SOFT PALATE INJURIES FROM RIGID STYLET DURING GLIDESCOPE INTUBATION.

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THE CASE: ‘Of Legos and Laryngoscopes’

56-year-old male brought in by ambulance with a report of left arm shaking, left sided weakness, left sided facial droop, and a period of unresponsiveness with tonic-clonic movements concerning for seizure. Last seen normal prior to arrival when patient was playing with Legos.

EMS reports significant hypertension with pressures in the 200 systolic range. Brain attack activated prior to arrival by EMS so that patient is evaluated by the ED staff in conjunction with Neurology. As they roll through the door, he is alert and able to give some limited history. There is notable left-sided deficit, slurred speech, right-sided incoordination, and neurology scores him at 10 on the NIH stroke scale.

CT head is negative for acute bleed. On the way back to the room he has a witnessed tonic-clonic seizure with a noted transient desaturation to the 80s. A nasal cannula at 2L with end-tidal CO2 monitor is attached and his seizure activity stops after 2 doses of Ativan 2mg iv. The patient then becomes apneic with no end-tidal CO2 detected and he begins to drop his sats.
An oral airway is inserted, nasal cannula flow rate is turned up to 15L/min (Apneic Oxygenation[19]) and bag-mask ventilation brings the patient to 99% as preparations are made for RSI. The patient is positioned with head of bed elevated to 20 degrees, the GlideScope is readied and 200 mg of succinylcholine and 150 mg of ketamine are pushed. Nasal cannula is left in place throughout the intubation attempt. The Glidescope screen shows clear visualization of the cords, but something is wrong. The ET tube will not advance past the base of the tongue and cannot be visualized on the screen. A quick glance at the monitor shows sats in the high 90s. The ET tube is withdrawn and a second attempt at intubation is made with a Pocket Bougie. The Pocket bougie is clearly visualized passing through the cords, but the ET tube will not advance to the point that it can be visualized on the GlideScope screen. The ET tube and bougie are removed and direct laryngoscopy (DL) is performed with a MAC 4 blade. The reason that the prior two attempts had failed is evident. There is a 2-3 cm tear to the right of the uvula on the soft palate. Under DL an 8.0 ET tube was passed successfully and the patient experienced no hypoxia.

**DISCUSSION:**

There are multiple documented reports of injury and perforation of the larynx, esophagus, and hypopharynx during direct laryngoscopy [1-5]. With the advent of Video Laryngoscopy (VL) and the introduction of hyperangulated devices such as the GlideScope and D blade (Storz) and we are seeing an increase in the reports of a new injury pattern with damage to the soft palate [6-12].

This case opens up a discussion of the potential but preventable complication of a penetrating injury when using a laryngoscope, and in particular, a hyperangulated video laryngoscope. Our review of the literature shows that soft palate injuries are rarely reported [14] and usually self-limited in severity, but can lead to vascular injuries including internal carotid artery thrombosis or pseudoaneurysm, thrombosis of the internal jugular vein, and mediastinitis. Injuries near the midline are less likely to result in carotid artery injury compared to lateral lesions [12-15]. Depending on the severity of these injuries, treatment may include primary repair or simple observation.

In the 2014 case series by Raja et. al. [12] seven soft palate injuries following Glidescope intubations are described. Patients were aged 29 – 64, with BMI’s ranging from 20.1 to 36.7. Four patients met criteria for obesity with Mallampati scores of III or higher. Injuries were generally located on the right aspect of the soft palate (see photo). 6 of the 7 injuries were repaired by the ENT service, and one injury was managed expectantly. The repairs were performed in the operating room with the use of electrocautery, and either 3.0 or 4.0 vicryl or chromic sutures.
Recommendations for management include the use of prophylactic antibiotics, and steroids. After interdisciplinary in services about this injury pattern Raja et. al. stated that they had not been consulted on further injuries.

Most common sites of injury during GlideScope® intubation. (Reproduced with permission from Junaid Raja MD [12]

The patient in the case described above was managed expectantly, and no swallowing, or speech issues were reported on a later speech therapy evaluation after extubation.

Anytime a soft palate injury occurs during intubation it is our recommendation to alert the admitting service, and discuss the options of expectant management versus early repair with the ENT service.

Intubation with the GlideScope is recommended by the manufacturer to be performed using the GlideRite Stylet [22] which is rigid and puts the tip of the ET tube at a flexion of around 60 degrees [17]. These two factors can make the tube more difficult to pass through the oropharynx and may lead to an increased risk of palatal injury.

Tartell et. Al. [3] felt that contributing factors to palatal injury during DL intubation included hasty intubation by inexperienced personnel; the use of curved, beveled
endotracheal tubes containing stylets; malpositioning of the head, and the application of cricoid pressure.

The most effective way to avoid this injury with the use of an indirect VL system is to attempt to never lose sight of the tip of the endotracheal tube. Intubating using an indirect VL device should involve a four step process [22](AKA Mouth:Screen:Mouth:Screen):

i: visualize VL blade passing the base of the tongue,
ii: visualize the glottis on the screen,
iii: visualize the tip of the ET tube passing the base of the tongue,
iv: visualize ET tube delivery on the screen.

Once the tip of the endotracheal tube passes the base of the tongue it should be visible on the VL screen. The technique of continued visualization of the ET tube tip can be challenging in the obese patient with excess soft tissue in the pharynx. In these patients there are occasions where the tip of the ET tube will be neither directly visible, or visible on the VL screen as the tube passes the base of the tongue.

Recently more attention has been paid to aggressive preoxygenation, and prevention of peri-intubation desaturation during airway management[19]. With patients in a 20 degrees head of bed elevation position to maintain and prolong the safe apnea duration [20-21] the ability of the airway provider to see directly into the posterior pharynx can be affected.

Ways to avoid the impaired airway visualization caused by patient positioning include lowering the height of the bed and having the patients head positioned as close as possible to the end of the bed. In the case described the patient had slipped approximately 20cm from the head of the bed during the bag valve mask ventilation prior to the intubation.

With all patients, and especially in obese patients it can be normal to experience some slight resistance to passage of the ET tube as it rounds the base of the tongue. Awareness of this injury pattern should remind the airway provider to use caution whenever increased, or abnormally high resistance to tube passage is met, particularly in the higher risk obese population with excess soft tissue in the pharynx and to avoid the use of excessive force in these situations.

**CONCLUSION:**

The GlideScope and other videolaryngoscope systems are a good example of disruptive technology, or technology that challenges or supplants existing technology. Undoubtedly, the videolaryngoscopes have their place in airway management. While the debate about direct laryngoscopy vs. video laryngoscopy (direct and hyperangulated) continues, we must always step back and remember the immense risk that comes along with airway management. It is one of the few
procedures with which we can kill our patients. As with most things in medicine, we must temper our eagerness and enthusiasm with new treatments and technologies with a full understanding of the risks involved. The case above serves not only to illustrate a possible complication with the GlideScope, but more importantly to illustrate the necessity for planning, preparation, and constant vigilance in our airway management.

REFERENCES:


