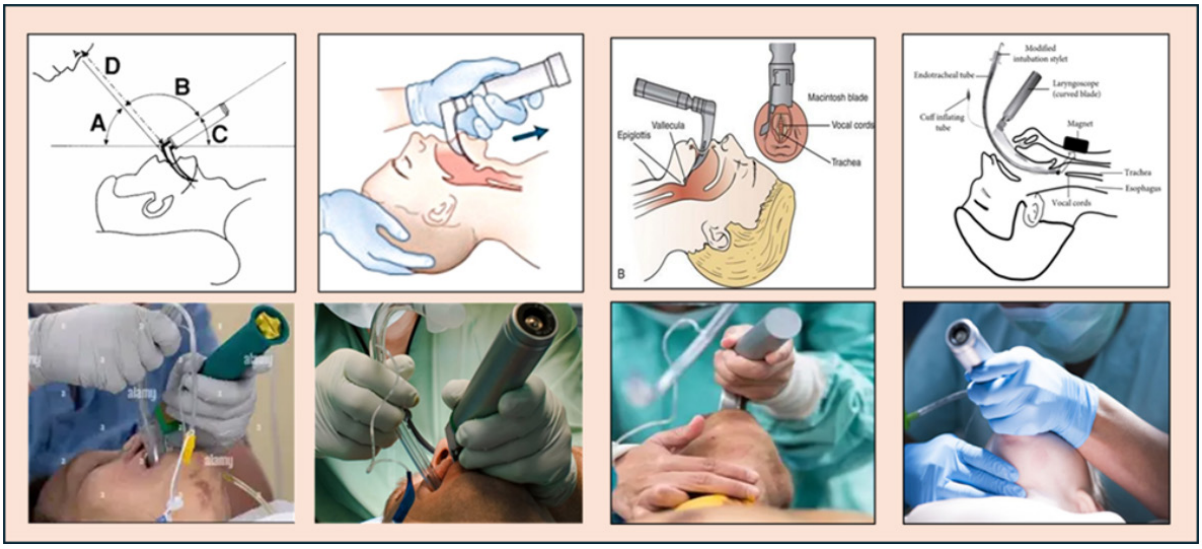
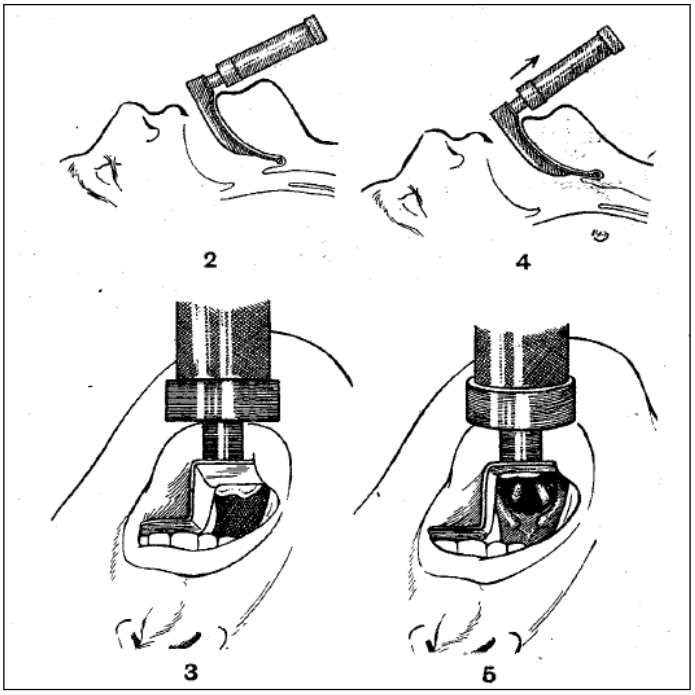


Figure 1 Images copied from various books without identifying their authors and of various intubations found on internet sites without identifying those who performed the use of the laryngoscope pointed towards the ceiling.

Difference in laryngoscope direction between macintosh and gouveia

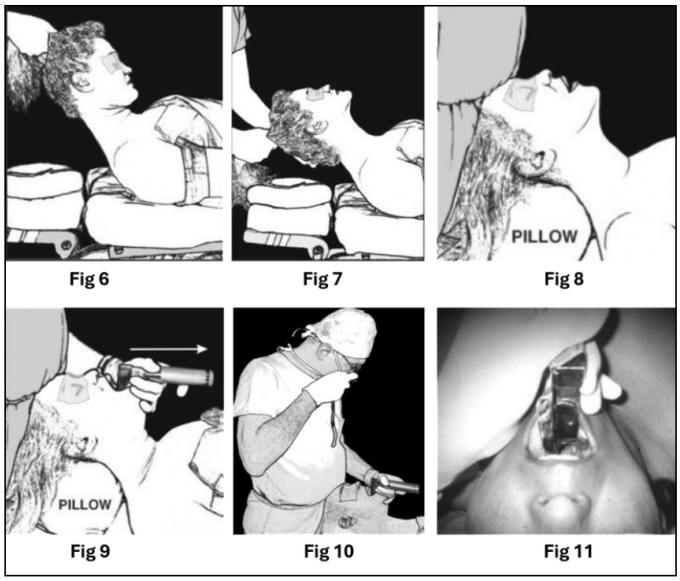
The new laryngoscope described by Macintosh in 1943 was designed to facilitate exposure of the larynx for endotracheal tube insertion.[3] The blade is inserted to the right of the tongue, which is displaced to the left. If the tongue is not moved to the left side of the mouth, it may protrude over the blade, obstructing the view of the larynx and making intubation almost impossible (Figures 2–5). In Brazil, the Macintosh blade[3] and the Magill technique[4,8] were disseminated through a study using seven xeroradiographs illustrating all stages of laryngoscopy.[10] The xeroradiographs demonstrate several modifications intended to facilitate tracheal intubation. The table height should be as low as possible, approximately at the level of the anesthesiologist's pubis. The patient should be positioned with the head at the edge of the headboard, which should remain horizontal. The pillow should be large enough to facilitate mouth opening without force (Figures 6–11). In Gouveia's xeroradiographs, gentle force is applied in an anterior direction (upwards), moving the mandible and the blade together and opening the glottis. Another force directs the laryngoscope handle towards the patient's feet. This movement opens the patient's mouth widely and keeps the blade away from the upper teeth, thereby reducing the risk of dental trauma (Figure 12). In contrast, the drawing in Macintosh's original article shows the laryngoscope pointed towards the ceiling, potentially applying force to the upper teeth and creating a lever effect (Figure 12). A summary of the main modifications proposed by Gouveia in 2003 is presented in Tables I and II.



Figures 2-5 Copied from Macintosh's article in the description of the curved blade.[3]

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Figures 6-11. Technique described by Gouveia with all the steps of intubation with a laryngoscope pointing towards the feet.[10]

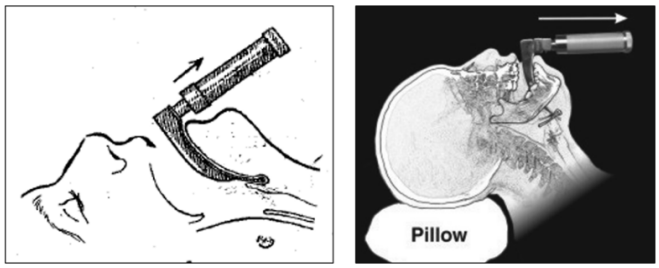


Figure 12 Difference in laryngoscope direction between Macintosh and Gouveia

Table 1 Procedures for intubation with laryngoscopy and Macintosh blade[1]

Assessment	Conduct
Patient preparation	Assess head and neck movement and parameters of anatomical difficulties for intubation.
Table height (OR)	The head of the patient should be low, at the level of their pubic area, and the patient's head should be at the level of the anesthesiologist's bladder.
Patient positioning	With the patient's head flush against the operating table, lift the head until the neck is fully flexed over the trunk, deflecting the head while keeping it elevated, and fill the space below the skull with appropriately sized sandbags or folded sheets.
Use the laryngoscope	Choose the correct curved blade size for the patient.
Insertion of the tube	Insertion of the appropriately sized tracheal tube follows the line of sight, that is, vertically, from the ceiling to the floor.

Table 2 Description of each step through xeroradiography of the Gouveia technique[10]

Figures	Behaviors in each figure
6	Full flexion of the neck over the trunk.
7	Deflexion of the head over the neck, maintaining its height from the table. No matter how high.
8	Filling the space between the table and the head's height. Fill it with what is necessary.
9	The mouth opens wide and permits excellent pictures with ordinary cameras.
10	Maintaining the position of the head fixed by pressure of your body against the skull (maintaining the horizontal axis of the face) and holding the chin and laryngoscope together to produce an anterior (up) movement and a to the toes (downward) movement. you can see here that the laryngoscope does not touch the upper teeth.
11	Picture of the rima glottidis taken with an ordinary camera. You can see the arytenoid processes and the glottis.

Laryngoscopy pointing towards the ceiling

After proper application of the steps for laryngoscopy with a curved blade, the tracheal tube is inserted along the line of sight, that is, vertically from ceiling to floor, rather than from head to feet or at a 45° angle, as suggested in the drawings of previous articles.[11,12] Directing the laryngoscope handle towards the patient's feet allows the mouth to open widely and keeps the blade away from the upper teeth, thereby reducing the risk of dental trauma.[13,14] A Cochrane systematic review and meta-analysis published in 2022 comparing videolaryngoscopy with direct laryngoscopy for tracheal intubation in adults found that all three types of videolaryngoscope (Macintosh-style, hyperangulated, and channeled) reduced the risk of failed intubation and increased the likelihood of first-pass success.[9] In an online search for images of tracheal intubation in adults using a Macintosh curved-blade laryngoscope, nearly all images identified showed the laryngoscope pointed towards the ceiling.[15] Interestingly, after more than one hour of searching, we found no image of intubation performed by an anesthesiologist showing the laryngoscope parallel to the patient's body and pointed directly towards the feet (Figure 12).

Ramped position

The ramped position is achieved by placing blankets under the patient's upper body and head to obtain horizontal alignment between the external auditory meatus and the sternal notch.16 In obese patients, this position is intended to improve the alignment of the oral, pharyngeal, and laryngeal axes (the three axes of intubation), similarly to the sniffing position in non-obese patients. A study comparing intubation time using videolaryngoscopy in morbidly obese patients in the ramped versus sniffing positions showed that the ramped position could reduce intubation time and facilitate intubation.17 As illustrated in the article, the elevation required to achieve the ramped position in obese patients is conceptually similar to the use of a pillow for head positioning in adult patients with the technique described by Gouveia.10

Conclusion

Although several new devices and techniques for tracheal intubation have been introduced in recent decades, direct laryngoscopy remains

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a widely used method for tracheal tube insertion and an important technique in airway management training. It has the advantage of allowing direct visualization of the vocal cords while reducing the risk of traumatic intubation when properly performed. A recent Cochrane systematic review and meta-analysis reported high success rates for direct laryngoscopy with a Macintosh blade.[9] Although the sniffing position has traditionally been recommended to facilitate laryngeal visualization, its anatomical basis remains debated. The position of the head on the operating table is fundamental for the use of the laryngoscope, however under normal conditions, most difficult intubations are a consequence of the misuse of the laryngoscope, as observed in several books and on the internet. Many books say that if you have difficulty inserting the tracheal tube, use a guide tube. I learned to use a guide tube in all my intubations. Similarly, appropriately sized pillows (sandbags) or supports may facilitate head positioning. Proper patient positioning on the operating table should therefore be considered an essential initial step in tracheal intubation, particularly in settings where optimal positioning may be more difficult to achieve.

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Conflict of interest

None.

Contribution

None.

Note: This article is dedicated to Marildo Gouveia, who devoted his life to teaching tracheal intubation and regional anesthesia.

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