A novel method of intubation and orogastric tube insertion using a C-MAC-D-blade videolaryngoscope-bougie technique

A. A. J. Van Zundert (*) and S. P. Gatt (**)
to the aryepiglottic fold. The right anterior glottis could not be viewed because of the tumor. At the time of presentation, the patient had acute airway obstruction at the level of the larynx, presumably from his carcinoma.

The patient had been transferred to our hospital (RBWH) for surgery because he was deemed ‘unintubatable’ and because of the magnitude of the surgery required. Because the patient could not be intubated, a tracheostomy had been performed under local anesthesia before transfer. Surgeons planned: a 1) pharyngo-laryngectomy and esophagectomy; 2) esophageal replacement using a stomach pull-up; 3) reanastomosis (jejunal flap repair); 4) right 1-5 area neck dissection; and 5) left 2-4 zone neck dissection. The tumor was known to be large, fragile to the point of crumbling when touched and bleeding when interfered with.

Because surgery included removal and excision of the tracheostomy area an oral/nasal endotracheal tube (ETT) was needed and, in the operating theatre, both the ENT and maxillofacial surgeons chose the oral route even though MRI studies suggested that intubation would not be possible. We induced anesthesia using the intravenous route because we had the advantage of the tracheostomy. In this case, a blind retrograde technique through the existing tracheostomy would have been inappropriate both in advancing the Seldinger wire or introducer and the subsequent railroad technique because of the size and friability of the tumor.

We opted for the C-MAC®-D-blade with Frova as first line technique because we regarded our technique as the most likely to be successful. Though previously regarded as impossible, we eased the blade gingerly down the left side carefully avoiding the large tumor on the right side. The left cord was visible but the right cord was obliterated by the large invading laryngeal tumor (Fig. 1A). An enlarged epiglottis made the intubation more complex. Once the C-MAC®-D-blade/Frova catheter technique identified the tracheostomy, a railroad intubation on the first attempt was possible, straightforward and ‘easy’. As anticipated, there was minor bleeding from the tumor (Fig. 1B). This ceased within a few seconds. Operation and recovery were uneventful. Patient gave written consent for publication.

**DISCUSSION**

The C-MAC®-D-blade, designed by Professor dr. Volker Dörges (University of Kiel Germany) features a narrow, curving channel within the blade’s infero-posterior aspect on the left side of the blade (Fig. 1C-1D) which can accommodate a 70cm-long 14Fr Single Use Frova Airway Intubating Introducer/oral endotracheal tube changer (Cook™ Bjaeverskov, Denmark) or, alternatively, a 70 cm 15 Fr Teflon Single Use Exchange Guide Bougie with Coudé Tip (Smiths Medical Int., Hythe, Kent, UK), provided both the channel and introducer are well lubricated before use. This technique has proven to be most satisfactory and is an additional, easy-to-implement strategy when difficult airway intubation is anticipated and when right-sided oral tumors obliterate the view or access to the glottis entrance.

In order to insure successful endotracheal tube placement into the airway using this technique, the following steps are necessary: 1) lubrication of the Frova Introducer or bougie (catheter) and internal surface of the D-Blade channel; 2) loading of the lubricated intubating catheter into position onto the D-blade (Fig. 1C-1D) with the catheter tip protruding no further than the D-blade distal end; 3) holding the videolaryngoscope in either the left or right hand, careful progression of the D-blade with bougie/intubating catheter/exchange catheter assembly into the mouth under direct vision; 4) obtaining a view on the C-MAC screen in the standard recommended fashion; 5) positioning of the tip of the D-blade into the vallecula under guidance using the image on the C-MAC monitor screen (Fig. 1E); 6) pointing the tip of the Frova intubating introducer/bougie to face the middle of the glottic entrance (which will usually now be visible in the center of the monitor screen); 7) using the free hand to advance the tip of the bougie/intubating catheter and inserting it about 7 cm over the vocal cords into the trachea (Fig. 1E); 8) removing the D-blade and unclip the catheter from the channel whilst holding firmly onto the bougie/intubating catheter just outside the lips to retain the catheter’s intratracheal position; 9) loading by a trained assistant now the endotracheal tube onto the proximal end of the bougie/intubating catheter/exchange catheter; and 10) using the latter to railroad the endotracheal tube into the trachea (Fig. 1F). While this last step can be undertaken ‘blind’ as in the standard blind railroad technique, it can be conducted under continuous visual guidance if the D-blade (Fig. 1G) is re-inserted into the mouth.

According to the anesthesiologist preference, the videolaryngoscope can be held in the left or the right hand, while the free hand can be used to advance the bougie (catheter). This avoids the need to “cross” hands. Experience has shown us that, in
Fig. 1. — Picture taken with videolaryngoscopy of a patient with a large invading laryngeal tumor on the right, obliterating the anterior view of the glottis, before (Fig. 1A) and after (Fig. 1B) endotracheal intubation, with a nasogastric tube in position; and the sequence of insertion using the C-MAC D-blade videolaryngoscope, mounted with an intubating catheter (Fig. 1C to 1G). Note the clear difference between the tracheal and esophageal orifices (Fig. 1H).
either case, crossing hands is not really a problem because the distal end of the laryngoscope handle and the catheter are in very close proximity.

If an orogastric tube also needs to be inserted, an identical technique can be used. This time the orogastric tube is loaded into the D-blade channel while the blade tip is adjusted to sit slightly more posteriorly to face the esophagus. With the tip of the blade in position, one can clearly distinguish the esophageal orifice from the glottic entrance (Fig. 1H).

The narrow, curving channel can also be used to administer oxygen during the process of intubation (if a Frova or Cook exchange catheter is used) or to suction the oropharynx and clear any blood or saliva (if a long Y suction catheter is used). The anesthesiologist should test, before use on patients, whether the oxygen delivery catheter or suction catheter (eg. Y-suction) fits snugly within the channel.

If the tip of the intubating catheter points too high onto the anterior commissure and, therefore, is anterosuperior to the vocal cords, this can prevent from being able to insert the endotracheal tube into the trachea. This can be solved by withdrawing the D-blade further by 1-2 cm and by gently rotating the bevel of the endotracheal tube counter-clockwise during the railroad procedure.

If dislocation of the airway intubating catheter was to occur during a blind railroad procedure, the procedure would need to be repeated, this time ensuring that the catheter sits within the trachea whilst, at the same time, monitoring and correcting peripheral oxygenation. This was not necessary in any of our subjects.

This new technique is easy to learn and to teach to others. We have used this method in over fifty patients with premetrics suggesting a difficult airway. All intubations using this technique were successful on the first attempt. My co-worker Keith Greenland also mentioned our new technique in a case reported in the Australian literature (9).

Further studies may be helpful to: 1) further validate our novel suggested method; 2) compare our technique in difficult airways with a control group in which the bougie is not used; 3) demonstrate the optimal qualities and physical properties of the introducer; and 4) validate the sequence and adjunct manipulation techniques during a successful endotracheal tube insertion.

CONCLUSION

Our new intubation technique provides to the operator a simple sequence, with small investment in time, to achieve a rapid, satisfactory outcome even in those where attempts at intubation have proved unsuccessful. Furthermore, it provides another application of the C-MAC®-D-Blade. Unlike the situation with other videolaryngoscopes, both direct and indirect laryngoscopy can be performed and both a ‘channelled’ (using the unique, previously unpublished, technique described in this paper) and ‘unchannelled’ method are possible.

References