CASE REPORT

Nasogastric tube knotting: a rare and potentially overlooked complication among healthcare professionals

Vijay Chavda,¹ Tariq Alhammali,¹ Joanna Farrant,¹ Leena Naidu,² Saleem El-Rabaa¹

¹Department of General Surgery, Kettering General Hospital NHS Foundation Trust, Kettering, UK
²Department of Radiology, Kettering General Hospital NHS Foundation Trust, Kettering, UK

Correspondence to
 Vijay Chavda,
 vijaycc987@gmail.com

Accepted 14 July 2017

SUMMARY

Nasogastric tube placement is a common procedure performed in surgical and medical specialities. The occurrence of knot formation is perhaps one of the least well-recognised complications associated with its usage. We present a case of nasogastric tube knotting to remind colleagues of this rare but important complication. A 75-year-old woman with adhesional bowel obstruction was admitted under the general surgery team. A wide bore nasogastric tube was inserted for drainage and decompression. Although placement of the tube was deemed to be successful, there was no drainage of gastric content evident. On removal of the 'non-functioning' tube a simple knot was seen at its proximal end. A further nasogastric tube was placed and the patient's symptoms resolved with conservative management. Nasogastric tube knotting is a rare and often overlooked complication with the potential to cause significant trauma on tube removal if unrecognised.

BACKGROUND

Nasogastric tube placement is a common procedure performed in many surgical and medical specialities. The indications for tube placement broadly include either enteric feeding or for the purposes of gastric decompression and drainage.

There are many potential risks involved with nasogastric (NG) tube placement (see [box 1](#)).¹⁻⁵

Although well documented within the literature, the rare occurrence of knot formation is perhaps

one of the least well recognised among healthcare professionals.

We present a case of NG tube knotting in a 75-year-old woman admitted with bowel obstruction to remind colleagues of this rare but important complication.

CASE PRESENTATION

A 75-year-old woman was rushed to the emergency department in the early hours complaining of vomiting, abdominal distention and absolute constipation. There was a history of abdominal surgery involving a laparotomy and sigmoid colectomy for bowel cancer. This was followed by a further laparotomy for completion colectomy and end-ileostomy formation for caecal recurrence. The patient had also had previous admissions with adhesional bowel obstruction.

Following review by the on-call general surgery team, the patient was admitted with a clinical diagnosis of adhesional bowel obstruction. A conservative management plan was instigated with the conventional 'drip and suck' regimen.

The patient was transferred to the surgical ward from the emergency department at 0400. Initial attempts at NG tube placement for gastric decompression were unsuccessful, and a third attempt was made by an experienced ward nurse using a wide bore 12 French tube. Although there was some moderate discomfort reported by the patient, the tube was felt to have been placed successfully with no immediate complications, thus it was left in situ. In particular, there was no respiratory distress encountered to suggest pulmonary placement of the tube. On retrospective review of the nursing handover notes, it was unclear whether any gastric contents were successfully aspirated immediately following tube placement or whether any attempts at aspiration had been made. The fluid balance chart also did not show any record of aspiration of gastric contents and there were no gastric contents visible in the attached drainage bag. Furthermore, there were no confirmatory tests evident on review of the nursing handover notes, such as pH testing following tube insertion, and no confirmatory imaging had been performed.

Following handover at 0700, an attempt was made by the nurse on day shift to aspirate the tube with a 50ml bladder syringe. There was resistance encountered on attempted suctioning with no

Figure 1 showing simple knot formation.

To cite: Chavda V, Alhammali T, Farrant J, et al. *BMJ Case Rep* Published Online First: [please include Day Month Year]. doi:10.1136/bcr-2017-220287

Box 1 Complications of NG tube placement

- ▶ Aspiration from inadvertent pulmonary placement of a feeding nasogastric tube
- ▶ Trauma to nasopharynx, larynx, oesophagus
- ▶ Inadvertent intracranial tube placement
- ▶ Oesophageal stricture from prolonged tube placement
- ▶ Knot formation
- ▶ Nasopharyngeal and gastrointestinal perforation

gastric content or air being aspirated, possibly suggesting tube blockage. Following this, an attempt was made at tube flushing with a small amount of sterile saline. Again this was not possible, therefore a decision was made to remove the tube.

The NG tube was removed with no significant resistance encountered. Although there was some minor discomfort reported retrospectively by the patient, she tolerated tube removal without incident. Following removal, there was no bleeding or pain to suggest any trauma. Inspection of the removed tube revealed a simple knot formation at its proximal end ([figure 1 and 2](#)). Following review on the post-take ward round, a further 12 French wide bore NG tube was placed. This was successful on first attempt with the immediate drainage of 600 ml of bile stained gastric content. There were no further confirmatory tests performed to check tube position as it was assumed, due to the drainage of significant amount of bile stained fluid, that the tube was correctly positioned and functioning as desired.

A CT scan was obtained later on in the day which supported the diagnosis of adhesional bowel obstruction. There was no evidence of disease recurrence on the scan.

The patient's further management was uneventful and following a period of bowel rest her symptoms resolved. Once oral feeding was re-established and stools were passed via her stoma, the patient was discharged home, 3 days after admission.

DISCUSSION

Following NG tube placement, correct positioning must be confirmed, particularly in feeding tubes whereby the introduction of feed through a misplaced pulmonary tube may have potentially disastrous consequences. The most reliable method to confirm correct tube position is by the use of imaging, commonly plain film radiography, whereby correct position is

Figure 2 showing simple knot formation.

Figure 3 Coronal reformat of CT image showing small stomach volume.

demonstrated by confirmation of the tube clearly passing below the diaphragm, not deviating into either of the main bronchi, and with its tip evident within the stomach.⁶ If excessive tube length within the stomach is evident on imaging it should be withdrawn by the desired amount and tube position should be re-checked with further imaging.

Knotting is a rare but recognised complication associated with the use of NG tubes. Risk factors postulated to be associated with knot formation include; the use of narrow bore tubes, excessive tube length in the stomach from incorrect measurement, small stomach volumes and altered gastric anatomy following surgery, violent peristalsis, prolonged duration of tube placement and excessive tube manipulation.^{1 2 7} Of these, use of narrow bore tubes and excessive tube length allowing self-knotting within the stomach are the most frequently reported within the literature. Similarly, a small stomach volume would also predispose to knot formation through the same mechanism of a relative excess of tube length in a smaller cavity allowing self-knotting to occur.

Within the literature, the majority of reported occurrences of tube knotting have been recognised only on tube removal in a previously 'functioning' tube. The mechanism for this is likely to be due to tightening of a previously formed knot on attempted tube removal. Our case differs in that there was no recognised initial tube function in our patient. Therefore, it is likely that the knot was formed during initial tube placement, either within the oropharynx or stomach, and tightened in vivo as the tube was advanced.

As mentioned previously, a relative excess of tube length within the stomach or a small stomach size can predispose to knot formation. On review of our patient's CT scan, a relatively small stomach size was clearly evident ([figure 3](#)).

The significance of a knotted NG tube is its potential to cause considerable trauma on removal, most commonly to the nasopharynx on attempted retrieval beyond the choana.⁸ Other

potential complications that may occur include laryngeal injury, respiratory distress and tracheaoesophageal perforation.^{9 10} The presence of excessive resistance on tube removal should alert the clinician to the possibility of knot formation. Further attempted removal of the tube should be stopped if resistance is encountered with subsequent inspection of the oropharynx assessing for the presence of a knot. If a knot is not visible, imaging studies, such as a lateral skull radiograph,^{9 11} should be performed to ascertain the cause for the encountered excessive resistance.

The technique most commonly described in the literature for the safe removal of a knotted NG tube involves using an instrument, such as an artery forcep, to grasp the NG tube within the oropharynx. Once the tube is secured it can be cut distally allowing the grasped proximal knotted portion to be removed through the mouth. The remainder of the tube can then be removed from the nose in the conventional manner.^{6 8 12–14} This technique can only be employed if a knot is visible within the oropharynx. Other techniques may involve removal of the tube under direct vision using nasendoscopy or an upper gastrointestinal endoscope.^{6 15} Safe removal may require the input of specialist teams such as ENT (ear, nose and throat) team and gastroenterology.¹³

Learning points

- Our case highlights the importance of accurate measurement prior to nasogastric (NG) tube placement to prevent excess tube length within the stomach which would predispose to knot formation.
- Adequate tube position and function must be confirmed following NG tube insertion.
- Clinicians should be vigilant to the rare but recognised complication of NG tube knotting, particularly if excessive resistance is encountered on attempted tube removal.

Contributors VC: Senior house officer looking after patient on ward, planning of case report, acquisition of images and patient consent, literature review, write up of article and submission of article. TA : Registrar looking after patient on ward, liaising

with radiologist and review of CT images, review of case report and amendments to content/structure. JF: Registrar looking after patient on ward, review of case report and amendments to content/structure. LN: Review of article and amendments to content/structure, reformatting and review of CT images. SE-R: Consultant in charge of patient care, final review and amendments to article.

Competing interests None declared.

Patient consent Obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

© BMJ Publishing Group Ltd (unless otherwise stated in the text of the article) 2017. All rights reserved. No commercial use is permitted unless otherwise expressly granted.

REFERENCES

- 1 Wright S, Warusavitarne J, Shaikh I. Safe removal of knotted nasogastric tubes. *Nurs Times* 2014;110:16–17.
- 2 Ravind R, Prameela CG, Gurram BC, *et al.* Naughty knot: a case of nasogastric tube knotting. *BMJ Case Rep* 2015;2015:bcr2015209937.
- 3 Cappell MS, Scarpa PJ, Nadler S, *et al.* Complications of nasoenteral tubes. Intra gastric tube knotting and intragastric tube breakage. *J Clin Gastroenterol* 1992;14:144–7.
- 4 Isik A, Firat D, Peker K, *et al.* A case report of esophageal perforation: complication of nasogastric tube placement. *Am J Case Rep* 2014;15:168–71.
- 5 Freij RM, Mullett ST. Inadvertent intracranial insertion of a nasogastric tube in a non-trauma patient. *J Accid Emerg Med* 1997;14:45–7.
- 6 Hirwa KD, Toshniwal N. Knotted nasogastric tube in the posterior nasopharynx: a case report. *Qatar Med J* 2016;2016:11.
- 7 Williams A, Liddle D, Singh AK. A knotted nasogastric tube. *Anesth Essays Res* 2011;5:109–10.
- 8 Thomson HG. "Granny's knot" as a complication of nasogastric tube feeding. *Ear Nose Throat J* 1989;68:636.
- 9 Singh M, Gupta A, Rao AS, *et al.* Spontaneous "lariat loop" knotting of a nasogastric tube: prevention and management. *Trop Gastroenterol* 2014;35:131–2.
- 10 Agarwal A, Gaur A, Sahu D, *et al.* Nasogastric tube knotting over the epiglottis: a cause of respiratory distress. *Anesth Analg* 2002;94:1659–60.
- 11 Jaa A. Self knotting of nasogastric tube: an unusual and rare complication. *Glob Adv Res J Microbiol* 2014;3:064–7.
- 12 Trujillo MH, Fragachan CF, Tortoledo F, *et al.* "Lariat loop" knotting of a nasogastric tube: an ounce of prevention. *Am J Crit Care* 2006;15:413–4.
- 13 Egan DJ, Shami N. Self-knotting of a nasogastric tube. *West J Emerg Med* 2011;12:266–7.
- 14 Onotai O, Uyanwanne N. Self-knotting of Nasogastric Tube: case Report and Review of Literature. *Br J Med Med Res* 2015;9:1–5.
- 15 Malik NW, Timon CI, Russel J, *et al.* A unique complication of primary tracheaoesophageal puncture: knotting of the nasogastric tube. *Otolaryngol Head Neck Surg* 1999;120:528–9.

Copyright 2017 BMJ Publishing Group. All rights reserved. For permission to reuse any of this content visit <http://group.bmj.com/group/rights-licensing/permissions>.

BMJ Case Report Fellows may re-use this article for personal use and teaching without any further permission.

Become a Fellow of BMJ Case Reports today and you can:

- Submit as many cases as you like
- Enjoy fast sympathetic peer review and rapid publication of accepted articles
- Access all the published articles
- Re-use any of the published material for personal use and teaching without further permission

For information on Institutional Fellowships contact consortiasales@bmjgroup.com

Visit casereports.bmj.com for more articles like this and to become a Fellow