Case Report

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A Piece of Broken Metal from Intubation Stylet Retained in Tracheobronchial Tree: A Case Report

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Intubation stylets are still being used in many medical centers for difficult intubations. Although very rare, it may break inside the trachea during endotracheal intubation despite routine pre-assessments by anesthesiologists and may surprisingly move deep into the tracheobronchial tree. In this case report, we describe a rare complication after stylet or guide-wire intubation in a patient in whom, a broken piece of metal guide remained in his tracheobronchial tree for 3 days.

A 62 year-old man was admitted to our hospital with the chief complaint of functional class 3 dyspnea. The patient was a known case of chronic obstructive pulmonary disease (COPD) from 3 years ago with a history of heavy smoking (40 p / y) and oral opioid usage.

We report a case with an unrecognized broken piece of stylet in his trachea and left main bronchus, which was later detected by CT scan and extracted before causing pressure rise symptoms in the airway.

Despite precise evaluation before use, signs of breakage in the stylet may be missed and consequently, it may break inside the trachea and result in serious complications. It is strongly recommended that the anesthesiologists pay attention to the sounds and movements of the instruments. This article also briefly reviews the most serious reported complications due to stylet breakage.

Key words: Intubation, Stylet, Endotracheal tube, Difficult Intubation

INTRODUCTION

Endotracheal intubation has been accepted as the best method for keeping airway patency and assistance of mechanical ventilation and oxygenation. It is also the most acceptable form of protection against regurgitation and pulmonary aspiration; and failed or difficult endotracheal intubation is a significant cause of morbidity and mortality during airway management (1).

Several methods have been introduced and used to detect patients at risk of difficult intubation before the induction of anesthesia (2). But, some cases already under endotracheal intubation or those undergoing extubation and re-intubation may be difficult cases since some of them may develop tracheal stenosis or inflammatory processes, making the airway more susceptible to difficult intubation.

A wide variety of methods and devices have been shown to have optimal efficacy for handling of difficult intubations and can be used as an alternative to conventional direct laryngoscope such as glidoscope, rigid optical instruments, flexible fiberoptic bronchoscopes, light wands, guide stylet assistance and many other commercially available devices (3).

All devices and methods have some degrees of side effects and complications especially if difficult intubation occurs. The complications include laryngospasm,

perforation of the trachea or esophagus, pulmonary aspiration of gastric contents or other foreign bodies, fracture or dislocation of the cervical spine, teeth, temporomandibular joint or arytenoid cartilages, decreased arterial oxygen content, elevated arterial carbon dioxide, and vocal cord paresis (4). Guide-wire or stylet intubation technique has also been reported to cause rupture of tracheal wall when being used in difficult intubation cases (5)

In this case report, we describe a rare complication after stylet or guide-wire intubation in a patient with a broken piece of metal guide remained in his tracheobronchial tree for 3 days.

CASE SUMMARIES

A 62 year-old man was admitted to our hospital with a chief complaint of functional class 3 dyspnea. The patient was a known case of chronic obstructive pulmonary disease (COPD) from 3 years ago with a history of heavy smoking (40 p / y) and oral opioid usage.

Other remarkable medical history points included pulmonary embolism at 20 years of ago which was treated appropriately, pilonidal abscess 10 years ago, two periods of 10-day hospitalizations in the last 8 months due to exertional dyspnea at other medical centers and also diabetes mellitus from 6 years ago, which was under control with oral hypoglycemic agents. Drug history included Glibenclamide and a group of drugs prescribed for COPD (Salbutamol, Atrovent and Theophylline). The family history was unremarkable.

At the time of admission, the patient had productive cough with white color sputum, post-nasal discharge (PND), orthopnea and also significant loss of appetite and weight loss in the past 1 year. Physical examination revealed bilateral basilar fine crackles and decreased lung sounds at the left side of the chest and also pitting edema in both lower extremities. Vital signs included BP=140 / 90 mmHg, PR=96 / min, RR=28 / min and T=37^0 C.

After initial evaluation for cardiac function and Doppler ultrasonography, which were almost normal, and normal, respectively, the patient developed respiratory distress and was intubated by a simple laryngoscopy method and endotracheal tube (ETT) and transferred to the ICU. During subsequent days, some extubation episodes happened. For the last episode, the anesthesiology resident used guide-wire assistance intubation method using a well-assessed stylet after failure of a conventional intubation method. During ICU care, the patient developed left pleural effusion, which was bloody and contained malignant cells by thoracocentesis. After spiral chest CT-scan, chest tube preparation was done.

The CT scan showed metal density in the trachea continuing to the left main bronchus and also a mass in the left lower lobe of the left lung, which turned out to be squamous cell carcinoma after CT-guided biopsy. Figure 1 demonstrates chest X ray taken at the period of metal retention.

Figure 1. Chest X ray of the patient showing a metal density inside trachea and left main bronchus.

Therapeutic bronchoscopy was done 6 days after the admission and a 4.5 cm metal piece of stylet used during the last intubation attempt was removed from the patient's tracheobronchial tree (Figure 2). The noticeable fact is that at the period of retention of the stylet the peak pressure of the airways did not increase and was totally normal.

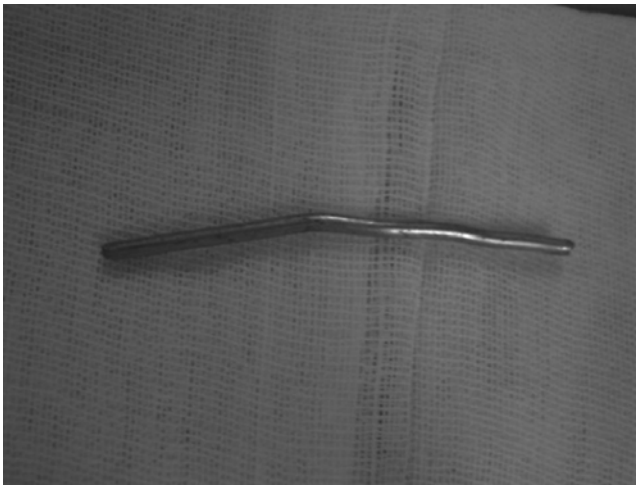

Figure 2. Removed broken piece of stylet from patient's tracheobronchial tree.

Unfortunately, the patient died due to pulmonary edema and cardiac arrest 14 days after removal of metal piece, but during the stylet-free period, the patient showed relative relief of respiratory distress symptoms.

DISCUSSION

According to the American Society of Anesthesiology, noninvasive interventions intended to manage a difficult airway include: awake intubation, video-assisted laryngoscopy, intubating stylets or tube-changers, supraglottic airway (SGA) devices for ventilation (e.g., laryngeal mask airway, laryngeal tube), SGA devices for intubation (e.g., ILMA), rigid laryngoscopic blades of varying designs and sizes, fiberoptic-guided intubation, and lighted stylets or light wands.

Among these methods, intubating stylets such as guide-wires result in successful intubation in 78–100% of difficult airway patients (6). Reported complications from intubating stylets include mild mucosal bleeding and sore throat (7) but breakage or shearing of the tip of the stylet and subsequent unnoticed airway obstruction is a very rare event being reported in only 6-7 cases before.

Boyd et al, in 1999 reported sheared endotracheal stylet plastic sheath remaining in tracheobronchial tree in a premature infant intubated because of respiratory distress after premature cesarean section. They eventually retrieved the plastic sheath using fluoroscopy and Amplatz Goose Neck snare directed through the endotracheal tube (8). Shetty et al. also reported the same plastic sheath retained inside the endotracheal tube, and reported that ventilator parameters and respiratory acidosis improved after removal of the sheath and re-intubation (9). A similar case of ETT obstruction by sheared plastic sheath was reported in a 30 year-old man by Schaffranietz et al (10).

Sharma PK et al. (11), Rabb et al. (12), Zmyslowski et al.(13), and Sharma A et al.(14) reported a broken metal piece of guide stylet remained unnoticed in ETT, which resulted in partial ETT obstruction. However, the problem solved after ETT exchange and re-intubation.

Further migration of plastic sheath or metal fragment may be more serious and also possibly fatal. Chalhoub et al. recently reported a plastic fragment of the sheath migrated into the intrapulmonary airway asymptomatically. Fortunately, the fragment was bronchoscopically removed 24 hours later (15).

In our report, we described migration of the broken piece of the intubation stylet to distal trachea and left main bronchus presented in CT image, which was removed by fiberoptic bronchoscopy. After this event, we noticed that the stylet was overused and had some signs of over usage such as a few stains and some scratched points suggesting potential weakness in its shaft. We also reviewed the process of intubation attempts with the responsible anesthesiology resident and found some noticeable points: First, the resident remembered noticing significant signs of over usage such as thinning in usual bending part of the stylet which was a critical point for breakage. Second, the tip of the stylet certainly had gone beyond the endotracheal tube with a sharp angle while guiding the intubation. Third, the breakage must have been occurred while removing the stylet from ETT, that is why he felt some degrees of resistance against the movement of the stylet out of the patient's trachea. Fourth, after removing the stylet, the resident got involved in management of the patient's hemodynamics and failed to pay careful attention to the integrity and 4.5 cm decrease in length of the stylet

and other possible defects. The point is that before usage of this stylet, routine assessment was done by an anesthesiologist and its safety was ensured and was well lubricated, but during the intubation and after that, not paying attention to signs of breakage in the stylet resulted in serious complications.

This report about our patient was written after obtaining his family's informed consent.

The authors declare that they have no conflict of interest.

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