

Successful difficult airway intubation using the Miller laryngoscope blade and paraglossal technique – a comparison with the Macintosh blade and midline technique

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In anaesthetic practice clinicians are often faced with difficult airway situations. The conventional approach to intubation is the midline technique using a curved Macintosh blade for direct laryngoscopy. However, we have been successful in such a case using old technology and a seldom-used technique. This case raised the question whether older, alternative, methods of tracheal intubation may offer an advantage in airway management above the conventional practice.

During pre-operative evaluation a patient presented with a large visible epiglottis on evaluation of the mouth and oropharynx. On direct laryngoscopy with a Macintosh 3 laryngoscope blade and the midline technique, a Cormack and Lehane grade-3b view was obtained due to the long epiglottis but normal position of the larynx. The Miller 4 blade and the paraglossal technique yielded a Cormack and Lehane grade-1 view and the trachea was successfully intubated using this approach.

Use of the Miller blade and the paraglossal technique provided a perfect view of the glottis. Based on this experience and the findings of several studies on this topic, this approach could be a viable alternative to airway management.

Keywords: difficult airway, Miller blade, Mallampati 0, Macintosh technique, paraglossal technique

Introduction

Tracheal intubation by direct laryngoscopy is practiced daily and use of the curved Macintosh blade is regarded as the gold standard.¹ Pre-operative evaluation of the patient's airway serves to estimate the ease or difficulty a clinician will experience in directly visualising the glottis and achieving successful tracheal intubation. The Mallampati classification (Class 1–4) is used to predict the possibility of a difficult intubation, in combination with other anatomical features. Ezri et al.² suggested the addition of a class zero, where class zero is described as 'visible epiglottis on examination' and that this class would be the easiest to intubate. However, there is literature to support that this is not always the case and that a poor view of the glottis was achieved using standard methods of direct laryngoscopy, resulting in a difficult intubation.^{3,4}

Awake flexible fibreoptic intubation (FFI) is regarded as the gold standard for anticipated difficult intubation and other video-assisted devices have achieved similar results to that of awake FFI.^{5,6} Successful difficult airway intubations have been achieved with the use of a Miller laryngoscope blade (straight blade) and paraglossal technique, achieving Cormack and Lehane views superior to those seen using Macintosh blades.⁷ As early as 1997, Henderson⁸ questioned the role of curved blades for difficult airway intubation and proposed that paraglossal straight blade laryngoscopy should be practiced for use in difficult airway situations.

Case report

A 44-year-old female patient, known with multi fibroid uterus, was scheduled for total abdominal hysterectomy. She had no known comorbidities or previous surgeries. During pre-operative evaluation of the airway the epiglottis was prominently visible on assessing the Mallampati classification – therefore a Mallampati class zero (Figure 1). Middle and left upper incisors were missing. The mouth opening was three finger widths, hyoid-mental

distance was three finger widths and distance from the mouth floor to the thyroid cartilage was two finger widths. The patient did not have any features suggesting difficult mask ventilation.⁹ General and systemic examination was normal.

The patient gave verbal consent to being photographed and was assured that she would not be personally identifiable in any case reports that might follow.

On the day of surgery airway preparations were available for difficult intubation and included the availability of C-MAC[®] video laryngoscopy, flexible fibreoptic and emergency cricothyroidotomy sets. Failed intubation was not anticipated owing to the equipment and expertise in our unit.

The patient was in a supine position with the head raised, flexing the neck and extending the head (sniffing position). Pre-oxygenation was done for five minutes, using a facemask, followed by Propofol induction. Muscle relaxation with Atracurium was done after establishing that ventilation by

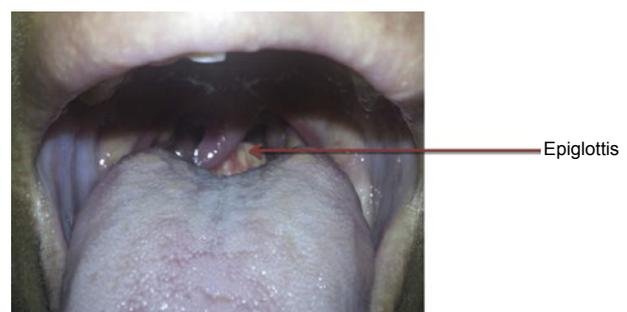


Figure 1: A large epiglottis is seen on mouth and oropharynx inspection

Note: The epiglottis extends to and displaces the uvula.

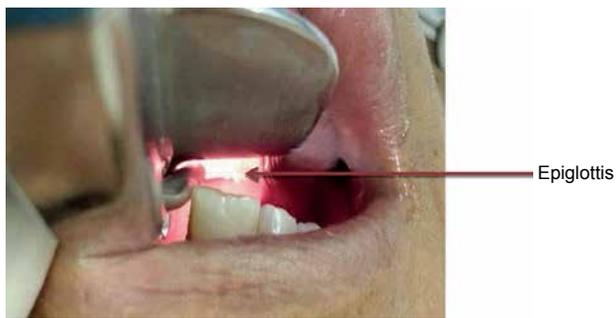


Figure 2: Cormack and Lehane grade-3 view

Note: The classic problem encountered with missing front teeth.



Figure 3: Cormack and Lehane grade 1 view through the Miller blade using the paraglossal technique

facemask was possible. After paralysis was achieved – three minutes following Atracurium administration – intubation was attempted. The midline technique using a Macintosh blade size-3 demonstrated a Cormack and Lehane grade-3b view (Figure 2). Intubation was not attempted. The paraglossal technique was performed using a Miller size-4 laryngoscope blade and provided a Cormack and Lehane grade-1 view of the glottis (Figure 3) and the trachea was successfully intubated, without the need for assistance devices.

The patient was placed on IPPV and maintained with sevoflurane, air and oxygen. Extubation following surgery was uneventful.

Had intubation failed using the Miller blade as well, mask ventilation would have been performed to ensure adequate re-oxygenation of the functional residual capacity (FRC). Following this, an attempt would have been made using a video-assisted device such as C-MAC. Had this failed, a supraglottic device would have been inserted. In any instance, failure to intubate and failure to oxygenate would have prompted a surgical airway, such as emergency cricothyroidotomy. This is in keeping with the Difficult Airway Society algorithm, which allows up to four attempts at laryngoscopy and recommending the use of alternative laryngoscopes.¹⁰

Description of the paraglossal technique for tracheal intubation⁸

All standard airway management pre-requisites must be in place. Following pre-oxygenation, the patient is induced and relaxed by either a depolarising or non-depolarising relaxant. With the head in the sniffing position the mouth is opened and the straight blade inserted in the extreme right corner of the mouth opening.

The blade is advanced under vision paraglossally until the epiglottis is visualised. The tip of the blade is then advanced further to a position posterior to the epiglottis. Thereafter the blade is lifted to expose the glottis and tracheal intubation may be performed.

Discussion

Paraglossal technique using a Miller blade has proven efficacy and may provide views that are superior to those achieved with the curved Macintosh blade and the midline technique. In a series published by Agrawal et al.⁷, Cormack and Lehane grade-1 views were achieved in all five cases of predicted difficult intubations (Mallampati class 3–4 with oropharyngeal lesions present), using the former approach. Grade-3 or -4 views were achieved using the latter in the same patients, suggesting that intubation would have been difficult or impossible without the use of the Miller blade and paraglossal technique. The authors also state that ENT surgeons rarely fail in direct laryngoscopy using their straight laryngoscopes, further supporting the use of straight blades for direct laryngoscopy and intubation.

These findings are not new, as Henderson⁸ published his experiences based on a series of ten cases in 1997. The patients in the series all presented with a Mallampati class-3 on examination. Direct laryngoscopy using the Macintosh technique provided Cormack and Lehane grade-3 or -4 views. Subsequent attempts with the paraglossal technique and Miller blade improved the Cormack and Lehane grading to grade-1 in all cases. Henderson recommends that clinicians be confident with both approaches to have an alternative should one fail in tracheal intubation.

A publication from 2011 investigating the advantage of C-MAC video laryngoscopy also reported improved results with the Miller technique using the straight C-MAC blade.¹¹ These authors concluded that in patients with suboptimal glottic views (Cormack and Lehane > 2) the straight blade technique might reduce the number of grade-3 and -4 views.

In addition to the improved glottic views offered by the technique, Huang et al.¹² published a series in which they reported the prevention of dental damage during the intubation of three patients with poor dentition by using the paraglossal technique.

There are limitations to the paraglossal Miller approach, such as reduced space to manipulate the endotracheal tube when the blade is in the right paraglossal position. This can be overcome by asking an assistant to pull the mouth opening laterally or by shifting the position of the blade more central once a sufficient view has been achieved.⁸ The straight line of sight provided by the blade ensures a continuous view of the larynx as long as the tip remains in position. The patient's head and mouth can be manipulated to accommodate the passage of the endotracheal tube. Assistance devices such as a bougie may be of use, however, in this case the technique described by Henderson⁸ allowed us an easy intubation despite the curved shape of an oral ET tube, with minimal visual obstruction of the glottic opening.

In conclusion, the experience gained from our case correlates with that of these authors. This technique definitely offers an advantage in terms of difficult intubation management, where the Macintosh midline technique has failed. We do not believe it is necessary to abandon the Macintosh approach as it is well known, widely practiced and clinicians should use an approach that they are comfortable with. However, should a first attempt at intubation fail, certain anatomical findings may warrant changing

the blade during a second attempt.¹³ The advantage offered by another blade must then be augmented by an effective technique for that blade. Therefore we recommend that clinicians practice the paraglossal technique using the Miller blade to obtain the confidence necessary to use this approach when intubation by the conventional approach has failed.

This alternative approach may yield results comparable to that of video laryngoscopy in terms of Cormack and Lehane views, with the benefit of being less expensive, but further study is needed to support this claim.

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Received: 20-02-2014 Accepted: 19-06-2014