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CASE STUDY

Nasal intubation of a difficult airway following supraglottic airway rescue facilitated by video laryngoscopy and a flexible intubation scope

A Ramkisson*, RE Hodgson

Inkosi Albert Luthuli Central Hospital, University of Kwa-Zulu Natal, eThekwini-Durban, KwaZulu Natal, South Africa
**Corresponding author, email: aramkisson@gmail.com*

The management of a patient following airway rescue with a supraglottic airway (SGA) is debatable. This report describes a case of successful orotracheal intubation via a SGA used for airway rescue after a "Can't Intubate, Can Ventilate" (non-emergency) airway scenario. Surgery required nasotracheal intubation so the second part of the case report describes the exchange of an orotracheal tube to a nasotracheal tube with a proved difficult laryngoscopy. The technique required three anaesthetists, two flexible intubation scopes, a videolaryngoscope and the Aintree intubation catheter (AIC). The case illustrates the technique of securing the required type of tracheal tube to facilitate surgery as an alternative to waking up the patient and postponing surgery.

Keywords: intubation via supraglottic airway device, aintree intubation catheter, flexible intubation scope

Introduction

A 31-year-old female presented for an elective anterior mandibular resection and plate insertion for a follicular ameloblastoma. She had undergone four previous procedures to excise the tumour due to persistent recurrences. The features of a difficult airway including four previous mandibular resections, a hair-weave and obesity, were noted but, with appropriate positioning, were not considered a contraindication to elective sequence induction.

Methods

Intubation

The airway plan was an asleep nasal intubation with direct laryngoscopy.

The patient was positioned with head elevated (to 20 °) laryngoscopy position (HELP) while her head rested on an adult head-ring. The hair-weave limited head extension.

The patient was pre-oxygenated with 80% oxygen for three minutes before an intravenous induction with propofol, fentanyl and rocuronium. Bag mask ventilation (BMV) with a two handed technique and size 3 oropharyngeal airway (OPA) was not difficult. Oxymetazoline nasal drops were administered bilaterally.

On insertion of the nasotracheal tube (NTT) into the right nostril, resistance was encountered at the level of the turbinates, which was overcome with a gentle rotational force. On direct laryngoscopy, blood was visualised in the oropharynx. The oropharynx was suctioned but there was a poor laryngeal view (Cormack and Lehane grade three). The patient then desaturated from 98% to 89%.

The NTT was then removed to get an adequate seal for BMV but the nasal bleeding continued. Attempts to rescue the airway had the following outcomes:

- Both BMV with two handed technique + OPA, and laryngeal mask airway using the LMA Unique™ failed.
- The patient desaturated to 68% and help was sought.
- The LMA was a size four and was deemed too small but a size five LMA provided adequate oxygenation and ventilation.

A team discussion then ensued on how to proceed. Two options were identified:

- Wake the patient up as the surgery was elective
- Plan for intubation with a NTT to facilitate surgery

A decision was taken to plan for nasal intubation.

Specialised airway equipment requirements identified were:

1. Aintree intubation catheter (AIC) with bronchoscope adapter (Cook Medical, P.O. Box 489, 750 Daniels Way, Bloomington, IN 47402-0489, USA)
2. Paediatric (2.5 mm diameter) flexible intubation scope (pFIS) (Karl Storz, 34 Dr.-Karl-Storz-Strasse, Tuttlingen, 78532, Germany)
3. Adult (4 mm diameter) flexible intubation scope (aFIS) (Karl Storz, 34 Dr.-Karl-Storz-Strasse, Tuttlingen, 78532, Germany)
4. Videolaryngoscope (VL)-Glidescope® (Verathon Inc., 20001 North Creek Parkway, Bothell, WA 98011, USA)

Figure 1. AIC with circuit connector[1]

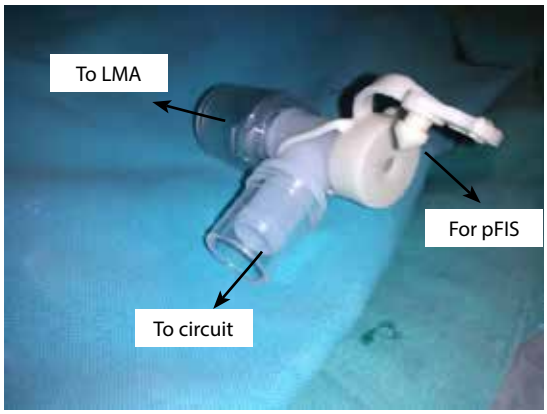

Figure 2. Bronchoscope adapter illustrating access ports

Procedure

1. The anaesthetic circuit with bronchoscope adapter was attached to the LMA.
2. The AIC was loaded onto the pFIS.
3. The pFIS was inserted via bronchoscope adapter and LMA into the trachea.

Figure 3. Insertion of AIC via LMA using bronchoscope adapter and pFIS[2]

4. The AIC was railroaded into the trachea via pFIS.
5. LMA and bronchoscope adapter were removed leaving only AIC in-situ.

Figure 4. AIC in-situ [3]

6. A size 6 endotracheal tube (ETT) was railroaded over AIC into the trachea.
7. The AIC was removed and ventilation commenced via the ETT.
8. The size 6.5 NTT was loaded onto the aFIS.
9. The aFIS was advanced through the left nostril.
10. Due to epistaxis a poor view was obtained via the aFIS.
11. The VL was inserted and the aFIS was observed on VL screen.
12. The aFIS was advanced under VL vision until the tip was directly above the vocal cords .
13. The AIC was reinserted into the oral ETT and the oral ETT was then removed.

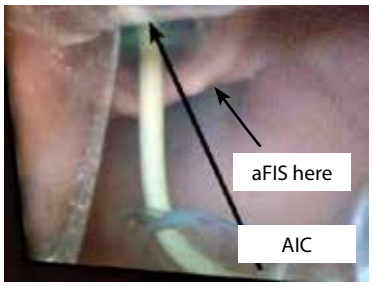

Figure 5. AIC insitu following ETT removal

14. The aFIS was then advanced into the trachea under VL vision.
15. The NTT was advanced into the trachea under VL vision while a view of the tracheal rings was maintained on the aFIS.
16. The AIC was removed once the NTT was confirmed to be in place.

Problems experienced

- **Difficulty passing pFIS through the LMA**

This was experienced due to the presence of aperture bars and the posterior rim of plastic created by the aperture bars.

This problem was also due to continued bleeding into the oropharynx and the inability to suction using the small-diameter pFIS.

- **Difficulty advancing the AIC via the pFIS through the LMA**

Figure 6. Posterior rim of plastic on LMA

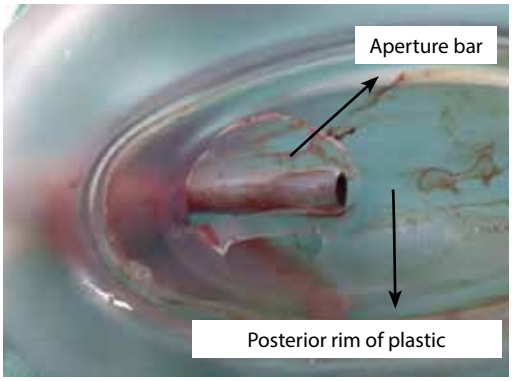

Figure 7. Aperture bars and posterior rim of plastic on LMA

Although the pFIS acted as a conduit for advancement of the AIC, this was still difficult as the AIC abutted against the posterior rim of plastic creating an obstruction to successful passage of the AIC into the trachea.

Figure 8. AIC eventually passed through LMA

Results

NTT placement was confirmed clinically and with capnography.

Surgery proceeded uneventfully.

The posterior mandibles were wired by the surgeon.

Extubation

Reversal with neostigmine and glycopyrrolate was administered.

The patient awoke and was obeying commands.

A 3.7 mm airway exchange catheter (AEC) (Cook Medical, P.O. Box 489, 750 Daniels Way, Bloomington, IN 47402-0489, USA) was inserted via the nasal ETT.

Placement was confirmed via capnography.

The patient was extubated with the AEC in situ.

Recovery

The AEC was strapped to left side of face. The patient maintained airway patency and a saturation at 97% on room air for 15 minutes after which the AEC was removed.

The patient was discharged to the ward after a further 30 minutes.

Discussion

The difficulty experienced in securing the airway was largely due to the traumatic nasal intubation. The patient's hair-weave contributed significantly by limiting atlanto-occipital extension.[4]

Figure 9. Patient's hair weave

The surgery was elective, allowing the option of awakening the patient and rebooking as recommended by the Difficult Airway Society (DAS) guidelines.[5] However, the logistical difficulties experienced by patients in getting to hospital and being booked for surgery played a role in the decision to proceed with the case.

The airway technique used does require expertise and special equipment that may not be freely available. The AIC serves as a means of oxygenating and ventilating the difficult airway while simultaneously providing a conduit for intubation.[6] The AIC is an important safety device when securing the difficult airway in Ear, Nose and Throat; and Maxillofacial operations.[7]

The AIC is a type of airway exchange catheter (AEC) that has been adapted from a range of AECs.

The important differences between the AIC and AEC are[8]:

- AIC is 56 cm long and has a larger and fixed internal diameter (4.7 mm) which can be preloaded onto a pFIS
- AECs are longer than 56 cm, available in smaller and varying internal diameters than the AIC and therefore cannot be preloaded onto a pFIS

The difficulties experienced during the technique were challenging and a better option for intubation through a SGA device would have been a second generation SGA device without the aperture bars found in the LMA Unique™. Such examples include the Air Q® (1101 Lucas Ave. Ste 200 Saint Louis, MO 63101-1159), the iGel™ (Wokingham, Berkshire United Kingdom, RG41 2RZ) and the Ambu® Aura-I™ (Baltorpbakken 13 DK-2750 Ballerup).

Figure 10. I-GEL™ [9]

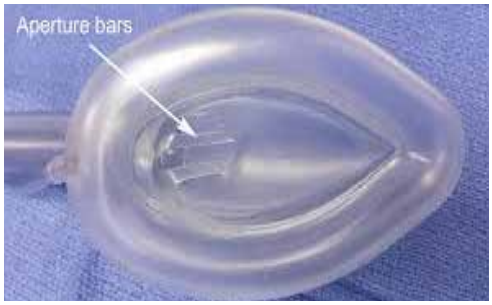

Figure 11. LMA Unique™ with aperture bars [2]

The decision to use the aFIS raises questions as the airway was bloody. We chose to use the aFIS for the following reasons:

- Primary use as a manoeuvrable bougie without a requirement for vision but ideal for manoeuvring the naso-tracheal tube under the vision of the VL
- Secondary uses:
  - visualisation of the entire airway (from nasal passage to trachea)
  - decreases the risk of further traumatising the nasal airway
  - provides a conduit for intubation where the glottic opening was now reduced following placement of the AIC in the trachea and potential airway oedema

Using the aFIS and VL concurrently provided dual visualisation of the airway, which is not always possible depending on the type of aFIS used. This allows for more than one operator to visualise the airway and the subsequent management thereof.

Three anaesthetists were available to undertake this technique, however the goal could have been achieved with two anaesthetists, but no fewer.

Informed consent was taken for photographs of the patient that maintained patient anonymity.

Conclusion

The described technique was achieved with an airway expert, an anaesthesiologist and an anaesthetic registrar in addition to various specialised airway equipment but was a safe and effective way in securing the airway, promoting skills transfer and facilitating surgery.

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Dr Kroshlan Kisten

Conflict of interest

None

ORCID

A Ramkisson https://orcid.org/0000-0002-9471-2441

RE Hodgson https://orcid.org/0000-0002-2861-4042

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