Gastric Perforation Caused by Nasogastric Intubation in a Patient on Peritoneal Dialysis

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Nasogastric (NG) intubation is frequently performed in critically ill patients. Although this procedure is associated with considerable complications, physicians tend to neglect its potential complications. There is also rare case of the reports of perforation of the stomach by an NG tube in adults. We report here on a case of gastric perforation that was caused by an NG tube in a peritoneal dialysis patient who required NG tube insertion for enteral feeding, with a review of the relevant literature.

Key Words: Peptic ulcer perforation, Nasogastric intubation, Peritoneal dialysis

INTRODUCTION

An NG tube is most commonly used for patients with gastrointestinal disorders. It is used to decompress the stomach in someone with suffering with ileus, gastric atony or intestinal obstruction; it can also be used for enteral feeding in neurologically impaired patients. Nutrient support is very important for successful management of critically ill patients. Most clinicians feel that enteral nutrition should be employed in preference to parenteral nutrition whenever possible because of its lower cost, the less frequent and severe complications and the low rate of infection. However, a variety of complications are associated with the insertion and placement of NG tubes, as well as with their prolonged usage. There are several complications related to an NG tube intubation such as nasopharyngeal and transbronchial perforation and esophageal or gastric perforation). But most of all, gastric perforation by an NG tube in adults is very rare and difficult to diagnose. No cases have yet been reported in Korean adult populations. Hence we report here on an interesting case of gastric perforation that was due to NG intubation in a peritoneal dialysis patient. We also discuss strategies to avoid this kind of complication.

CASE REPORT

A 63-year-old man, who was undergoing peritoneal dialysis treatment for chronic renal failure, was admitted to the intensive care unit due to aspiration pneumonia. His medical history included diabetic mellitus and a sudden cardiac arrest due to acute myocardial infarction. He was bedridden and had a stuporous mentality due to hypoxic brain damage after aspiration pneumonia. NG feeding tube (polyvinyl chloride, 16 French) was inserted because of a stuporous mentality. Fourteen days after NG tube insertion, a sudden fluid gushing from NG tube was developed. The drainage volume of NG tube increased from 400 mL to 2,050 mL per day. Simultaneously, the drained volume per bag of peri-
Ponnet dialysis suddenly decreased from 2,300 mL to 150 mL. His blood pressure was 130/80 mmHg, pulse rate 80/min, respiration rate 21/min and body temperature 36.8°C. On physical examination, he had diffuse abdominal distension without guarding or rigidity. A complete blood cell count revealed hemoglobin 9.4 g/dL, hematocrit 27.8%, white blood cells (WBC) 14,630/uL with 85.2% neutrophils, and a platelet count 366,000/uL. Drained fluid from the NG tube was analyzed. It showed a glucose level of 556 mg/dL, an amylase level of 876 U/L and a lipase level of 908.9 IU/L. The peritoneal fluid analysis showed WBC 300/uL with 40% neutrophils and RBC 350/uL. The laboratory tests gave us the suspicion of gastric perforation. A simple supine abdomen radiograph demonstrated that the NG tube tip was towards the fundus of the stomach (Fig. 1). Gastrofibroscopic examination found that the NG tube penetrated gastric wall (Fig. 2). Fortunately, the perforation site was successfully closed by endoscopic hemoclipping with no complication under the coverage of broad spectrum antibiotics for a treatment of aspiration pneumonia (Fig. 3). The follow-up gastrofibroscopy revealed no bleeding or perforation at clipping site (Fig. 4). Although peritoneal dialysis maintained successfully thereafter, patient died of pneumonia and congestive heart failure 1 month late.

DISCUSSION

NG tube is commonly used for obtaining enteral access for feeding, medications or drainage, and the complication incidence by NG tubing has increased. However, reports on gastric perforation by NG tubing are very rare and it partly comes from a difficulty in making diagnosis. Our case might have been missed if we had not analyzed the drained fluid from NG tube. It was very interesting that the decrease of drainage

![Fig. 1. Simple supine abdomen radiograph shows a tip of NG tube (arrow) was toward fundus of stomach.](image)

![Fig. 2. (A) Gastrofibroscopic examination shows the NG tube penetrates gastric wall (B) Nasogastic tube was removed by endoscopic forceps.](image)
esophageal and gastric abnormalities\textsuperscript{7}, tracheal intubation\textsuperscript{6, 8}, cardiomegaly\textsuperscript{8} and cervical osteophytes\textsuperscript{5, 6}. The longer residence of the tube in the stomach and a pathologic stomach all increase the risk of perforation \textsuperscript{7, 9}. The factors associated with the NG tube itself may also predispose a patient to esophageal and gastric perforation. NG tubes made of polyethylene, polyvinyl chloride or latex were reported to be responsible for erosion of the esophagus and stomach because of their size, rigidity and instability in digestive juices, and they have a tendency to become increasingly rigid after insertion in the gastrointestinal tract due to acid hydrolysis\textsuperscript{10}. In addition, myocardial infarction might be related with gastric ulcer perforation\textsuperscript{11}. In this case, patients mental status and the NG tube made of polyvinyl chloride might have been the important predisposing factors of gastric perforation. Moreover, keeping the mal–positioned NG tube in the fundus of stomach for a long time was believed to be the most important etiologic factor. The tip of an NG tube might repeatedly irritate the gastric mucosa. Moreover, extrinsic compression of stomach due to peritoneal dialysate made it easier to develop a gastric pressure sore in this situation. And his medical conditions such as myocardial infarction also might effect on gastric perforation. The development of ulcers and erosions of gastric mucosa in ischemic heart disease patients are probably related with blood circulation disorders in gastric mucosa\textsuperscript{12}.

The management of gastric perforation remains controversial. The main issue is whether an immediate surgery is required or not. Standard medical therapy includes intravenous broad spectrum antibiotics and hydration. In our case, he had been receiving intravenous broad spectrum antibiotics because of his aspiration pneumonia. Most of all, because of his unstable vital signs due to heart failure and limited gastric perforation lesion, non–surgical treatment seemed to be a safe and effective treatment. So, he underwent successful non–surgical closure of the gastric perforation by endoscopic hemoclipping.

Fig. 3. Endoscopic finding shows the perforation site was closed by endoscopic hemoclips.

Fig. 4. Follow–up endoscopic finding shows no bleeding and perforation at clipping sites.
In conclusion, to avoid gastric perforation during NG intubation, we propose a radiographic evaluation to verify NG tube placement should be done immediately after tube insertion especially in patients with stuporous mentality. We also emphasize that softer, small-bore tubes made of material such as silicone, rubber and polyurethane should be used for total enteric nutrition, and especially for the peritoneal dialysis patients who could be subject to increased intra-abdominal pressure due to the peritoneal dialysate.

REFERENCES