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ORIGINAL ARTICLE

Self-knotted Nasogastric tube: A Case report

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ABSTRACT
The nasogastric tube is commonly used in medical care but this innocent-looking simple medical device may cause unexpected and severe complications. In this report, we describe our experience about sticking of a 16-french plastic nasogastric tube during removal in the nose of a 23-year old self-intoxicated woman in poisoning ward. The situation was further complicated by the inability to visualize the tube in the posterior pharynx of the patient for removal through the mouth. The real reason of sticking was not clear to us; so, using some medications and a Kelly forceps, the tube was removed from the patient's nose. It came as a surprise to discover a real impressive knot at the end of the nasogastric tube. The patient was discharged without any complication after two days. Knotting of small diameter feeding nasogastric tubes have already been reported by some authors but, knotting of large caliber nasogastric tubes has rarely been reported. We reviewed the related literature and discussed the precautions to prevent knot formation and methods for the removal of a knotted nasogastric tube.
Keywords*: nasogastric tube, Nose*

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INTRODUCTION

The nasogastric tube is commonly used in medical care but this innocent-looking simple medical device might cause unexpected and severe complications [1]. Since the technique is usually 'blind' and the nasogastric tube insertion and extraction are usually left to the junior and inexperienced members of the team, it may be subject to legal complaints as an instrument highlighting medical errors [1, 2].
Knotting of small diameter feeding nasogastric tubes have already been reported by some authors [3-6]; but, knotting of large-caliber nasogastric tubes is even more uncommon [3, 7]. This usually appears to be a stressful situation and doctors have to adopt strategies to resolve the problem safely and effectively. In the article, we report a case of spontaneous knotting of a plastic nasogastric tube during removal. We also review the literature related to this and/or other complications associated with the use of nasogastric tube to elucidate risk factors, precautions to prevent knotting and methods for the removal of a knotted nasogastric tube.

CASE REPORT

A 23-year old woman who was presented with a deliberate multi-drug ingestion, in a suicidal attempt, was admitted to our hospital. Based on the taken history, the patient had ingested 20 tablets of amlodipine 5 mg, 10 tablets of ciprofloxacin 250 mg, 10 tablets of metronidazole 250 mg, and a few other unknown medicines.
She underwent nasogastric tube insertion for gastric washing through right nostril using a 16-French plastic nasogastric tube uneventfully by our general practitioner in the emergency department. After a successful gastric lavage and insertion of a mixed aqueous solution of activated charcoal (40 g) and sorbitol (60 g), the patient was transferred to the poisoning ward. Four hours later, the gavage of similar

dose of activated charcoal and sorbitol was repeated. On the following day, however, the patient's condition improved and a clinical toxicologist issued order of removing the nasogastric tube.

It was not possible to an experienced nursing staff to remove the nasogastric tube. The tube had stuck in nasopharynx during extraction and the distal end of the tube was not visible in the oropharynx for removal through the mouth. The patient complained of pain but no gagging or respiratory distress resulted. Further attempts to remove the tube from the nose or to advance it into the oropharynx by the attending physician were unsuccessful.

Unfortunately, lateral neck x-ray could not be performed because the portable radiography apparatus of the hospital was impaired and out of service at that time. Comparing the length of the tube with a similar nasogastric tube alongside revealed that about 13 centimeters of distal portion of the tube impacted in the right nostril due to an unknown reason.

It was for the first time that we encountered this situation in our long-lasting professional experience. We thought something such as a clot or a food remnant had been trapped in tip holes of the tube and had led to this complication. We really did not imagine that the nasogastric tube could have been knotted or twisted. So we inserted about 5 mL of lidocaine gel beside the tube into the right nostril. After 10 minutes we tried to remove the tube, but in vain.

We had a phone consult with an otorhinolaryngology (ENT) specialist, and following his advice we used three drops of nasal drop of phenylephrine into the right nostril every 10 minutes for three times. After about 30 minutes, the third retry for removing the tube was unsuccessful again. Finally, we had to cut off the proximal end of the tube about 7-8 cm outside the nose and insert about 10 mL of castor oil via the tube by a 10 mL syringe. Then we tried to advance the tube inward, but it was not possible. Finally, we turned the free end of the tube gently using a Kelly forceps and pulled it out from the nose by moderate force without complication. It came as a surprise to discover a real and impressive knot at the end of the nasogastric tube (see Figure 1).

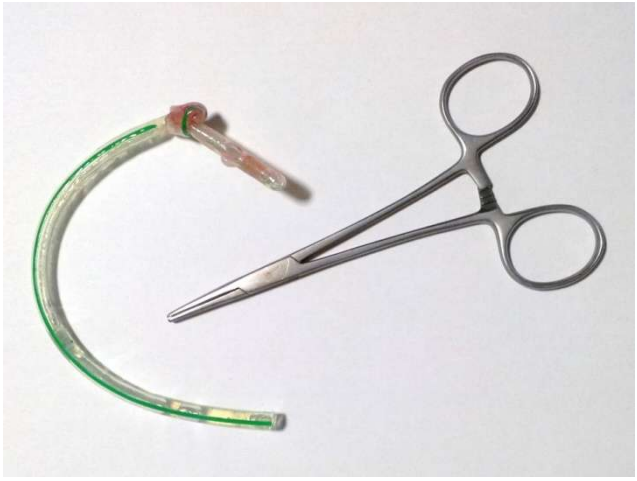

Figure 1. A real impressive knot at distal end of a 16-French plastic nasogastric tube (left) and a Kelly forceps (right) used to remove the tube

Upper gastrointestinal endoscopy after tube retrieval showed no esophagogastric complication. The patient was visited for two next days at the ward and was discharged from hospital without any complication.

DISCUSSION

As early as 1790 John Hunter of London reported the use of a stomach tube for the purpose of feeding a patient with paralysis of the muscles of deglutition [8]. Nowadays, nasogastric tubes are commonly used in medicine for feeding [9, 10], gastric decompression [9, 10], removal of ingested toxins [9], determining whether GI bleeding arises from the upper GI tract [9, 11], and gastric sampling during gastric secretory studies [9].

The procedure complications during both insertion and removal include epistaxis [11-13], irritative rhinitis [12], sinusitis [9, 11, 12], otitis media[12], pressure necrosis of nasal wall [12], pharyngitis [9, 12], laryngeal injury or edema [7, 9], tracheal intubation or obstruction [9], respiratory distress [7], pulmonary aspiration [10], pulmonary hemorrhage [9], nasopharyngeal or esophageal perforation [7, 11, 12], pneumothorax or hemothorax [10, 11], esophageal stricture [9, 12], tracheoesophageal fistula [1], vocal cord paralysis [9], penetration of the tube to the adjacent organs such as the brain [9, 11, 12, 14],

the maxillary sinus [12], the orbit [12], pleural cavity [9, 15], aorta or other great vessels [9], and coiling of the tube and knot formation [9, 10, 12]. In some rare instances even deaths were reported due to these complications [1, 2, 13].

Established risk factors for some complications include maxilla-facial or cranial trauma, especially cribriform palate fracture, for intracranial penetration [9, 11]; esophageal diverticulum or stricture for esophageal perforation [9]; failure to confirm gastric intubation for pulmonary infusion [9]; prolonged tube placement for esophageal stricture formation [9]; and continuous suctioning for gastric ulceration [9].

The nasogastric tube coiling and knot formation are rare complications and have been commonly reported with small-diameter tubes [1, 3, 9, 10, 16]. Insertions of an extra length of the nasogastric tube, repetitive advancement of the tube and interference with an endotracheal tube in the intubated patient are among the risk factors which are intimately associated with knotting of the tube [9, 10, 13, 17]. A small gastric remnant (e.g., following gastroplasty) has also been reported as a risk factor to knot formation [9, 10, 16]. However, many authors have postulated that pushing or pulling of the nasogastric tube after it has been placed, either by an operator or due to coughing or neck movement may also result in knot formation in normal stomach [9, 10, 13].

The knot formation in a nasogastric tube is recognized either once the tube is completely removed, or when a resistance is encountered during its removal [10, 16]. Moreover, inability to infuse solutions or aspirate gastric contents through the nasogastric tube might be warning signs of possible tube knotting [9]. Diagnosis can be confirmed radiologically by a plain lateral neck film [6, 10, 18]. A knotted tube should not be retrieved forcefully through the nasopharynx; approached this way it runs the risk of leading to nasopharyngeal trauma [6, 9, 10]. The knotted distal portion of the tube should be pulled out through the mouth, cut, and removed [9].

SUGGESTION FOR PREVENTION OF COMPLICATIONS

Most of complications of nasogastric intubation are avoidable with careful attention to details when placing the tube and careful management of the tube on a day to day basis. In this specific case, our guess was that the nasogastric tube had been inserted unnecessarily too far. The tube length required for gastric intubation can be estimated as the distance from the xiphoid process to the angle of mandible (pinna) and from the pinna to the tip of the nose [7, 9, 11]. The appropriate length should be marked with a piece of tape or by noting the marks on the tube just beyond this point [7]. A nasogastric tube should be carefully passed just into the stomach in the patients with small gastric remnants [9]. Proper gastric intubation can be verified by auscultation over the epigastrium during air insufflation through the nasogastric tube and then by aspiration of gastric contents [9, 11]. Tip location may also be verified by fluoroscopy or abdominal radiography [6, 9, 11]. Radiographs of the chest and abdomen should be obtained periodically throughout the course of tube alimentation of all patients in order to detect any subsequent tube misplacement, knot formation, or clinically silent aspiration [1]. Using larger-diameter tube and avoiding excess advancement into the stomach may minimize the risk of coiling and knot formation. Failure to clear a blocked tube by flushing with water or normal saline at moderately high pressure should end in tube removal and not to application of excessive pressure [9].

CONCLUSIONS

Nasogastric intubation is not a simple procedure as in the general concept. The ‘victorious’ placement of the full length of the tube is not a good practice. Removal of the tube by an unskilled team member may also lead to serious compilations. The New England Journal of Medicine has published a series of videos on clinical medicine, including a video on nasogastric intubation, which are freely accessible on the Internet; we suggest them for medical students as a very good learning source [11].

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