

Case Report

Rare Occurrences in Gastroenterology: The Phenomenon of Nasogastric Tube Self-Knotting

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Nasogastric tubes are commonly used in daily practice both for stomach decompression and for feeding purposes however the number of potential complications almost exceeds the indications for use. This innocent-looking tube can at times cause unexpected complications especially in patients with pre-existing risk factors. It has been found to have led to serious complications including respiratory distress, severe laryngeal injury, and trachea-esophageal puncture. Knotting of small-bore feeding tubes and nasogastric tubes during insertion and removal is rare; knotting of large-caliber nasogastric tubes is even more uncommon. However most of this morbidity is avoidable with careful attention to detail when placing the tube and careful management of the tube on a day to day basis. A knot occurring in the distal end of a nasogastric tube is a rare complication. This is either recognized once the tube is completely removed, or if resistance is encountered during its removal, when the knot presses upon the posterior aspect of the nasal area. We hereby report a knotted nasogastric tube on one of our long stay patient in our health facility inserted for feeding and administration of medication. After some time, it was observed that the nasogastric tube suddenly became blocked. Attempts to flush the tube freely failed.

Keywords: Nasogastric tube, Knotting

INTRODUCTION

The nasogastric tube is used extensively in medical practice and its insertion is usually left to the junior members of staff. This innocuous-looking tube at times can be a source of many untold miseries for the patient.

Insertion of a nasogastric tube during various abdominal procedures is the standard method of decompressing the upper gastrointestinal tract. Despite the many uses of the nasogastric tube, its insertion and prolonged presence is not without complications (Mohsin et al., 2007). Some of these complications such as necrosis of the nasal ala, ulceration and infection of the posterior cricoid region with subsequent dysfunction of vocal cord abduction, the so called nasogastric tube syndrome (Apostolakis et al., 2001)

and various other complications have been documented in the literature.

Although nasogastric tube coiling and knot formation is a known complication, it is more commonly seen with small-diameter tubes or in patients with a small stomach such as following gastroplasty or when an excessive length of the tube is left in the stomach (Morris 1997; Malik et al., 1999; Cappell et al., 1992).

Insertions of an extra length of the nasogastric tube, endotracheal intubation and repetitive advancement of the tube are the other risk factors associated with knotting of the tube.



Figure 1



Figure 2

Agarwal *et al.* state 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 lead to the formation of a loop (Agarwal *et al.*, 2002).

Previous case reports on nasogastric tube knotting have usually involved nasogastric tubes that were in situ for a prolonged duration, ranging from one (1) to twelve (12) days (Trujillo *et al.*, 2006).

This is the report a knotted nasogastric tube on one of our long stay patient in our health facility inserted for feeding and administration of medication.

After some time, it was observed that the nasogastric tube suddenly became blocked and attempts to flush the tube failed and it was not until the tube was later removed that we noticed a knot had formed at its distal end.

One is therefore compelled to share this experience and to alert clinicians about this complication which may be encountered during the use of this simple and widely used tube in clinical practice.

CASE REPORT

A 30-year old male patient on long term admission in our hospital in a persistent vegetative state due to severe head injury had a 16 F (French gauge) nasogastric tube inserted through the right nostril for feeding and administration of medication. It was fixed at an approximately fifty five (55) cm mark at the nostril after confirmation of correct placement by aspiration of gastric contents.

After two (2) weeks, it was observed that the nasogastric tube suddenly became blocked. The tube was manipulated and flushing attempted to ascertain its patency without any success.

A decision was then taken to pull out the tube and replace it with a new one. We found that it was difficult to

pull the tube out of the patient's stomach, and the tube got stuck in his naso-pharynx.

After two failed attempts at removal, the proximal end of the tube was cut and the knotted end removed via the mouth with the aid of a Magill's forceps while the remaining length of the tube was removed easily through the nose.

We were surprised to discover a perfect tight knot at the end of the nasogastric tube that was withdrawn via the mouth (figures 1 and 2 above).

Significant in this case on enquiry after this discovery of the tight knot was that one of our junior staff alluded to the fact that after partial displacement of the original tube two days earlier, the tube was manipulated and pushed further into the stomach before it was discovered to be totally blocked two days later.

We also inspected the tube after removal to rule out any structural damage to its substance making it more malleable and rendering it more liable to knotting, but there was no such abnormality noted.

DISCUSSION AND CONCLUSION

Nasogastric tubes are commonly used in daily practice both for stomach decompression and for feeding purposes. Despite their frequent use, they are associated with complications like lung aspiration, pneumothorax and coiling (Nakano *et al.*, 1996). Most of this morbidity is avoidable with careful attention to detail when placing the tube and careful management of the tube on a day to day basis.

Feeding through the nasogastric tube is one of the commonest methods employed to maintain the nutritional status of a patient who is unable to take food orally due to disease or disability (Pancorbo-Hidalgo *et al.*, 2001).

However, this innocent-looking nasogastric tube can cause unexpected complications. Since the technique is

usually blind and left to the junior members of the unit, it has often been a subject of court battles as an instrument highlighting medical errors (Dyer 2003).

The complications noted by various authors, especially trachea-pulmonary, range from 0.3% to nearly 8% (McDanal et al., 1983), and even a mortality of around 0.3% are documented (Rassias et al., 1998).

One of the rare complications associated with insertion of a nasogastric tube is that the distal end of the tube can undergo knotting and impaction (Liao et al., 2007).

Mechanism of knot formation is similar to that of super coiling and concatenate formation. This results in the failure of removal of the tube. The main reason for this is that the tube can coil back on itself when an excess length is introduced. The victorious placement of the tube to its full length has been found not to be a good practice.

Although this phenomenon of knotting has been reported in the literature, its incidence appears low (Dasani and Sahdev 1991).

Risk factors appear to include smaller diameter tubes, insertion deep into the stomach.

Once knotted, the traction during retrieval tightens the knot. Larger diameter tubes and the avoidance of excess advancement into the stomach may minimize this complication.

Agarwal et al. state 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 lead to the formation of a loop (Agarwal et al., 2002).

Hence, repositioning of the nasogastric tube should be avoided, especially in patients who are anesthetized or have an obtunded cough reflex as it is in this case.

It is imperative to measure the correct length of insertion of the nasogastric tube prior to its placement and mark this length with a marker or tape so that only the necessary length of the tube is inserted and any unrecognized tube movement can be detected.

Nasogastric tube coiling and knotting is more common with small bore tubes or in patients with small stomachs. Insertions of an extra length of the nasogastric tube, endotracheal intubation and repetitive advancement of the tube are the other risk factors associated with knotting of the tube.

Unusual types of knot have previously been reported with traumatic complications (Trujillo et al., 2006). The possibility of a true knot in the nasogastric tube should be kept in mind if a stiff resistance is felt during its attempted removal.

A lateral radiograph of the head and neck may aid in the diagnosis of a suspected coiled or knotted nasogastric tube.

This case illustrates that even a simple procedure such as the insertion of a nasogastric tube can have potentially serious consequences. Only the necessary length of the tube should be used, and this length should be determined by measuring from the nostril along the side of the face past the ear. The appropriate length should be marked with a

piece of tape or by noting the marks on the tube just beyond this point because as the saying goes, an ounce of prevention is worth a pound of cure.

In this case the nasogastric tube may have been inserted too far and at the same time because of the manipulation after its partial displacement two days earlier; the tube had formed on itself into a very unusual knot, which then tightened as the nasogastric tube was pulled out.

In addition, the intragastric part of the tube that formed the knot may have become rigid as a result of the action of hydrochloric acid or the alkaline content entering the patient's stomach from the duodenum (Drenick and Lipset 1971).

We postulate from this case, that unnecessary advancement of the nasogastric tube may result in knot formation, and care should be taken to avoid this.

Also, knot formation in a nasogastric tube should be borne in mind when difficulty is encountered upon removal and diagnosis can be confirmed radiologically by plain X-ray or a water soluble contrast via the nasogastric tube (Santhanam and Margaron 2008). In such cases care should be exercised if nasal or oesophageal trauma is to be avoided.

Nasogastric intubation is not a simple procedure as is the general concept and it should not be left to the inexperienced team members of the medical profession because of its attendant complications as highlighted by this case report and documentation of other authors.

The standard technique for insertion should always be adhered to and it should be followed by radiographs to rule out malpositioning and other reported complications (Cappell et al., 1992).

It is recommended therefore that prior to insertion of nasogastric tubes or any other similar tube of significant length, the tube should be checked for structural defect and patency.

The manufacture's instruction regarding the markings on how far the tube should be inserted in the stomach should be strictly followed so as to avoid inadvertent looping (Egan and Shami 2011) and subsequent knotting that could result in morbidity for the patient.

Furthermore confirmation of the nasogastric tube's position after insertion should not only be by the traditional method of injecting air through the tube while auscultating the epigastric area to detect air insufflation alone; but other methods of checking like post insertion abdominal x-ray, measurement of tube length, visual assessment of the aspirate and sometimes the pH measurement of aspirate should be used as the foregoing is not one hundred percent reliable.

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