

A Near Miss: Case Report and Literature Review

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Abstract

Keywords

- ▶ endotracheal
- ▶ intubation
- ▶ stylet

We report a 28-week gestation premature infant with rare complication of endotracheal intubation. A piece from the plastic sheath of the stylet was retrieved inside the endotracheal tube after extubation.

Plastic-coated stylets are commonly used during endotracheal intubation. The plastic sheath eases the stylet removal from endotracheal tube (ETT) and minimizes the trauma caused by its distal tip. However, they may host harmful risks to the patients. Shearing of the plastic sheath may compromise the function of the ETT or the airways. We report a complete severance of part of the stylet's plastic sheath in a newborn.

Case Report

A 28 weeks gestation premature infant with birth weight of 970 g developed respiratory distress syndrome causing oxygen desaturation and respiratory acidosis in blood gas. The attending physician decided to perform endotracheal intubation for mechanical ventilation support. A 2.5 mm uncuffed ETT threaded with 6-French (2-mm) plastic-coated stylet (SMMP, Riyadh, Kingdom of Saudi Arabia) was used. After intubation the physician could not remove the stylet from the ETT. The stylet was stuck inside the ETT but eventually came out with force. The intubation attempt lasted more than 90 seconds and the infant experienced a period of desaturation without bradycardias. After removal, it was noticed that the distal part of the coated sheath is missing. The infant was extubated and ~5-cm long plastic piece found embedded distally inside the ETT (▶**Fig. 1**). The infant immediately reintubated with a new set of ETT and stylet.

Discussion

Neonatal intensive care often involves using technologies and devices. Tracheal intubation is an invasive procedure using a

foreign body, the ETT. Improved staff training and quality of devices reduce complications related to endotracheal intubation. Although, it is considered to be safe and useful instrument, the stylet may pose a serious hazard to the infant. The stylet is covered by a plastic sheath to minimize trauma from the distal tip and ease withdrawal from the ETT. Retention of broken or sheared plastic sheath from the stylet is rare but serious complication. Case reports are scarce in the literatures but mainly included premature infants intubated with ETT size 2.5 mm, but term infants, ETT size 3 mm, and adult cases have been reported.^{1–9} We believe the few literature reports may not reflect the true incidence neither the magnitude of the problem. Signs of airway obstruction, persistent respiratory distress, oxygen desaturation, and difficult suctioning of ETT, despite a correct placement of the ETT should alert the physician of possibility of this complication.

The plastic sheath is stretchable, pliable, and the malleable metal core should rotate easily inside it. It is unclear how does the plastic sheath shear off. We speculate that at different point of surface contact between the plastic sheath, the ETT externally and the metal core internally, the frictional force is variable. During forceful withdrawal of the stylet, the linear force created will be mounted at the point of maximum friction, such as an angulation's point at the stylet. These different points may be created by kinks and bends in the metal core caused by excessive handling of the stylet.¹⁰ Using a forceful withdrawal commonly attributed as a risk factor for the shearing.^{1–9}

The sheared fragment may dislodge or be pushed in further, causing more damage to the airways or pulmonary parenchyma such as pneumothorax.³ Suctioning of the ETT

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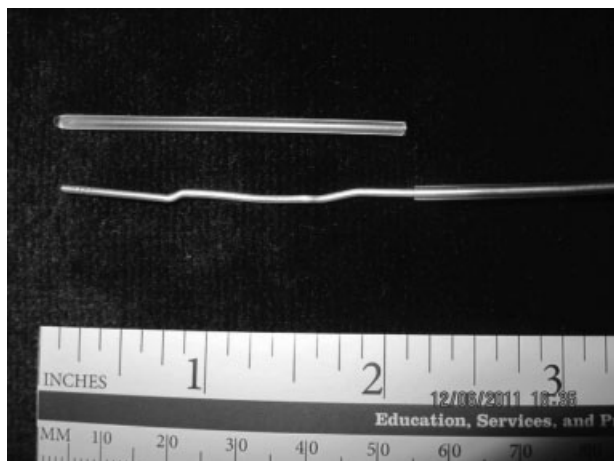


Figure 1 A 5-cm long piece of the stylet sheath retrieved from the endotracheal tube lumen after extubation.

will be almost impossible in the presence of the obstructing fragment.⁵

Pulling the stylet forcefully should be avoided, instead, if the stylet stuck inside the ETT, we recommend to extubate the patient and reintubate with a new set of ETT and stylet. Fitting and rotating the stylet into the ETT before intubation may ease the stylet's withdrawal without using excessive force. A bigger size ETT may be used if indicated. Bending the stylet sharply to fit the ETT should be avoided because most of the reported severed point occurs at the angulation point and consistently reported as a risk factor.⁶ The practice of completely removing the plastic sheath from the stylet before fitting it inside ETT and seating the metal tip completely inside the ETT distally has been advocated but not commonly used.⁶

The broken part of the plastic sheath has to be retrieved and should not be left inside. The timing of retrieval is controversial. The fragment may advance deep to a location too far to be accessed by endoscopy. Some authors do not recommend immediate removal of the ETT because the fragment may migrate deep.¹ Boyd et al reported successful retrieval of a sheared endotracheal stylet's sheath from the left main bronchus by using the "Amplatz" gooseneck snare, a special catheter used frequently to remove endovascular devices, guidewires, and their fragments.⁷ We were fortunate

that the ETT and the sheared plastic piece came out as one unit; otherwise, the fragmented sheath may compromise the function of the ETT or the airway. In case the stylet removed successfully while part of its plastic sheath sheared and left inside the ETT, the physician has to assess the clinical condition of the infant. Consulting a specialist in pediatric airway management or anesthetist versus extubation and ETT withdrawal should be considered.

It is very important to carefully inspect the stylet's integrity after withdrawal and before using any positive pressure ventilation,³ to use a new stylet for each intubation attempts, to minimize bending and rebending the stylet, and to twist the stylet's proximal end around the ETT adaptor. High index of suspicion and vigilance will help in avoiding doing harm to patients.

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