Plan D: cannula first, or scalpel only?

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Editor—The Difficult Airway Society (DAS) intubation guidelines working group should be commended for producing their new set of guidelines.1 There are many aspects of the revised Plans A, B and C which improve upon the 2004 guidelines. However, we have concerns regarding the reasoning behind, and recommendations in, what is in effect a ‘scalpel only’ Plan D recommendation. It would be convenient if the evidence unequivocally supported the simplification of the CICO pathway as produced, but this is not the case. We hope sharing our concerns with the anaesthetic community will facilitate further discussion and lead towards what we would feel is a more rounded Plan D approach.

The DAS guidelines attempt to reduce decision-making in a time-critical CICO scenario. This may remove ‘analysis paralysis’2 and aid transition to performing CICO rescue techniques. However it is also important that this is achieved without limiting options for managing the CICO scenario. For Plan D, DAS acknowledge that the evidence base for choice of technique is limited and “none of these completely replicates the situation faced by anaesthetists delivering general anaesthesia in a hospital setting”, acknowledge that “a cricothyroidotomy can be performed using either a scalpel or a cannula technique”, but then conclude that anaesthetists should perform a specific (scalpel) technique.

The authors cite the Fourth National Audit Project of the Royal College of Anaesthetist and the Difficult Airway Society (NAP4)3 as evidence to support their guidance, that anaesthetists should perform a specific (scalpel) technique. NAP4 actually details that anaesthetists, and produces a route for both rapid reoxygenation and airway control techniques.
frame, to prevent hypoxic arrest. This can be rapidly achieved via a cannula technique. Ventilation and airway protection are secondary goals that can anyway be achieved via a cannula using the 5.0 Melker.

Historically much of the concern in the literature regarding the safety of cannula techniques, focusses on the subsequent process of attempting to ‘ventilate’ via the cannula using a high pressure oxygen source. Again, it must be emphasised that the priority in a CICO scenario is oxygenation, not ventilation. The article quotes evidence related to outdated approaches that involved attempting to ventilate as opposed to oxygenate via cannula cricothyroidotomy, and in the Plan D BJA podcast it is suggested that the Manujet would be the usual oxygen delivery device to be used, when performing cannula cricothyroidotomy. We agree with the risks associated with attempting ventilation via a cannula or the use of a Manujet, but argue that they do not apply to a safe rescue oxygenation technique using appropriate equipment.

The process of rescue oxygenation via cannulae has been refined in recent yr, with considerable improvements in safety and efficacy. It is vital that anaesthetists understand that when it comes to emergency oxygenation through a small bore cannula, the Manujet, which was considered the gold standard device for oxygen delivery, has now been superseded. Low-cost flow-regulated oxygen delivery devices are now available that give feedback for obstruction and which enable expiratory flow out of a cannula. This, along with a robust check aspiration technique for identifying correct tracheal placement, and a simple oxygen delivery plan aimed at initially treating hypoxia, dramatically improves the safety profile of cannula oxygenation techniques, to the extent that we now strongly disagree with the assertion that there is a ‘significant risk of barotrauma’. The scalpel-bougie technique as detailed in the ‘cricothyroid membrane palpable: scalpel technique’ section of Plan D, is a variation of a technique first described by one of our group in 2004, presented at the DAS meeting in Dublin in 2006, and published in 2009. We are unaware of any human studies of this technique. It should be noted that the three pre-hospital papers quoted by DAS concern with a SFSB technique. Manipulating a cannula at the bottom of a blood filled cavity is far more concerning enough with our SFC technique, but is far more concerning with a SFSB technique.

It should be highlighted to the reader that, with an appropriate technique, the scalpel-bougie technique can be performed through the trachea and not only the cricothyroid membrane. It has been shown that in a significant percentage of CICO events the trachea is palpable even when the cricothyroid membrane is not. A minimally invasive tracheal scalpel-bougie technique is preferable to a long midline incision, when the trachea is palpable but the cricothyroid membrane is not. This option is not made evident in the DAS guidelines.

Of interest, no positive “endpoint” to determine successful bougie insertion is described in the technique in the guidelines. It appears correct identification of the airway will only be established after railroading the endotracheal tube and attaching capnography. If the tube is railroaded in a peri-tracheal plane it will result in substantial trauma and bleeding, and substantial delay until identification of a failed attempt. As a minimum, recognition of tracheal “clicks” or bougie hold-up at an appropriate depth (10-15cm) should be sought. Ideally, we would advocate that the patient be re-oxygenated via a Frona bougie, using a 15mm Rapi-Fit connector (or similar), attached to the anaesthetic circuit, which also confirms appropriate placement by capnography. This allows for both re-oxygenation and identification of technique failure earlier and with less trauma than waiting for tracheal tube capnography. Also it is important to accept that railroading of the ETT over the bougie may not always be initially successful, reinforcing the benefit of early delivery of oxygen via the bougie.

Another concern with the 2015 guidelines relates to the recommendation of a ‘scalpel-finger-bougie’ technique in the patient with an impalpable cricothyroid membrane. In some clinical scenarios airway anatomy maybe impalpable even though it is superficial (e.g. burns), however in many it will be because the structures are deep as a result of the volume of pretracheal tissue (e.g. adipose tissue, blood or goitre). When we first introduced a deep impalpable neck wet lab model in 2005, it took more than six months of trial and error, including ENT surgical input, to establish which technique was achievable by anaesthetists. There were four options considered: percutaneous cannula insertion, Scalpel Finger tube (SFT), Scalpel Finger Cannula (SFC) and Scalpel Finger Scalpel Bougie (SFSB), which the authors of the 2015 guidelines have named ‘scalpel-finger-bougie’. We recommend a judicious attempt at percutaneous cannula insertion (3 passes or 60 s) even in the impalpable scenario, as it aids transition to declaring a CICO, and avoids the need for a deeply invasive open technique if it is successful.

In the cases where a scalpel is required, the only technique anaesthetists could reliably and safely perform was the SFC technique. The SFT technique was feasible but required high levels of scalpel control, which most anaesthetists could not achieve. The SFSB was excluded because we found it had a high failure rate. The reason for this failure was twofold. Firstly, (once the trachea had been identified, if possible, by dissection) it required making a difficult incision deep in the neck into the trachea via a narrow cavity rapidly filling with blood. This again (as in the SFT technique) required a high level of precision with a scalpel blade. Manipulating a cannula at the bottom of a blood filled cavity is concerning enough with our SFC technique, but is far more concerning with a SFSB technique.

Secondly, the bougie must be held parallel to the floor (as correctly described by the authors in their paper for scalpel-bougie technique), in order for the coude tip to abut the scalpel blade and slide into the trachea. In a deep trachea scenario, the bougie cannot be held parallel to the floor, because of the position of the trachea at the bottom of a ‘valley’ of neck tissue (see Fig 1). This forces the operator to hold the bougie at a more vertical angle and hence the coude tip does not abut the scalpel blade and does

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**Fig 1 SFSB Difficulty in “Deep” impalpable airway anatomy scenario.**
not enter the trachea (which in our live model often cannot be seen as a result of the blood filling the incision).

We acknowledge that these concerns may not be equally applicable to patients with an impalpable cricothyroid membrane with superficial neck anatomy, but (particularly given the impact of obesity on airway management) we believe the deep neck scenario is highly relevant to clinical practice. We are concerned that the new DAS guidelines recommend a technique that proved ineffective in our wet lab and, to our knowledge, is untested in any other clinical, cadaveric, or large animal appraisal.

In conclusion, given the enormous influence of the DAS guidelines on airway specialists all over the world, if there is any doubt as to what is the “right” choice, then it is not appropriate to promulgate a “no choice” approach. The more appropriate alternative is in fact already eloquently stated in these guidelines. To rephrase the advice on choice of supraglottic airway device, “The decision about which Emergency Front of Neck technique (our substitution) to use should have been made before induction of anaesthesia, and this choice should be determined by the clinical situation, device availability, and operator experience.” We believe that with appropriate training and equipment, an integrated cannula first approach to CICO rescue techniques is a valid approach for anaesthetists and their patients, and this should be reflected in the DAS Plan D recommendations.

Declaration of interest

All the authors have taught, presented or published on CICO rescue techniques. Many CICO courses we have been involved in have received training equipment from Cook, VBM, and Meditech. A.H. has received funds from sales of his eBook, which have been used support CICO courses.

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Reply

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Editor—We would like to thank Dr Heard and Dr Lacquiere and colleagues for their considered responses to the new DAS guidelines.¹

Dr Heard concluded that “We believe that with appropriate training and equipment, an integrated cannula first approach to CICO rescue techniques is a valid approach for anaesthetists and their patients, and this should be reflected in the DAS Plan D recommendations.” We would like to make it clear that the 2015 guidelines do not exclude the use of other rescue techniques, but they do state that a surgical technique should be taught to all anaesthetists and that where departments choose to select additional equipment and techniques, specific additional training must be provided before anaesthetists are expected to use the equipment in a crisis.