Management Of A Difficult Airway Assisted By The Use Of A Combination Of Fibreoptic Bronchoscope And Gum Elastic Bougie

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Citation

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Abstract

Both the fibreoptic bronchoscope and the gum-elastic bougie are widely used in the management of a difficult airway [1, 2]. To our knowledge there are no published reports of using these airway tools in combination to change a nasotracheal tube to an orotracheal tube. We report a technique using the combination of a fibreoptic bronchoscope and gum-elastic bougie to change a nasotracheal tube to an orotracheal tube in a morbidly obese patient with a difficult airway. The gum-elastic bougie was guided by the fibrescope alongside the nasotracheal tube and advanced into a left sided small bronchus. Position of the bougie was confirmed by passing the fibreoptic bronchoscope through the nasotracheal tube. The orotracheal tube was then railroaded over the bougie. The rationale for using this technique over other options available in this case is discussed.

CASE REPORT

A 50 year old man with an estimated weight of 190 kg and BMI 65 was admitted to our critical care unit via accident and emergency (A & E) department with a history of shortness of breath. His past medical history included controlled hypertension, non-insulin dependent diabetes, chronic renal impairment and hypercholesterolemia. He gave a history strongly suggestive of sleep apnoea but this had never been formally diagnosed.

His diagnoses were pneumonia, sepsis and acute-on-chronic renal failure. He rapidly developed type 2 respiratory failure (P_aCO_2 7.1 KPa on admission, rising to 12 KPa within half an hour). Non-invasive ventilation was tried, but did not improve his clinical condition and his Glasgow Coma Score decreased from 14/15 to 10/15. He underwent repair of a paraumbical hernia 3 years ago and the anaesthetic records showed that he was a difficult intubation with laryngeal view grade IV (Cormack and Lehane classification).

Given his rapid decompensation, potential difficult airway and full stomach, a secure airway was a priority. It was decided to perform an awake, fibreoptic endoscopic guided, nasotracheal intubation. 4% cocaine paste was applied to both nostrils and the fibreoptic bronchoscope was introduced through the right nasal cavity. The oropharynx was sprayed with 3ml of 10% lidocaine and the nasopharynx and vocal cords were sprayed with 2% lidocaine through the fibreoptic scope. A size 6.0 ID nasotracheal tube was guided into the trachea and the cuff was inflated. The position of the tube was verified by fibreoptic bronchoscopy and end-tidal CO_2 monitoring. Sedation (Propofol and Alfentanil), paralysis (Atracurium) and ventilatory support were started. The patient remained stable throughout the procedure. His peak airway pressure was around 40 cmH_2O. Aggressive medical therapy was initiated in an attempt to reverse his disease and allow early extubation, however, this proved ineffective.

After seven days of nasal intubation a leak developed around the nasotracheal tube, his tidal volumes dropped and it was getting increasingly difficult to ventilate him although his gas exchange remained stable. Direct laryngoscopy was performed using Macintosh laryngoscope with size 4.0 blade followed by McCoy laryngoscope, which showed marked oropharyngeal oedema. Despite routine manoeuvres to try and improve the view at direct laryngoscopy it proved impossible to visualise the nasotracheal tube passing between the vocal cords.

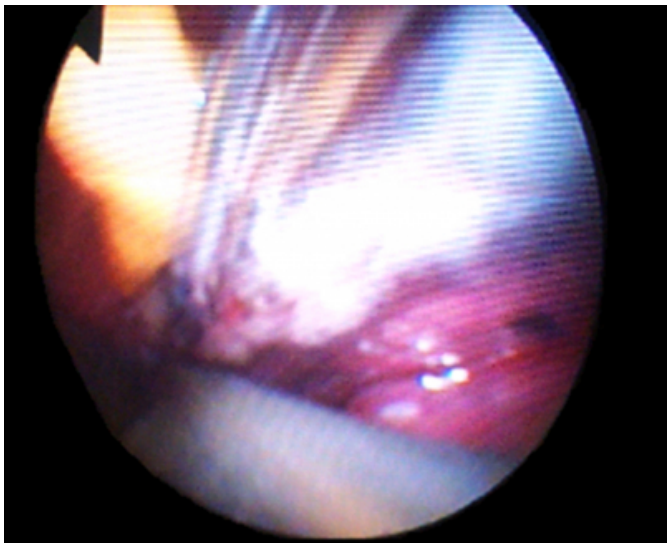
Management of the airway at this stage was even more challenging. Several options, discussed below, were considered and discarded. We used the fibreoptic endoscope and gum-elastic bougie in combination to change his nasotracheal tube to an orotracheal tube. Whilst still sedated

and paralysed, the patient was ventilated with $FIO_2$1.0 for 15 minutes prior to the procedure, producing an arterial oxygen saturation of 97%.

The fibreoptic bronchoscope was introduced orally and the nasotracheal tube visualised. A single use 14 French gauge (5 mm) gum-elastic bougie was passed into the mouth and advanced alongside the tracheal tube through the vocal cords under vision through the bronchoscope (Figure 1).

Figure 1

Figure 1: Gum-elastic bougie advanced through vocal cords with fibreoptic guidance.



Once the bougie was in place, the bronchoscope was removed and introduced through the nasotracheal tube. The position of the bougie within the trachea was re-confirmed (Figure 2). The bougie was further advanced until resistance was met. Its subcarinal position in a left sided small bronchus was confirmed by the bronchoscope (Figure 3).

Figure 2

Figure 2: Tracheal position of gum-elastic bougie confirmed with fibreoptic bronchoscope in the nasotracheal tube.

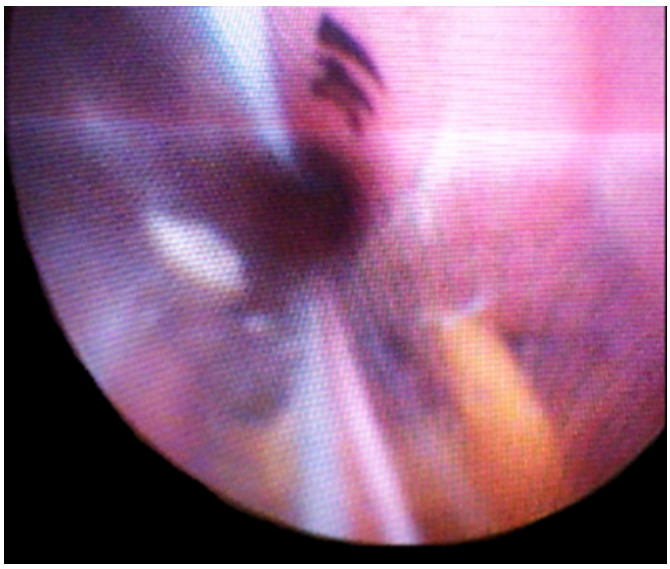
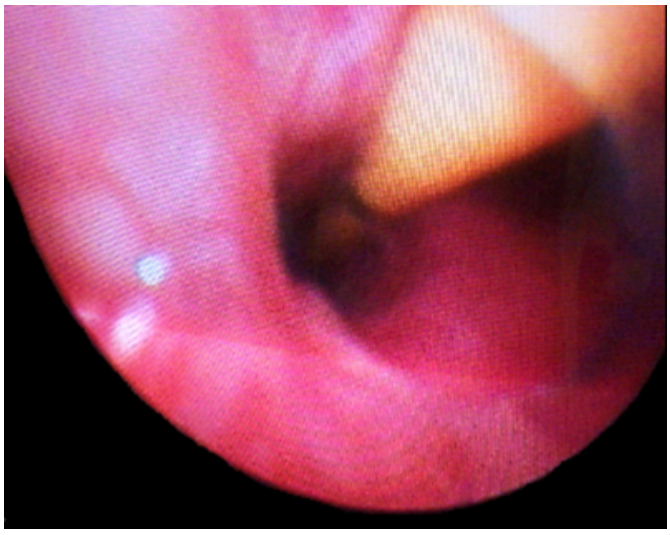


Figure 3

Figure 3: Subcarinal position of gum-elastic bougie confirmed with fibre-optic bronchoscope.

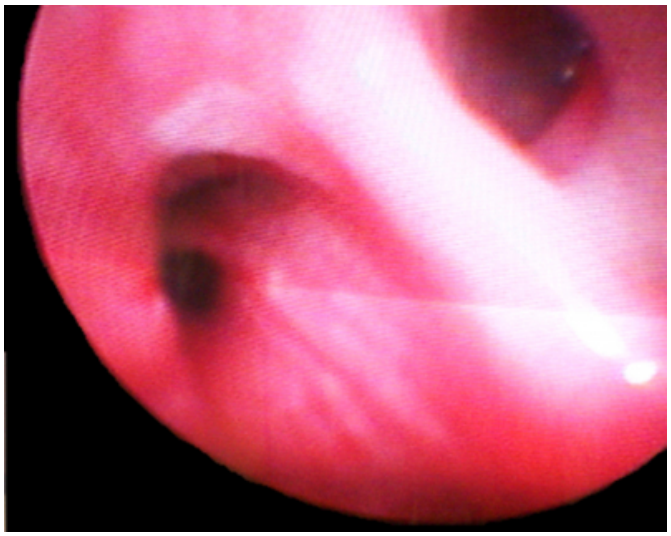


The bougie was manually stabilised in place. The resultant length of the gum elastic bougie was sufficient to permit safe withdrawal of the nasotracheal tube and the fibreoptic bronchoscope. A size 8.0 ID Portex cuffed orotracheal tube was introduced into the mouth over the bougie, which was sufficiently long to allow a length of bougie to protrude from the connector end of the orotracheal tube. Both the nasotracheal tube and bronchoscope were removed and the orotracheal tube was railroaded into position assisted by the use of a 4.0 Macintosh laryngoscopic blade. Ventilatory support was recommenced immediately after the intubation.

There was a decrease in oxygen saturation (SaO_2) for approximately 30 seconds, the lowest recorded being 76%. Finally, the position of the oral endotracheal tube was confirmed by auscultation of the chest, end-tidal CO_2 monitoring and by visualisation of carina using fibreoptic bronchoscope introduced through the oral endotracheal tube (Figure 4).

Figure 4

Figure 4: Position of oral endotracheal tube confirmed with fibreoptic bronchoscopy.



Our back up airway management plan included Laryngeal mask airway (LMA) and Intubating LMA insertion and cricothyrotomy all of which carried a high risk of failure. The patient died of sepsis with multisystem organ failure 10 days later.

DISCUSSION

Obese critically ill patients have poor prognosis partly related to increased problems with their airway management [3]. Although nasotracheal intubations are uncommon in critical care units, we initially intubated our patient nasally. At the time this was felt to be the safest option given his morbid obesity, short neck, poor range of neck movements, previous documented grade IV laryngoscopy (Cormack and Lehane classification) [4] and rapid decompensation. Upon the subsequent development of problems with ventilation and the leak around the nasotracheal tube an alternative secure airway was needed.

Change to a tracheostomy tube would have been our number one choice. Percutaneous tracheostomy has been described in the obese [5] but was considered too risky due to the neck anatomy. After consultation with and assessment by the ENT team, a surgical tracheostomy was ruled out for the same reason.

Repeat nasotracheal intubation was discounted because of the high risk of complications of long term nasotracheal intubation [6, 7] and the fact that it would have been near impossible to physically place a larger nasotracheal tube through the nostril.

Orotracheal intubation under direct laryngoscopy was not attempted for the reasons given above. Standard Laryngeal Mask Airways [8], Intubating Laryngeal Mask Airways [9] and Proseal LMAs [10] have all been used in obese patients. They were not used in this case as this would have had involved removing the nasotracheal tube before success of ventilation with the LMA could be assured. In addition, the oropharyngeal oedema would have made successful placement less certain.

Other airway devices including the combitube [11] and laryngeal tube [12] that have been employed in obese patients were unavailable to us.

We therefore settled upon the combination technique described above to obtain an orotracheal airway. To our knowledge use of the fibreoptic bronchoscope and gum-elastic bougie in tandem is not described for the management of difficult airways.

We were concerned about the inadvertent displacement of the bougie from the trachea to the posterior pharynx while withdrawing the nasotracheal tube and the bronchoscope. The bougie was advanced as far as it went without resistance (distal hold up sign) [13]. Placing the bougie in a small bronchus assured the necessary depth to allow safe withdrawal of both the nasotracheal tube and the fibreoptic bronchoscope. There are no reports of lung perforation with subcarinal placement of multi-use gum elastic bougies. This is probably due its angulated tip that does not reach distal bronchi thus reducing potential for lung trauma [14, 15]. This is a well recognised risk with Cook Airway exchange catheters [16]. We do also recognise that having a correctly placed gum-elastic bougie does not guarantee the ability to successfully pass a tracheal tube. However, this is usually not a problem [17].

We suggest that before changing a nasotracheal to an orotracheal tube, laryngoscopy should be performed to look for oropharyngeal oedema and expected grade of intubation. We recommend our technique to minimise risk of losing

airway control while changing a nasotracheal tube to an orotracheal tube in patients with difficult airways.

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