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CASE REPORT

Case report: Oropharyngeal injuries with GlideScope® usage in two obese patients

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The GlideScope® is a widely used video laryngoscope that is especially beneficial in the setting of the anticipated difficult airway. However, its design introduces blind spots and necessitates the need for a curved stylet, most commonly the accompanying GlideRite® Rigid Stylet. A combination of these features and incorrect technique has resulted in cases of oropharyngeal injury, especially to the tonsillar pillars. Two cases of oropharyngeal injury are presented that were sustained during the use of the GlideScope® in the East London Hospital Complex. Both patients were obese. The recommendations presented in the literature to avoid such injuries are also summarised.

Keywords: difficult airway, GlideScope®, obesity, rigid stylet, tonsillar pillar injuries

Introduction

Since its release in 2001, GlideScope® has become one of the most widely used video laryngoscopes for both routine and difficult airways.[1] It has also been a valuable tool in teaching institutions as an experienced anaesthetist may guide a junior via the images projected on the screen. Correct use of the GlideScope® requires understanding of its design and unique shortcomings. Due to its curved shape, a curved stylet is required. The GlideRite® Rigid Stylet is usually used in combination with the GlideScope®. In addition the configuration of the video input creates blind spots so oropharyngeal injuries may therefore go unnoticed.

Case reports

Case 1

The first patient was a 37-year-old man presenting for repair of his paraumbilical hernia. Our hospital does not routinely weigh adult patients but he was estimated to be over 100 kg with a central fat distribution. His neck was short but had adequate mobility. He could place three of his own fingers in his mouth and was classified as a Mallampati class two. He had no symptoms of gastro-oesophageal reflux disease so rapid-sequence induction was deemed unnecessary.

He was correctly identified as having a difficult airway by the attending anaesthetist so the difficult airway equipment was prepared in theatre. The GlideScope® (size 5) with GlideRite® Rigid Stylet was chosen as the first-line airway instrument. Prior to induction the patient was positioned in the 'sniffing the morning air' position and preoxygenated with 50% oxygen for 3–5 minutes. He was induced with fentanyl and propofol. Bag mask ventilation was easily achieved so he was paralysed with 0.1 $mg.kg^{-1}$ vecuronium and bag-mask ventilated for 3 minutes before intubation was attempted.

The larynx was visualised easily but the oropharyngeal cavity was noticed to be very small owing to his large tongue and uvula. On passage of the tube, slight resistance was felt before the endotracheal tube and blood were visualised on the screen. The technique was abandoned and direct laryngoscopy was attempted. Anticipating that oral intubation would be difficult due to limited space in the mouth, the anaesthetist opted for nasal intubation, which he performed successfully on his first attempt. Examination of the mouth revealed a tear in the right tonsillar arch. The bleeding stopped spontaneously so the decision was taken not to repair the laceration. However, the patient developed signs of airway obstruction on extubation so was re-intubated nasally and ventilated overnight in ICU.

Case 2

The second case of oropharyngeal injury was a 45-year-old man booked for removal of a lipoma on the posterior aspect of his neck. Again he was assessed as having central obesity, with an estimated weight of over 100 kg. His neck mobility was normal, as was his mouth opening, but he was classified as a Mallampati class three. He also did not have symptoms of gastro-oesophageal reflux.

Again, the GlideScope® (size 5) with GlideRite® Rigid Stylet was used as the first-line instrument. He was similarly positioned and preoxygenated. Again induction consisted of fentanyl and propofol followed by vecuronium once bag-mask ventilation was achieved.

The larynx was well visualised on the monitor of the GlideScope® but on the first insertion of the endotracheal tube loaded on the GlideRite® Rigid Stylet, blood was noticed on the screen before the endotracheal tube came into view. No resistance was felt on insertion of the endotracheal tube. The procedure was abandoned and the patient intubated orally via direct laryngoscopy with a size 8 endotracheal tube. Examination revealed a tear in the right anterior tonsillar pillar with a big defect in the peritonsillar area. It was feared that this defect would collect food so the ENT surgeons opted to repair it before the case proceeded. The patient was successfully extubated at the end of the surgery but spent a night in ICU for airway observation.

Discussion

Examination of the literature showed that this complication has occurred elsewhere in both obese and non-obese patients. Magboul and Shaw presented an incident involving an 80-year-old woman with a BMI of 41. On intubation, the endotracheal tube preloaded on the GlideRite® Rigid Stylet pierced the tissue of the retromolar trigonum, which also holds the lingual nerve, before re-entering the oropharynx to pass through the vocal cords.[2]

Injury has also been reported in the paediatric setting during adenotonsillectomy. Blind insertion of the endotracheal tube, this time without a stylet, was blamed for partial detachment of the right tonsil and associated mucosal bleeding in a six-year-old child with large tonsils.[3]

Malik and Frogel reported a case of a 72-year-old man with myotonia congenita whose right anterior tonsillar pillar was penetrated during intubation with GlideScope® using the GlideRite® Rigid Stylet.[4] Postulated mechanisms include the blind passage of the endotracheal tube until the tip was visualised on the monitor and the use of a rigid stylet, which when combined with the sharp edge of the endotracheal tube may have perforated the pillar. Unique to this case was that the patient may have been resistant to the effect of non-depolarising muscle relaxants. Inadequate relaxation of palatoglosseus may predispose to tonsillar perforation.

The manufacturer, perhaps anticipating such adverse outcomes, recommends a four-step insertion technique when using the GlideScope®.[5]

(1) First, the GlideScope® should be introduced into the midline of the oropharynx with the left hand.
(2) When the epiglottis is identified on the screen, the scope should be manipulated to obtain the best view of the glottis.
(3) The endotracheal tube should then be guided into position under direct vision.
(4) When the distal tip of the endotracheal tube disappears from direct view, it should be viewed on the monitor. Gentle rotation and angulation may be required to direct the endotracheal tube through the glottis.

The bulk of literature on this topic recommends the following steps to ensure one avoids oropharyngeal injury when using the GlideScope®:

(1) Insertion of the endotracheal tube under direct vision

Despite the anaesthetist using a gentle technique, blind advancement of the endotracheal tube may be the main cause of oropharyngeal injuries. It is postulated that the upward force applied to the GlideScope® to facilitate view stretches the tonsillar pillars taut, making them susceptible to perforation.[1,6] It is my opinion that since direct laryngoscopy is used most frequently, it is tempting for anaesthetists to adopt the same technique when using the GlideScope®. In direct laryngoscopy one usually brings the endotracheal tube in from the corner of the mouth so as not to obscure one's view. However, this technique causes a significant blind spot when using the GlideScope®. To account for the blind spot on the monitor, insertion of the endotracheal tube should be right next to the GlideScope® blade, in the midline. Direct visualisation of the tracheal tube as it is inserted into the mouth along the curvature of the GlideScope® laryngoscope blade is required. Only once the tip of the tube has passed out of view should the GlideScope® video monitor be viewed.[4]

(2) Re-inspection of the endotracheal tube and oral cavity on removal of the scope.[2]
(3) Use of a soft-tipped endotracheal tube

Soft-edged endotracheal tubes such as the Parker Flex-Tip™ have been advocated.[2,4] In the absence of such tubes, the tube may be softened in warm water, as in a nasal intubation.

(4) Avoidance of the GlideRite® Rigid Stylet

The GlideRite® Rigid Stylet is designed to curve the endotracheal tube to follow the shape of the GlideScope® in order to assist intubation. However, because the stylet is rigid it converts a relatively malleable endotracheal tube into a rigid potential weapon. Attempts at intubation should be made without the stylet or with a curved flexible stylet.[2]

(5) Avoidance of undue force during intubation

If resistance is felt, the endotracheal tube should not be advanced further.[7] However, lack of resistance should not be taken as a sign that no injury has occurred. Injuries have been reported by experienced users who felt no resistance on insertion of the endotracheal tube.[6]

The cases presented show the implications of airway injuries during intubation. In both cases the patients had unexpected ICU admissions. In case one, the patient required re-intubation and ventilation. This placed him at further risks associated with repeated intubations and prolonged ventilation. It is therefore vital that airway manipulation is done carefully and safely.

Conclusion

The GlideScope® is a highly useful tool in the anaesthetist's difficult airway arsenal. However, when using it, it is important to understand the implications of its design and adhere to the simple guidelines listed above. It is not sufficient for the anaesthetist to adopt the same technique used for direct laryngoscopy as the direction of insertion of the endotracheal tube differs. During direct laryngoscopy the endotracheal tube is inserted from the right side of the month. During GlideScope® use the endotracheal tube is placed alongside the blade in the midline. It is also essential that anaesthetists practise using the GlideScope® and other difficult airway devices on routine cases so they are familiar with each device's unique design. This will help minimise the risk of oropharyngeal injuries, which may be particularly detrimental to a patient with a difficult airway.

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