

## Nasogastric Tube Knotting: Two Case Reports from Kampala, Uganda.

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**Background:** Nasogastric tube (NGT) use is common in patients' care right from basic health units to tertiary hospitals. NGT knotting is a very rare complications associated with its insertion. In this review, we present two cases of NGT knotting encountered in two cases.

**Case Reports:** The two cases presented around the same time in two major hospitals in Kampala. One was a 60-year female (Case 1) and another, a 24-year old female (Case 2). Both cases had been admitted with clinical features of small bowel obstruction secondary to adhesions. At surgery, Case 1 had resection and primary anastomosis for a gangrenous loop of ileum. Case 2 was first managed conservatively failing of which she had a laparotomy. As part of their preoperative management, they had a NGTs inserted, while fully conscious. The NGTs functioned well pre-operative, intra-operative and postoperative. Postoperatively, they both had difficulty NGT removal. Case 1 was a case of "overhand" knotting, while case 2 was a complex, "4-loop" knot, of plastic NGT.

**Conclusion:** A review of literature reveals that no such cases have been documented from the East African region, and offer lesson for surgeons and gynaecologists. Healthcare providers should be aware of this and complication and how to "troubleshoot" the problem.

### Introduction

In the practice of surgery, iatrogenic complications occur quite frequently. This is particularly so in emergency settings. Nasogastric tube (NGT) feeding has for a long time been used routinely for gastroenteric decompression and/or feeding. In many cases, especially severely ill patients, the number of potential complications almost exceed the indications for use<sup>1</sup>. Knotting of feeding tubes and NGTs, during both insertion and removal, is rare. It is more likely to occur with small bore tubes, as opposed to large-calibre ones<sup>2</sup>. We describe two cases NGT knotting in two females treated at Mulago hospital, Kampala (Case 1) and another, at St. Raphael of Francis Hospital, Nsambya.

Knotting can lead to serious complications including respiratory distress<sup>3</sup>, laryngeal injury<sup>3</sup>, and tracheoesophageal perforation<sup>4</sup>. Other notable complications, associated with mechanical trauma are ulceration and bleeding from the nose, pharynx, oesophagus, and stomach<sup>5</sup>. The rarest of complications include knotting over the epiglottis<sup>3</sup>, and formation of a tracheoesophageal fistula<sup>6</sup> following NGT knotting. A case has been reported in which knotting occurred at intubation preventing NGT access to stomach and presenting difficult removal<sup>7</sup>.

Though NGT knotting is an interesting case in its own right, the amazing nature of the symptoms, perioperative management and radiological investigations, for Case 1 (discovering a left ectopic malrotated kidney) add further intrigue.

### Case Reports

#### Case 1.

The patient was a 60-year old, female, African-Ugandan; of Bantu ethnicity. She was admitted to Mulago National Referral hospital on the 31<sup>st</sup> December, 2011 with complaints of abdominal pain, vomiting, abdominal distension and constipation. Abdominal pain had lasted 3 days and was colicky in nature; associated with vomiting. She had constipation for 2 days prior to presentation, but never developed an

absolute type. She had generally been unwell for 6 months, with complaints of lower abdominal pain; initially mild then intensifying over a period of one month. It was located over the hypogastrium and the right iliac fossa, and was insidious, dull; on and off. She also complained of on and off, vague, flank pain; radiating around the waist, which had been present for over 2 years. It was sometimes absent for days, and aggravated by exertion.

On examination, she was moderately to severely dehydrated but not in shock. Her abdomen was distended, moved normally with respiration, and had a midline subumbilical postoperative scar. Distension was more marked over the umbilical area, and manifested visible peristalsis. There was marked tenderness over the umbilical, hypogastric, and right iliac areas. Bowel sounds were increased in frequency and pitch. Digital rectal examination revealed only small amounts of normal stool. She was diagnosed with small bowel obstruction and strangulation.

After resuscitation she had an emergency laparotomy. A knotted, gangrenous loop of ileum (about 60 cm) caused by a tight band; and surrounding areas of fibrinous adhesions. Resection of the gangrenous portion and primary ileo-ileal anastomosis was done. Postoperatively, she improved, passing flatus after 2 days, and had a loose motion after 4 days. On the 5<sup>th</sup> POD, a decision to remove the NGT was made. Most of the tube length came out smoothly but towards the end of the procedure, some resistance was encountered. With firmer traction, though not forceful, the NGT (FG18) yielded (Figure 1). There was minor haemorrhage, but no significant pharyngeal or nasal injury. It was instantly noticed that the tube had developed an “overhand” knot during extubation (Fig 2). She was discharged on the 7<sup>th</sup> POD in a good condition.

### **Case 2.**

A 24yr-old female presented with colicky abdominal pain for 3 days, vomiting, progressive abdominal distention and absolute constipation for 2 days. Five months prior to admission, she had had a laparotomy for a twisted ovarian cyst by open laparotomy. After clinical examination, a diagnosis of intestinal obstruction secondary to adhesions was reached. A 14F NGT was inserted for suction and patient maintained on nil by mouth and intravenous fluids and analgesics. The patient was managed conservatively for 24 hours without improvement. A decision to perform a laparotomy was made. At operation the patient was found to have gangrenous proximal ileum with minimal adhesions (adhesions not involving the gangrenous area). Resection of about 150 cms was done with an end-to-end ileo-ileal anastomosis.

Postoperatively nasogastric suction and intravenous fluid therapy were maintained and i.v parenteral metronidazole, ceftriaxone, and tramadol given. On the 6<sup>th</sup> postoperative day (POD), she developed a high output enterocutaneous fistula for which an emergency laparotomy was done. An anastomotic breakdown was found. A 10cm ileal resection was done, with end-to-end anastomosis. Postoperatively she seemed to be improving. There was minimal (<50 mls) NGT suction. The NGT was removed on the 5<sup>th</sup> POD. On removal of the NGT there was great resistance after the 40cm mark. However, with a sustained gentle pull and manipulation, the tube was removed through the nostril. The patient sustained superficial tears in the nasal cavity and had minimal bleeding. The NGT had 4 loops knotted together (Figure 2).

Unfortunately, on the 6<sup>th</sup> POD, the patient developed a high output fistula and underwent a third laparotomy. At laparotomy, a partial anastomotic breakdown was found and a tube ileostomy was performed. The patient's condition remained critical. She died one month later, severely wasted and malnourished.



**Figure 1.** “Overhand” Knot on Removal (Case 1).



**Figure 2.** A Complex Knot Involving 4 Loops (Case 2)

### Discussion

We have presented two cases that demonstrate typical scenarios for the use of a NGT in adults for gastric decompression in the management of intestinal obstruction. It is usually in neonates that NGT use is commoner. In keeping with this, more complications occur in that age group<sup>8</sup>. The complication of knotting in our cases under review, presents in different forms. The “Lariat” knot<sup>9</sup> and a range of complex knot-types have been described in previous reports<sup>8,10</sup>; including knotting of a NGT around a nasotracheal tube, seen in only a single adult patient<sup>11</sup>. In Case 1 we have an “overhand” knot, while we see a 4-loop complex knot for Case 2.

The knotting encountered shows us the value of choice of NGT bore and length for insertion. Tubes with small bore tend to bend, loop and coil more easily<sup>3</sup>. Longer lengths (Fig 1, Fig 2) inserted also encourage these. Pushing or pulling of the NGT after it has been successfully placed into the stomach, either by the healthcare provider or spontaneously during neck movement, swallowing, or coughing, may lead to formation of a loop<sup>3</sup>. It is not clear if gastric churning has any role in knot formation or tightening. Of recent, the narrow bore enteral feeding tube has gained widespread acceptance as compared to the rigid large-bore type. The narrow tube is softer, provides greater patient comfort and fewer complications (such as ulceration and bleeding from the nose, pharynx, larynx, esophagus, and stomach) than the stiffer, large-bore tube<sup>3</sup>. Along with this comes the extra responsibility of careful insertion and use of correct length.

For this patient, we realised (in retrospect) that the nasogastric tube had been inserted “too far” and spontaneously formed a knot. It first “looped” within the stomach, without tightening; remaining functional in situ. During extubation the loop was tightened forming a knot. Had this knot tightened while still in the stomach, the NGT would have stopped functioning.

This demonstrates that even a simple procedure such as the insertion of a nasogastric tube can have potentially serious consequences. Only the necessary length of tube should be inserted. A usually accurate length can be determined by measuring tubing required, prior to insertion. This is practically done by tracing an imaginary course from the nostril, looped round the ear or along the side of the face past the ear, and then to the xiphoid process. The neck is in anatomical position. An allowance of about 5 cm may be added for proper function. In Case 1, the length should have been a maximum of 65 cm. The actual length used was 83 cm; an excess of about 20 cm. There was a predisposition to coil, loop and eventually knot.

## Conclusion and Recommendations

There is need to ensure safe and proper tube placement, the appropriate length should be marked prior to insertion. It is important that healthcare providers get acquainted with the procedure, complications and “trouble-shooting” points associated with the NGT. NGT knotting should particularly be included among the possible complications of NGT usage when instructing health care trainees in their various capacities. It should constitute one of the guidelines (on a chart) for NGT management; with chart placed in procedure rooms and intensive care units, of health units.

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