Case Report

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Knotting of a nasogastric feeding tube in a child with head injury: A case report and review of literature

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ABSTRACT

Nasogastric intubation is one of the most common routine nonoperative procedures available for the hospital care of patients. The insertion and removal of this tube is associated with many complications. The complications include trauma, nasal septal abscess and inadvertent entry into the cranial cavity and trachea, ulceration, bleeding from varices and perforation. Knotting of the nasogastric tube is one of the very rare complications of nasogastric intubation particularly in children. To the best of our knowledge there are very few reported cases in children. The technique used in the patient was the application of a steady tug which allows the lower oesophageal sphincter to open, therefore enabling the removal of the nasogastric tube. The possible predispositions to knotting of a nasogastric tube include small bore tubes, excess tube length and gastric surgery. We postulate that reduced gastric tone is another possible predisposing factor with head injury being the most likely reason in the index patient. We also challenge the fact that the small sized stomach is a risk factor for knotting of a feeding tube if the functional status and tone are normal, because of the rarity in children.

Key words: Nasogastric, feeding tube, Knotting, child, head injury

INTRODUCTION

There are several uses of nasogastric tube (NT) in medical practice ranging from gastric decompression to feeding.[1] The understanding of the benefit of early enteral nutrition in attenuating metabolic response and reducing the rate of gastrointestinal bacterial translocation, preventing systemic inflammatory response syndrome has made this tool important in nutritional rehabilitation of patients.[2] The tube though beneficial is froth with several complications. The rate of complication is further heightened by the fact that the tube is usually inserted and removed by junior staff.[1] Some of the complications include nasal sepal abscess and erosion, sinusitis, otitis media, inadvertent entry into the cranial cavity, laryngeal oedema, inadvertent entry into the trachea, ulceration, bleeding from varices and perforation.[3] The tube may kink, fold, but a true knot is a very rare occurrence.[4]

CASE REPORT

The patient is a 5-year-old primary school pupil involved in a road traffic accident 6 weeks prior to presentation in our institution. He presented with a 6-week history of loss of consciousness and post traumatic seizure. He was a pedestrian who was hit by a fast moving car. He lost consciousness at the scene of the accident, no bleeding from craniofacial orifices or vomiting. He, however, had generalised tonic clonic seizures which were controlled by anticonvulsants. He was admitted to the intensive care unit and had endotracheal intubation. A week after admission a nasogastric feeding tube was passed in the referring hospital. Two weeks post trauma he developed difficulty in respiration necessitating a tracheostomy. He was then referred to a neurosurgical centre (our institution) on account of a computed tomography (CT) finding of a subdural haematoma. On examination he was not pale, anicteric, acyanosed and afebrile. He had a Glasgow coma score (GCS) of 8T (tube-tracheotomy)/15, spastic with hypereflexia. He had a burr hole and evacuation of the haematoma. He was recommenced on NT feeding a few hours after surgery and on the third post operative day, a leakage from the proximal end of the same NT that was inserted in the referring hospital was noticed when the child increases his intraabdominal pressure. No respiratory distress or chest signs.

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On an attempt to remove the tube an unusual resistance was felt, but a steady tug was sustained following which it was removed and a knot of the tube was noticed [Figure 1]. A new tube was inserted and about 10 ml of altered blood was aspirated. Patient was left *nil per os* for 6 hours, no drainage was noticed thereafter, NT feeding was recommenced. Subsequently he was placed on graded oral sips. He subsequently had decannulation of the tracheostomy tube and was discharged with a GCS of 11/15.

DISCUSSION

The technique of removal of the NT of this patient involved the application of a steady sustained tug (steady tug technique) which allowed the lower oesophageal sphincter to open. This is similar to the vomiting reflex where the increased intragastric pressure leads to opening of the lower oesophageal sphincter. It should also be noted that the tube was not pulled forcefully which could lead to an oesophageal tear and the risk of an oesophageal injury and also the risk of oesophageal stricture in the future. A similar technique of gentle removal under fluoroscopy by Otsuji[5] has been described but not exactly the same as the steady tug technique.

Nasogastric intubation is one of the most common clinical procedures performed. This is frequently done by the inexperienced staff of the unit, and when precautions are not taken it could be wrongly placed leading to complications.[1] The list of the complications of nasogastric intubation are more than the indications for its use. The likelihood of complications is increased mainly because the procedure is blind and further worsened if done by an inexperienced personnel (junior physician or nurse).[6] Knotting of the tube is usually associated with increase NT length.[7] Since insertion of the NT is associated with complications, the personnel inserting the tube must ensure that it is properly placed, when in doubt it should be removed.



Figure 1: Pictures showing a true knot of a nasogastric tube after extubation from a child

An appropriate size of tube should be used. In the adult a size 10–12 FG tube should be used as feeding tubes,[8] while sizes 14–18 as drainage tubes for decompression. In neonates size 4–6 should be used, in infants size 8 should be used for feeding and for older children size 8–10 is appropriate. For preterm babies weighing less than 1.5 kg size 4 tube is used, for those greater than 1.5 kg a size 5 tube is used, those above 5 kg size 6 tube is used, [9] while in term neonates up to size 8 has been used for drainage to reduce intra gastric gas. Disposable hand gloves should be worn when inserting a NT and if the risk of vomiting is high, the operator should consider face mask protection. The patient is placed in a semi sitting position and the length to be inserted measured from the Xiphisternum to the ear and then to the tip of the nose. The tube is then lubricated with a lubricating jelly (xylocain jell could be used and the pharynx could be anaesthetised with xylocain spray). The tube is then gently passed downwards through the nostril and the patient asked to swallow if conscious, when it has passed beyond the pharynx the tube moves downwards with minimal resistance until the end of the earlier estimated Naso-gastric length is reached. The tube is then strapped with an adhesive tape. To confirm the location of the tube air insufflations is done through the outer end of the tube, while the epigastrium is auscultated, a 20% false gastric confirmation has been documented.[10] An attempt to aspirate the gastric content is the next step. The absence of continuous bubbling of air in water with the outer end of the tube under water in a galipot helps to rule out the possibility of the tube being in the airway. The pH of the aspirate and the bilirubin level could be used to determine where the content is arising from, stomach (3.9) acidic, intestine (7.35) neutral, lungs (7.73) basic.[11] The localisation of the tube by X-ray is one of the most reliable methods. Roubenoff and Ravich outlined a two step safe protocol which includes, advancing the tube blindly to 30 cm and then confirming the placement with X-ray.[12] Capnography has also been used with a sensitivity and specificity of 100%.[13] The commencement of feeding should involve the use of little amounts of clear water and observation made to ensure that the patient is not in any form of respiratory distress, before the proper commencement of nutritional rehabilitation. The tube should be changed every 21 days (2 to 4 weeks) to prevent pressure necrosis.[14] During the removal of the tube the procedure is explained to the patient if

conscious, an emesis bowl kept within reach, the tube is flushed with air to clear residual fluid from distal tube. The tape is gently removed, the tube occluded between the finger and thumb, the patient is asked to take a deep breath to reduce the risk of aspiration. It is then gently but quickly removed and the patient wipes his or her face. The items are them safely discarded.

Knotting of NT is rare in children most likely due to the small size of the stomach. Hence, when the tube is inserted it remains in stomach, but if excess length is passed the chances are high that it would pass to the duodenum and subsequently to the small intestine.

In conclusion the insertion of a NT should be properly learnt and when in doubt the tube should be removed and reinserted or it should be confirmed by X-ray. The insertion, use and removal of NT should not be left to inexperienced staff, rather they should be taught, supervised and there competence approved before being left to perform this procedure. This will go a long way in preventing some of the complications of the use of NT.

A knot is one of the complications of a feeding tube which is associated with fine bore tubes and insertion of excess length of the tube. Although some authors believe it is common in patients with small stomach such as following gastroplasty.[15] We think it is less common in patients with normal functioning small sized stomach because it is relatively rarer in children and its more likely to direct the tube to the duodenum, but may present in patients who have had gastric surgery or have a reduced gastric tone even after reduction in size of the stomach as in those who have had gastroplasty. We also postulate that the index patient may have had decreased gastric tone due to the head injury which sometimes present with delayed gastric emptying and increased risk of aspiration.

The technique of the steady tug without rapid pulling of the tube may allow the lower and subsequently the upper oesophageal sphincters to open as in the index patient, but if this fails the radiological localisation with endoscopic or surgical intervention becomes the next level of care. After using this technique it is recommended that the patient is followed up to rule out the possibility of a stricture in the future.

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