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Breakage of stylet inside endotracheal tube following intubation

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ABSTRACT

A 52-year-old lady was scheduled for hemithyroidectomy for right colloid goitre. After the preanesthetic check-up, she was classified as an American society of anesthesiologists (ASA) physical status I.[1] Her baseline vitals parameters were within normal limits. After receiving premedication, she was induced and intubated with a 7.0 mm ID flexometallic endotracheal tube (ETT) preloaded with a malleable aluminium stylet. Shortly afterwards, while fixing the ETT, the size of the stylet was noticed to be shorter than initial length. Immediately, ETT was removed and replaced with a new one. The broken piece of stylet was found inside the removed ETT.

Keywords: endotracheal tube; hemithyroidectomy, stylet

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INTRODUCTIONS

Stylets are frequently used to shape endotracheal tubes (ETTs) thereby facilitating intubation of the trachea, especially for flexometallic tubes insertion. Although rare, there are case reports of shearing or breaking of the tip of stylets with serious consequences in adults and even neonates.[2-6,8] Here, we report a case of breaking off of the tip of the stylet while removing it after successful intubation.

CASE REPORTS

A 52 years lady was admitted in the department of Ear-Nose-Throat (ENT) as a case of colloid goiter with history of gradually increasing right sided neck swelling for 8 months. She was posted for right hemithyroidectomy. On physical examination, she was an average built lady of 5 feet 3 inches, weighing 55 kilogram. Pre anesthetic evaluation was normal. Airway evaluation did not predict difficult airway. She was classified as an American society of Anesthesiologists physical status I (ASA I)[1] and planned for general anesthesia after written informed consent was taken. On scheduled day, patient was taken to operation theatre and baseline vitals noted to be Pulse: 78 beats per minute, Blood pressure : 124/78 mm of Hg and Oxygen saturation: 97 % on room air. After securing the intravenous line with an 18 G cannula, she was premedicated with injectable midazolam 2 mg and dexamethasone 4 mg. Induction of general anaesthesia was done with fentanyl 100 mcg, propofol 100mg and vecuronium 6 mg after 5 minutespreoxygenation . Tracheal Intubation was done with flexometallic ETT of 7.0mmID preloaded with a malleable aluminium stylet. Following easy intubation stylet was pulled out of the ETT with a little difficulty and some extra force was needed. Tracheal placement was confirmed by auscultation and $ETCO_2$. Patient was mechanically ventilated on volume-controlled mode with a tidal volume of 450 ml and respiratory rate of 12 per min, peak airway pressure was 18 cm H_2O. Anesthesia was maintained with Isoflurane 1-2 vol%, oxygen with end-tidal CO_2 40 mmHg. During the time of ET tube fixation, consultant anesthesiologist was suddenly alarmed by the length of the previously removed stylet lying on the tray whose tip had ripped off and appeared shorter.

Quickly laryngoscopy was done to see if anything can be visualized above the vocal cord inside the lumen of the endotracheal tube. As nothing was visible, quick decision was made to remove the just fixed ET Tube and replaced with another one. The removed ET tube harboured the tip of the stylet at its tip. After confirmation of the correct placement of new endotracheal tube, surgery was proceeded which lasted for 90 minutes and the intra-operative period remained uneventful. After completion of surgery, the residual neuromuscular blockade was reversed, she was extubated and sent to the post op ward. The postoperative period was uneventful.

Figure 1. Endotracheal tube with shortened stylet

Figure 2. Broken piece of stylet inside ETT

DISCUSSIONS

Metallic stylets were used in the past with reports of broken stylets often causing ETT obstruction.[1,3] The newer plastic sheathed metallic stylets can also cause serious complications.

There are reported cases of broken piece of stylet in the ETT which were initially unnoticed until it caused partial ETT obstruction.[2-4,7] The obstructions were relieved with ETT removal and re-intubation with a new one. Further migration of plastic sheath or metal fragment may be more serious and possibly fatal as reported by Chalhoub et al.[8] of a case of migration of plastic fragment of the stylet sheath into the intrapulmonary airway in an intubated 27-year-old trauma patient. Two large plastic fragments had detached from the stylet. One piece was removed from the endotracheal tube a few hours later while the other migrated silently into right bronchus which was retrieved bronchoscopically 24 hours later. In many places anesthetists have abandoned the use of stylet and are pre-shaping the endotracheal tube by immersing it in ice cold water.[6]

There have been case reports of shearing of plastic coating of stylet even in neonates with 2.5 mm ET tubes.[4,5] Cook and Schultetus reported a case of a 700-gram new born that was intubated soon after birth due to depressed respiration. They argued that due to a difference of only 0.5mm between the diameter of the stylet and the internal diameter of the ETT the stylet gets tightly fitted within the lumen of the ETT. The tight fit and the soft plastic coating prevents the stylet from being removed easily from the ETT. Holding the ETT tightly by the clinician to prevent dislodgement also contributes to difficulty in removing the stylet leading to the pliable soft plastic coating being sheared from the tip of the stylet. Therefore, shearing can occur even with a loose fit and should be considered as a possible cause of partial ETT obstruction.[7]

Because of cost constraints, malleable aluminium metallic stylets are still commonly used in our setup. They are reused multiple times after cleaning and disinfecting.

The shearing or breaking off of stylet tip can occur especially when removal of the stylet from an endotracheal tube is difficult. In our case also, some extra force was needed while removing the stylet. The multiple used stylet could have worn out and might have ripped off. Fortunately, it was noticed in time. The event could have gone unnoticed until it caused partial airway obstruction or was pushed into the trachea by positive pressure ventilation with signs and symptoms of a foreign body in the tracheobronchial tree.

Regular equipment checks are recommended before its use and we should be cautious while using intubating stylets. Stylet must always be checked for intactness after removal from the ET tube—particularly when removal has been difficult.

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