D-blade C-MAC videolaryngoscopy™ with the Frova Intubating Introducer™

Hyperangulated videolaryngoscope blades, such as the Glidescope videolaryngoscope™ (Saturn Biomedical Systems, Burnaby, BC, Canada) and D-blade C-MAC videolaryngoscope™ (Karl Storz Endoscopy, Tuttlingen, Germany), have large viewing angles which improve glottic visualisation in a variety of abnormal airway configurations where conventional Macintosh-type videolaryngoscope blades fail. The D-blade C-MAC videolaryngoscope was designed by Prof. Dr. Volker Dörges at the University of Kiel. It is a highly angulated blade with an angulation of 40°, compared to a Macintosh blade 3 C-MAC videolaryngoscope™ (Karl Storz Endoscopy, Tuttlingen, Germany), which has an angulation of 18°. This higher angulation improves the chance of successful laryngoscopy in difficult airways. However, the higher angulation makes the manipulation of a tracheal tube or introducer difficult and increases the intubation failure rate. We present a case to illustrate how this mismatching may be overcome when the D-blade C-MAC videolaryngoscope is used with a Frova Intubating Introducer™ (Cook Medical Inc., Bloomington, IN, USA).

An elderly man presented for elective laparoscopic cholecystectomy under general anaesthesia. His past medical history was unremarkable and he could not recall any issues with previous general anaesthesia. Airway assessment included mouth opening of 4 cm, a modified Mallampati 3, full set of teeth and a good range of neck movement. However, the patient had a narrow palate and increased submental angle, indicating a possible difficult airway. The patient’s physical examination was otherwise normal. General anaesthesia was induced with midazolam, fentanyl and propofol, and rocuronium was used to achieve muscle relaxation. After three minutes of easy bag–mask ventilation, direct laryngoscopy with an English-type Macintosh blade revealed a Cormack and Lehane grade 3b view. The laryngoscope was removed and the patient was ventilated by facemask with sevoflurane in 100% oxygen while a D-blade C-MAC videolaryngoscope was prepared.

The left-hand side of the D-blade has a channel (or lateral guide), which the manufacturer recommends for placement of either a suction or oxygen catheter into the supraglottic area. A Frova Intubating Introducer was used in this channel to facilitate tracheal intubation (Figure 1). The Frova introducer was chosen because of the familiarity of the operator with this introducer. It is also one of the airway adjuncts suggested in the Australian and New Zealand College of Anaesthetists guideline PS56 (2012), ‘Guidelines on Equipment to Manage a Difficult Airway During Anaesthesia’. The tip of the Frova introducer projected a few centimetres from the distal end of the channel but still short of the blade tip.

After positioning the blade and preloaded introducer into the patient’s airway and optimising the laryngoscopy view, the introducer was inserted through the glottis (Figure 2A). After the introducer was advanced to slide laterally out of the channel, the D-blade was removed and reinserted into the patient’s pharynx to the left of the introducer. In this position, the blade was used to lift the tongue and epiglottis, while a tracheal tube was railroaded over the introducer and into the trachea under videolaryngoscopic guidance (Figure 2B).

So far, very little research has been conducted on the D-blade but, currently, there are mixed results when stylets and introducers are used with this hyperangulated videolaryngoscope blade. In the case of introducers, we feel a problem occurs when the straight part of the introducer fails to negotiate the tight curvature of the hyperangulated blade. One solution is to approach laterally with the introducer and bypass the vertex of the curved blade. Further modification, such as using a ‘kiwi grip’ with or without a preloaded tube may enhance the success rate of intubation. This option is more likely to be achieved when there is a small tongue, wide pharynx and good mouth opening. Our patient had a narrow pharyngeal space, which made manipulation of the introducer in this manner difficult. An alternative approach is to pre-shape the introducer to mirror that of the videolaryngoscope blade prior to inserting it into the airway passage. Unfortunately, the introducer has a memory and will start to straighten while being inserted into the pharynx.
If an introducer is used rather than a stylet, we recommend using the channel on the D-blade C-MAC videolaryngoscope so that it mimics the blade’s shape and provides easier intubating conditions.

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Editor’s note
All subsequent trademark symbols (™) have been removed after the first use for ease of reading.

References

Hyperthermia in brain dead patients

The hypothalamic thermoregulatory centre maintains temperature homeostasis. Loss of its function due to failure of cerebral blood-flow is generally associated with hypothermia. Therefore, fever is unexpected in patients after brain death (BD). The first case was a young woman who was admitted with subarachnoid haemorrhage. On day 17, BD was confirmed by clinical examination, transcranial Doppler and computed tomography angiography. The patient was confirmed as an organ donor. Five days before BD, the patient had a tympanic temperature of 38°C to 40°C, due to a respiratory infection, which persisted until organ donation, reaching 40.5°C. Blood culture was negative, while tracheal aspirate culture showed the presence of *Streptococcus viridans*. Both kidneys and liver were transplanted and organ donation was uncomplicated. In the second case, a middle-aged man with intracerebral haemorrhage had a fever of 39.5°C due to pneumonia caused by aspiration. Fifty hours later, BD was confirmed by clinical examination and transcranial Doppler. The patient was confirmed as an organ donor. Fever persisted until organ donation, reaching between 38°C and 39°C. Blood culture was again negative, while tracheal aspirate culture was positive for *Staphylococcus aureus*. The liver was transplanted again without complications. The third case was an elderly man with cerebellar haemorrhage who had pneumonia caused by aspiration. BD was confirmed 19 hours after intensive care unit admission by clinical examination and electroencephalogram. The patient maintained a temperature of 40°C despite the presence of BD. Cultures were negative.

Lack of hypothalamic vascularisation in BD causes loss of function in the thermoregulatory centre, located at the pre-optic nucleus of the anterior hypothalamus, leading to hypothermia. The hypothalamus is vascularised by perforating branches from the anterior communicating artery and from the A1 segment of the anterior cerebral artery. The adenohypophysis and tuberal area are vascularised by the superior hypophyseal arteries, which are branches of the ophthalmic artery. The neurohypophysis receives vascular supply from the meningohypophyseal trunk terminal branches.