Peer Review File

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Review Comments

Comment 1:
Introduction:
I recommend adding newer references to the first statement about head and neck cancer patients:
Examples: Endlich Y, Beckmann LA, Choi SW, Culwick MD. A prospective six-month audit of airway incidents during anaesthesia in twelve tertiary level hospitals across Australia and New Zealand. Anaesth Intensive Care. 2020 Sep;48(5):389-398. doi: 10.1177/0310057X20945325. Epub 2020 Oct 8. PMID: 33104443.

Reply 1:
We thank the reviewer for their constructive and helpful suggestion and added the following new references as suggested.

> It is widely established that difficulties with airway management are more likely to be encountered in head and neck patients (4,5,6,7).
>
> 6. Bryan YF, Morgan AG, Johnson KN, et al. Procedural challenges during intubation in patients with oropharyngeal masses: a prospective observational study. Anesth Analg 2019;128:1256-63.
> 7. Endlich Y, Beckmann LA, Choi SW, Culwick MD. A prospective six-month audit of airway incidents during anaesthesia in twelve tertiary level hospitals across Australia and New Zealand. Anaesth Intensive Care 2020;48:389-98.

Comment 2:
Pg 4, row 118/9:
Ultrasound assessment has been recommended as well. There are also newer references for nasendoscopy assessment. In addition, virtual endoscopy is a new valuable technique for the planning of airway management in complex head and neck patients.

Reply 2:

Again, we'd like to thank the reviewer for their comments and have updated the relevant text and references as suggested.

> Review of investigations including magnetic resonance or computed tomography imaging of the airway (with 3-dimensional reconstruction and/or virtual 3D endoscopy if available) (19,20) and recent flexible nasendoscopy is strongly advised (4,21,22,23).

19. Ahmad I, Keane O, Muldoon S. Enhancing airway assessment of patients with head and neck pathology using virtual endoscopy. Indian J Anaesth 2017;61:782-6
20. El-Boghdadly K, Onwochei DN, Millhoff B, Ahmad I. The effect of virtual endoscopy on diagnostic accuracy and airway management strategies in patients with head and neck pathology: a prospective cohort study. Canadian Journal of Anesthesia 2017;64:1101–10.
22. Gemma M, Buratti L, Di Santo D, et al. Pre-operative transnasal endoscopy as a predictor of difficult airway: A prospective cohort study. Eur J Anaesthesiol 2020;37:98-104.
23. Law JA, Duggan LV, Asselin M, et al. Canadian Airway Focus Group updated consensus-based recommendations for management of the difficult airway: part 2. Planning and implementing safe management of the patient with an anticipated difficult airway. Can J Anaesth 2021;68:1405-36.

Comment 3:
General: Recommend not using brand names unless one device is specifically prioritised over another device (e.g. Ovasappian pg 8, row 258)

Reply 3:
We thank the reviewer for this comment and have now made the following change:

> An oral airway designed to maintain the flexible
>
> bronchoscope in a midline position and facilitate navigation over the tongue may be helpful (40).

Comment 4:
In general:
The authors describe advanced airway management techniques, however, using incorrect terminologies or directions for the techniques.
For example:

Row 290:
instead of (video-assisted fibreoptic, VAFI) recommend using the correct technical term: 'video-assisted flexible intubation, VAFI)
VAFI technique should be explained better:
The operators are NOT observing the view of both screens simultaneously.聽
The aim of this technique is to the view of the VL for intubation and the flexible scope as a stirrable bougie. After intubation, the position is confirmed using the view of the flexible scope identifying the tracheal rings.

Reply 4:
We thank the reviewer for this comment regarding VAFI and have removed the term VAFI altogether from the manuscript and have clarified our description of the technique as follows:

> Most commonly, a hybrid approach involves using a videolaryngoscope with a flexible bronchoscope or a video stylet. The videolaryngoscope provides a wide-angle view of the laryngeal anatomy and facilitates navigation of the flexible bronchoscope or video stylet (with their narrow fields of view) acting as a steerable introducer to the glottic opening. This may allow placement of the tracheal tube from both above and below the vocal cords to be observed.

Comment 5:
Retrograde tracheal intubation:
The authors have probably never performed a retrograde technical intubation; otherwise, they would know that:
- railroading the tube over the guidewire does not work
- there are many little steps and pitfalls in that technique
- the guidewire needs to be secured using a clamp at the front of the neck
- complications with this technique might be major if not performed correctly and with experience

Reply 5:
We understand the point raised by the reviewer but would respectfully disagree with some of the points. There are multiple published descriptions of how to perform a retrograde tracheal intubation and we have attempted to summarise the key generic steps without favouring one specific technique over another or describing our personal experience of the technique.

We have clarified our description of the use of the guidewire to enable tracheal tube delivery.

We have not described the potential complications of retrograde tracheal intubation since our own local experience as well as that of published complications suggest these to be minor.

This section has been updated as follows:

> Retrograde tracheal intubation is usually a technique that is reserved for patients whose upper airway anatomy is extremely distorted and standard anatomical landmarks are unrecognisable. There are multiple published descriptions of how to perform a retrograde tracheal intubation and these are summarised elsewhere (69). The basic steps of the technique include: Initial identification of the cricothyroid membrane, which can be aided by ultrasound scanning, particularly when anatomical landmarks are not easily palpable (70); needle puncture of the cricothyroid membrane, to allow passage of a retrograde guidewire; advancement of the guidewire in a cephalad direction until it emerges from the upper airway; delivery of the tracheal tube into the trachea, which can be facilitated by using a variety of techniques, including using an airway exchange catheter or passing the guidewire through the distal end of the working channel of a flexible bronchoscope; or utilisation of the guidewire as a visual guide to the laryngeal inlet. Complications associated with the technique are usually minor (69).
>
> 69. Dhara SS. Retrograde tracheal intubation. Anaesthesia 2009;64:1094-104.
> 70. Kristensen MS, Teoh WH, Rudolph SS. Ultrasonographic identification of the cricothyroid membrane: best evidence, techniques, and clinical impact. Br J Anaesth 2016;117:i39-48

Comment 6:

Tracheostomy:

The authors state it might be indicated in a small portion of patients. How do they define 'small portion'?

The authors mention ultrasound to identify the landmarks beforehand. Do they have a reference for that?

The authors do not mention the risk of airway fires once but mention the use of HFNO.

An awake tracheostomy does not equate to a tracheostomy using sedation.

Reply 6:

We thank the reviewer for their constructive and helpful suggestion and have made the following changes:

- We have removed the statement regarding ‘small portion of patients’ and have included a statement regarding the scarcity of published literature describing the incidence of this strategy.
- We have added a reference for ultrasound identification of the landmarks.
- We have amended the text to include a statement about the risk of airway fire.

We politely disagree with the reviewer regarding sedation in the context of an ‘awake’ tracheostomy. In the same way that sedation may be a component of awake tracheal intubation (as described in the DAS guidelines), there are a number of published reports describing the use of sedation in awake tracheostomy procedures (indeed the reference we have cited for airway fire during awake tracheostomy using HFNO).

> An awake tracheostomy may be indicated as the primary or secondary airway management plan in patients with significant airway pathology, in whom the chances of successful ATI are deemed to be low. Reports in the literature of awake tracheostomy as an airway strategy in patients undergoing oral cancer surgery when other techniques are not feasible or have failed are scarce. In general, the favoured technique in this situation is a surgical tracheostomy however a percutaneous tracheostomy may be used depending on the personal preference of the surgeon. This is likely to be a high-risk procedure and the patient should be counselled appropriately.
>
> Ultrasound scanning may aid landmark identification of the proposed tracheostomy site as well as any overlying blood vessels (71). Awake tracheostomy should be performed following local anaesthetic infiltration. If local anaesthetic has been used for a recent failed ATI attempt, this should be factored into the local anaesthetic toxic dose calculation. HFNO can be used during the tracheostomy procedure to try to maintain oxygenation. It is important for the theatre team to remain vigilant to the risk of fire when using surgical diathermy in the presence of HFNO and minimise this risk where possible (72). Whilst sedation is not essential (and may not be recommended), judicious administration can often help improve the patient’s tolerance of the procedure. The use of a variety of sedative agents has been described in case reports and case series (73,74,75,76,77). In keeping with the Difficult Airway Society guidance for minimal sedation in ATI, a target controlled infusion of remifentanil can be very effective in this context, especially when combined with a team member specifically allocated to maintaining verbal contact and providing reassurance to the patient throughout the procedure.

71. You-Ten KE, Siddiqui N, Teoh WH, Kristensen MS. Point-of-care ultrasound (POCUS) of the upper airway. Can J Anaesth 2018;65:473-84.
72. Adams TRP, Ricciardelli A. Airway fire during awake tracheostomy using high-flow nasal oxygen. Anaesth Rep. 2020;8:25-7.

Comment 7:
In general, 2:
The authors make various statements that are not supported by any references. E.g. Paragraph about the choice of intubation technique

Reply 7:
We thank the reviewer for this comment. We have made the text clearer and where available, references to support statements have been added.

> There are a number of options available to achieve tracheal intubation and each clinical situation requires a bespoke multidisciplinary airway management strategy. Table 1 provides a summary of the main options for tracheal intubation in patients undergoing oral cancer surgery and summarises some of the factors that may influence choosing one technique over another. Published literature in this area is of generally low-quality since it is not straightforward to compare one technique to another. The decision to proceed with a specific technique will be primarily influenced by the patient, the underlying pathology and its impact upon airway anatomy, the availability of appropriate equipment as well as the experience and expertise of the anaesthetist and the multidisciplinary airway team present (4). Local culture and practice heavily influence choice of technique and consequently there may be institutional variation in management of similar cases (79). Other considerations relating to equipment include the ease of use, speed of setup and the type of view that will be obtained. The learning curve and skill acquisition associated with the use of any technique or device is affected by many factors (80). Some techniques, whilst novel, are easy to learn and perform because they are based on using existing and established cognitive and manual dexterity skills (e.g., AVL) (81). This is in contrast to techniques which rely upon unique device handling or viewing anatomy from a different perspective (e.g., flexible bronchoscopy or video stylet). Such techniques may not be used frequently, and thus are likely to be associated with slower achievement of proficiency combined with rapid skill attrition (82,83). Regular simulation and workshop training to practice,

maintain and improve airway management skills for these less regularly used techniques are likely to be crucial to successful performance when needed (82,83,84).

79. Cook TM, Morgan PJ, Hersch PE. Equal and opposite expert opinion. Airway obstruction caused by a retrosternal thyroid mass: management and prospective international expert opinion. Anaesthesia. 2011;66:828-36.
80. Myatra SN, Kalkundre RS, Divatia JV. Optimizing education in difficult airway management: meeting the challenge. Curr Opin Anaesthesiol. 2017;30:748-54.
81. Hodzovic I, Bedreag O. Awake videolaryngoscope - guided intubation - well worth adding to your skill-mix. Rom J Anaesth Intensive Care. 2019;26:5-7.
82. Boulton AJ, Balla SR, Nowicka A, et al. Advanced airway training in the UK: A national survey of senior anesthetic trainees. J Anaesthesiol Clin Pharmacol 2019;35:326-34.
83. Law JA, Thana A, Milne AD. The incidence of awake tracheal intubation in anesthetic practice is decreasing: a historical cohort study of the years 2014-2020 at a single tertiary care institution. Can J Anaesth 2022;26:1-10.
84. Baker PA, Weller JM, Greenland KB, et al. Education in airway management. Anaesthesia. 2011;66:101-11.

Comment 8:
The authors make no comments about different types of ETT that might benefit specific head and neck cancer patients and their airway management. For example, there might be indications for a re-inforced ETT, an ETT with a flexi tip, or a bull-eye or left-facing bevel. No mention is made of which ETTs to use for submental intubations. No mention of sizing of tracheostomies and safety preparations.

Reply 8:
We thank the reviewer for their constructive and helpful suggestion and have added to the section on tracheal tubes:

> The type of tracheal tube selected is dependent upon surgical requirements, local practice and the anaesthetist's preference. Common choices include Ring, Adair and Elwyn (RAE) tracheal tubes for nasal intubations and reinforced tracheal tubes which may be used for oral or nasal intubations. RAE tubes maintain a fixed contour similar to the average facial profile thus allowing for oral cavity surgery whilst minimising surgical field interference from bulky connections between the tube and ventilator circuit. However, RAE tubes are associated with an increased risk of bronchial intubation because of their preformed shape (32), so appropriate

> vigilance should be exercised to ensure optimum placement. With nasal tubes, specific attention should be taken to secure the tube in a position that minimises the risk of pressure injury on the naris. Reinforced tracheal tubes are designed to be flexible and to resist kinking and compression - these properties make them particularly suitable for oral cancer surgery since the tube and circuit can be easily secured and draped away from the operating field. An important caution with reinforced tubes is the risk of excessive pressure to the wire-reinforced component causing permanent partial or total occlusion of the internal lumen of the tube (33,34).
>
> For tracheal intubation techniques that rely on railroading of the tracheal tube into the trachea, specific tube characteristics (e.g. material, internal and external diameters, shape, tip design) may minimise the risk of tube impingement at the laryngeal inlet and thus contribute to the success of the technique. For example, the Parker Flex-Tip (Bridgewater, CN, USA) has a curved, centred, tapered, flexible distal tip with a posterior facing bevel. These features are intended to decrease the risk of the tube tip impinging on laryngeal structures during railroading by reducing the size of the gap between the introducer device and the inner wall of the tube compared to a conventional polyvinylchloride tracheal tube (35,36,37,38). For similar reasons, using the smallest appropriate external diameter tracheal tube is also recommended (39,40).

With respect to tracheostomy tubes, we have added this additional information to the text:

> There are no widely accepted recommendations for sizing of tracheostomy tubes (131). However, appropriate sizing is important to minimise the risk of inadequate ventilation, tube dislodgement, cuff leaks, and bleeding. Tracheostomy tube choice is influenced by a number of factors including gender, body habitus, existing tracheal tube size, and a need for the distal tip of the tube to be positioned 2-4 cm proximal to the carina. If available, existing computed tomography imaging of the thorax may be used to help select the appropriate size of tracheostomy tube (132).