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Video-assisted Laryngoscopy a useful adjunct in endotracheal intubation

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Abstract : The difficult airway is the single most important cause of anaesthesia-related morbidity and mortality and most catastrophes are due to unexpected difficulty, which are more likely in emergencies. We report a difficult airway scenario in a patient with a high energetic trauma and used several techniques for the "can't intubate, can't ventilate scenario". Eventually, successful intubation was obtained with the video-assisted laryngoscope.

Key words : Anaesthesia ; difficult intubation ; video assisted laryngoscope.

Introduction

Endotracheal intubation, using a classic laryngoscope is a well-known method, although it has its limitations and complications. Sometimes vocal cords are difficult to observe, especially with laryngoscopy grades III or IV according to the Cormack and Lehane scoring system (1). Despite the availability of a large armamentarium of airway adjuncts in difficult airway techniques, there is still room for improvement. We report the successful use of the video-assisted laryngoscope in a difficult airway scenario.

Case report

An 18-yr-old Caucasian male (ASA I, height 175 cm, weight 72 kg) presented for fixation of multiple mandibular fractures following a high energetic impact of his motorbike colliding with a car. Although the patient was wearing a helmet, he sustained multiple injuries : 1) cerebral contusion with several small intracranial haemorrhages ; 2) a capsulofracture of C2 cervical vertebra, complicated with a hernia nucleus pulposus of C2-C3, displacement of the posterior longitudinal ligament and partial loss of motor and sensory function in the right arm and right leg ; 3) subdural haematomata at C5-C6 ; 4) epidural haematomata at T1 ; 5) two communitative mandibular fractures ; 6) tongue laceration at the sublingual region ; and 7) several broken teeth, bruises and cuts all over the body. The patient's cervical spine was immobilized with a halo fixation at the accident and emergency trauma department. His medical and surgical history was uneventful. He was not under the influence of any drug or alcohol.

At arrival in the operating room, the patient was conscious (Glasgow Coma Scale score 15/15) but frightened and complained of severe neck pain. Due to the halo traction, his neck was fixed. It was obvious he hardly could open his mouth. The inter-incisor and thyromental distances were 19 mm and 38 mm respectively, while inspection of the oropharynx revealed a Mallampati score IV. As part of our preparation for the management of a difficult airway scenario, extra anaesthesia staff was asked to give support, the surgeon was asked to be on stand-by for a possible tracheostomy, the difficult airway management trolley was obtained to provide us with the "alternative" instruments, and various options for airway management were considered prior to the start of anaesthesia.

Awake fibreoptic intubation was not the first option, as the patient was in a very painful condition and strongly objected to be awake at all, although he was fully informed of the actual situation. The maxillo-facial surgeon specifically asked for a nasal intubation. Preoxygenation with a facial mask and oxygen FIO_2 1.0 for five minutes was followed by a rapid sequence intubation induction with 100 µg of fentanyl, 200 mg propofol and

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100 mg of suxamethonium, applying cricoid pressure. Long-lasting muscle relaxants were avoided as we were not sure we were able to provide a clear airway. Both laryngoscopy, using a standard curved Macintosh blade laryngoscope, performed by an experienced anaesthesiologist, revealing a Cormack and Lehane grade IV, and the use of a flexible bronchoscope did not result in exposure of the glottis. Blood at the basis of the tongue further obscured the vision. After three failed intubation attempts and repeated doses of propofol/suxamethonium, the patient could not be hand-ventilated successfully anymore, not even with an oral pharyngeal airway (guedel) in situ. In order to buy some time, we decided to insert a laryngeal mask size four, which was successful in providing an open airway, thereby increasing oxygenation and peripheral oxygen saturation. As nasal intubation was required, the laryngeal mask could not be used as a conduit for tracheal intubation. An attempt to perform a retrograde intubation using a J wire (Cook® Retrograde Intubation Set, Cook Critical Care, Bloomington IN, USA) inserted through an 18 G sheath needle via the cricoid-thyroid membrane, did not result in its visualisation during laryngoscopy.

As recently a video-assisted laryngoscope (DCI™ Video Intubation System, Karl Storz, Tuttlingen, Germany) was introduced in our department (Fig. 1), we decided to use it in this case. We subsequently were able to visualise on the scope – but not by direct visualisation – the glottis partially, and we managed to insert the nasal endotracheal tube successfully. After checking its exact position, the patient was put on the ventilator and the operation evolved uneventfully. At no time the head was moved, maintaining all precautions in order to prevent the neck injuries from any further deterioration. Postoperatively the patient was extubated the day after surgery. Five days later, part of his neurological loss recuperated, showing only right upper extremity sensory and motor loss.

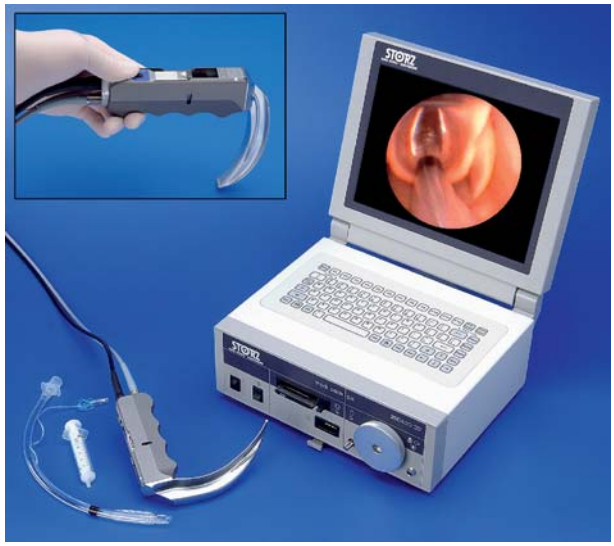

Fig. 1. — Video-assisted laryngoscope system with LCD monitor, integrated keyboard and recording card allowing indirect and direct vision of the larynx. The camera head is attachable to different sizes of laryngoscope blades. Focus can be adjusted with a small ring at the side of the camera body. All laryngoscope blades can be fully immersed or washed and sterilized with common methods.

Discussion

It is well known that intubation attempts of the vocal cords with an endotracheal tube can have a tremendous impact on patient outcome (2, 3). Both morbidity and mortality increase in emergency and trauma situations or when patients are presented with the likelihood of a difficult intubation.

Planning for unexpected difficulties, asking for extra help and tools, and applying the American Society of Anesthesiologist's difficult airway algorithm (4) are essential in the management of difficult airways. Early use of known alternative difficult airway devices may further limit complications.

Our patient had several items that could predict difficulties during intubation : 1) interincisor distance < 20 mm and chin-thyroid distance < 60 mm ; 2) Mallampati score IV ; 3) fixed neck in flexion due to halo fixation ; and 4) mandibular fractures and tongue laceration.

The introduction of video techniques is well established in surgical endoscopic procedures. Video-assisted laryngoscopy was recently evaluated in anaesthesia and found to produce better viewing conditions in most cases, resulting in a lower incidence of difficult airways compared to the direct vision laryngoscopy method (5-8). The anaesthesiologist involved in this case report (AVZ) had used the video-assisted laryngoscope in over a hundred patients without a single failure, including its use in two morbidly obese patients, several patients with difficult airways and even in a patient with an extensive pharynx tumour.

The Karl Storz Berci-Kaplan DCI™ Video Laryngoscope uses the Tele Pack™ documentation unit. This is an integrated endoscopic CCD video system including CCU (camera control unit) with Image Processing Module and electronic filter to eliminate the Moiré effect when used with flexible or semi-rigid endoscopes. It is equipped with a

24 Watt HI-Lux light source keyboard, 12" LCD monitor and a PCMCIA memory card slot for still image recording (Fig. 1). The DCI™ Camera Head is attachable to different sizes of blades with distal light- and image fibres providing optimal illumination and image acquisition with a 60° field of view, which is wider than with a standard laryngoscope blade, since the viewpoint is closer to the glottis entrance. When using the video-assisted laryngoscope, less force is needed to visualize the glottis entrance on the monitor compared to the use of a classic laryngoscope as direct vision is not required. In contrast, the use of a standard curved blade laryngoscope possibly may exert more pressure on the upper teeth while visualising the glottis inlet. Other advantages of the use of a video-assisted laryngoscope are : 1) both direct (naked-eye view) and indirect (video-assisted) laryngoscopies are possible ; 2) better (indirect) viewing of glottis inlet, without excessive angulations of the scope and hence possibly less trauma to the upper teeth ; 3) documentation of entire intubation procedure ; 4) better teaching tool than the "look over my shoulders" method as the video monitor allows visualization of intubation attempts performed by others ; and 5) better quality view than with conventional laryngoscopes. A disadvantage of the indirect technique is that saliva or lubrication of tubes may blur the vision during endoscopy. If the tube is inserted too straight it will obscure the view of the endoscopist. Therefore it is better to introduce the endotracheal tube from the side.

Conclusion

Endotracheal anaesthesia has paved the way for some of the greatest advances in modern surgery. However, attempting an endotracheal intubation can be one of the greatest challenges an anaesthesiologist can be confronted with. It is only with a continuous search for better tools that we can safely provide an open airway for our patients. Since William MacEwen first performed tracheal intubation some 125 years ago, many individuals have contributed to the evolution of this technique. As this case confirms, we believe that the video-assisted laryngoscope deserves a prominent place in routine and difficult airway management. It offers a useful addition to the range of difficult airway devices and is a valuable teaching-aid.

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References

1. Cormack R. S., Lehane J., *Difficult tracheal intubation in obstetrics*, Anaesthesia, **39**, 1105-1111, 1984.
2. Peterson G. N., Domino K. B., Caplan R. A., Posner K. L., Lee L. A., Cheney F. W., *Management of the difficult airway – a closed claims analysis*, Anesthesiology, **103**, 33-39, 2005.
3. Burkle C. M., Walsh M. T., Harrison B. A., Curry T. B., Rose S. H., *Airway management after failure to intubate by direct laryngoscopy : outcomes in a large teaching hospital*, Can. J. Anaesth., **52**, 634-640, 2005.
4. American Society of Anesthesiologists Task Force on Management of the Difficult Airway. *Practice guidelines for management of the difficult airway*, Anesthesiology, **98**, 169-1277, 2003.
5. Hofstetter C., Scheller B., Flondor M., Gerig H. J., Heidegger T., Brambrink A., Thierbach A., Wilhelm W., Wrobel M., Zwissler B., *Videolaryngoskopie versus direkte Laryngoskopie zur elektiven endotrachealen Intubation*, Der Anaesthetist, **55**, 535-540, 2006.
6. Kaplan M. B., Hagberg C. A., Ward D. S., Brambrink A., Chhibber A. K., Heidegger T., Lozada L., Ovassapian A., Parsons D., Ramsay J., Wilhelm W., Zwissler B., Gerig H. J., Hofstetter C., Karan S., Kreisler N., Pousman R. M., Thierbach A., Wrobel M., Berci G., *Comparison of direct and video-assisted views of the larynx during routine intubation*, J. Clin. Anaesth., **18**, 357-362, 2006.
7. Lai H. Y., Chen I. H., Hwang F. Y., Lee Y., *The use of the GlideScope for tracheal intubation in patients with ankylosing spondylitis*, Br. J. Anaesth., **97**, 419-422, 2006.
8. Benjamin F. J., Boon D., French R. A., *An evaluation of the GlideScope, a new video laryngoscope for difficult airways : a manikin study*, Eur. J. Anaesthesiol., **23**, 517-521, 2006.