Intestinal Perforation: A Magical Angle Change of Nasojejunal Tube on CT

Hua Wang[1,2], Chang Xu[1], Yu Chen[1], Zhaojun[1]*

[1]*Department of Critical Care Medicine, China*

[2]*Intensive Care Medical Centre, Tongji Hospital, School of Medicine, Tongji University, China*

***Correspondence:** Zhaojun Xu, Ningbo No.2 Hospital, No. 41, Xibei Street, Ningbo City of Zhejiang Province, China

xuzhaojun1@yeah.net

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CONSENT
Written informed consent is taken from the patient.

ABSTRACT

This case presents a special case of a 29-year-old man who had a new intestinal fistula which was found at the end of nasojejunal tube for necrotizing pancreatitis in intensive care unit(ICU). Abdominal computed tomography (CT) showed imaging revealed the angle of the tube in the upper right abdomen changing from the acute angle to the right angle under the gastrointestinal peristalsis. With the peritoneal lavage and antibiotics coverage, the patient's abdominal pain was resolved quickly. He was discharged 16 days after admission and went back to the local hospital for further laparotomy.

CASE REPORT

CASE REPORT

A 29-year-old man went to the local hospital with paroxysmal epigastric pain, nausea and vomiting for one day. Urgent CT showed peripancreatic exudation and pelvic effusion. Laboratory tests showed white blood cell (WBC) count of 18900/μL, and elevated serum amylase of 748U/L(range, 35-135 U/L). Acute pancreatitis was diagnosed.With adequate fluid resuscitation, the use of octreotide and gastrointestinal decompression, the patient felt worse and was transferred to our hospital for better treatment. After admission to hospital, it revealed that the elevated C-reactive protein(285.64 mg/L, range 0-8 mg/L) and organ failure: the level of creatinine 133.5 μmol/L(range 57-97 μmol/L); the level of alanine aminotransferase 175 U/L (range 9-50 U/L). CT imaging revealed the enlargement of pancreas, diffuse lamellar high-density shadow and acute necrotizing pancreatitis was diagnosed. He was transferred to the ICU because of oliguria (urine output: 50 mL/3 hours) and dyspnea.

In order to reduce the fluid overload and clear the inflammatory mediators, continuous renal replacement therapy (CRRT) was initiated as soon as a double-lumen catheter was inserted percutaneously into the right femoral vein to establish temporary vascular access. A nasojejunal tube (CORFLO, inserted 90cm) was placed through the right nasal cavity for early enteral nutrition (EN) on Day 2. Abdominal radiography showed the appropriate position of the tube with an acute Angle in the right upper abdomen. The intra-abdominal pressure was above 20 cmH_2O, the initial trophic nutrition was delayed until Day 4. Repeat CT showed more peripancreatic fluid collections, but less abdominal fluid and gas accumulation. The patient's abdominal pain was resolved, EN was increased to 500ml (500kcal) per day.

On Day 6, the inflammatory markers elevated accompanied by transient hyperthermia, the patient's abdominal pain aggravated and his oxygen saturation reduced while using Venturi mask. Intravenous antibiotics, ulinastatin and somatostatin were already administered for inflammation control. The central venous catheter was removed and blood culture was sent to the laboratory. Interestingly, the serum and urinary amylase returned to normal.

On Day 8, CT image showed peripancreatic fluid collections, increased ascites and a new intestinal fistula which was found at the end of nasojejunal tube.

DISCUSSION

Etiology & Demographics

Severe acute pancreatitis (AP) is one of the most common causes of gastrointestinal inflammatory disease requiring

hospitalization with high mortality [1, 2]. Traditionally the concept of "pancreatic rest" (initiation of oral nutrition only after complete resolution of abdominal pain and normalization of pancreatic enzymes) guided nutritional management in severe AP [3]. In the ICU, a nasojejunal tube is placed blindly, or via endoscopy at bedside for post-pyloric small intestinal nutrition [4]. The complication associated with tube placement is rare, but it may be life-threatening if happened. Many articles showed the complications of nasoenteric tube placement: inadvertent malposition, epistaxis, inadvertent tube removal, tube clogging and tube-feeding-associated diarrhea [5]. The most dangerous complication is the insertion into the trachea and develop pneumothorax and empyema despite the tubes nowadays are soft, properly tipped and small-bore. McWey et al. described 1 nonpulmonary complication of esophageal perforation at the gastroesophageal junction during 1100 nasoenteric intubation [6]. This led the authors to confirm tube position by X-ray before starting a tube feeding and limit the use of stiffening stylettes to the level of the nasopharynx only. As a result, bedside ultrasound-guided nasojejunal tube is recommended and has a good outcome in the ICU [7].

The etiology of the perforation of the small intestine may include two major reasons: the spillage of pancreatic enzymes may lead to the necrotic collections accumulated at retroperitoneal spaces [8]. The corrosion of the peritoneum and small intestine was serious. The other reason was the end of nasojejunal tube may slide upward accompanied with the gastrointestinal peristalsis and develop the perforation at last.

Approximately 10-20% of patients with AP develop necrosis of the pancreatic parenchyma or extrapancreatic adipose tissue [9]. However, the demographic characteristics of the intestinal perforation are currently unknown.

Clinical & Imaging Findings

In our patient, we can see the angle of the tube in the upper right abdomen changing from the acute angle to the right angle under the gastrointestinal peristalsis. On Day 8, CT image showed peripancreatic fluid collections, increased ascites and a new intestinal fistula which was found at the end of nasojejunal tube (Figure 1). The surgeon saw the end of the tube in the abdominal cavity at this emergent surgery.

Nowadays, many clinical practice guidelines recommend post-pyloric feeding of EN for patients within 24 to 48h of entering ICU [10,11]. The commonly used methods for aiding placement and positioning of the tube, include abdominal X-ray, auscultation, observation of aspirated fluid, measuring PH, use of electromagnetic devices and integrated real-time imaging system or a systemic ultrasound positioning protocol [12]. In other articles, we can find modified protocol and Corpak 10-10-10 protocol [13]. In our ICU, we use the protocol which called 'M-R-S-J-F-C' (Figure 2). It will cost us 20-30 minutes to insert the nasojejunal tube. During the protocol, we should avoid these mistakes: (1) If we insert the tube more than 60 cm, but we can't heare the sound of air passing through water under the xiphoid, we can open the mouth to find if any tube was coiled in it. (2) To some older patients, we should be more patient because of their decreased gastrointestinal motility. (3) Misplacement of the tube into the airway did occur sometimes and confirm the tube position before the beginning of EN.

Treatment & Prognosis

On Day 8, EN was discontinued and the patient underwent a surgical drainage of retroperitoneal abscess. At surgery, the surgeon saw the end of the nasojejunal tube in the abdominal cavity through the perforated jejunum. With the peritoneal lavage and antibiotics coverage, the patient recovered speedily. Six days after surgery, the WBC count rose from the level of 29700/μL to 8500/μL and the patient's abdominal pain was resolved again. He was discharged 16 days after admission and went back to the local hospital to further laparotomy.

Differential Diagnoses

The differential diagnosis of the intestinal perforation includes acute cholecystitis and acute appendicitis. Patients usually had typical signs and symptoms, like wandering right lower abdominal pain and so on. Iatrogenic intestinal perforation is rare. We should pay more attention to other complications of AP which including pancreatic pseudocyst, pseudoaneurysm and venous thrombosis.

TEACHING POINT

This case highlights the importance of the inserted nasojejunal length of the patient with severe AP. We should insert the length of the tube 100-120cm and make sure the end of the tube was downward in order to better post-pyloric feeding.

QUESTIONS

Question 1: Which of the following patients with pancreatitis need post-pyloric feeding?

1. Mild acute pancreatitis
2. Moderate pancreatitis
3. Moderately severe acute pancreatitis(applies)
4. Severe acute pancreatitis(applies)
5. Necrotizing pancreatitis(applies)

Explanation: According to ESPEN guideline,in patients with gastric feeding intolerance not solved with prokinetic agents, post-pyloric feeding should be used.

Question 2: Which of the following are the best ways for severe AP to have post-pyloric feeding?

1. Nasojejunal(applies)
2. Oral
3. Total parenteral nutrition(TPN)
4. Nasogastric
5. Nasoduodenal(applies)

Explanation: Traditionally the concept of "pancreatic rest"guided nutritional management in severe AP delivered through a nasoduodenal or nasojejunal tube.

Question 3: What are the complications of the post-pyloric feeding for severe AP patients?

1. Inadvertent malposition(applies)
2. Epistaxis(applies)
3. Inadvertent tube removal(applies)
4. Tube clogging(applies)
5. Tube-feeding-associated diarrhea(applies)

Explanation: Many articles showed the complications of nasoenteric tube placement: inadvertent malposition, epistaxis, inadvertent tube removal, tube clogging and tube-feeding-associated diarrhea.

Question 4: Which of the following are the techniques available for the positioning of post-pyloric feeding tubes?

1. Abdominal X-ray (applies)
2. Auscultation(applies)
3. Abdominal CT (applies)
4. Observation of aspirated fluid(applies)
5. Measuring PH(applies)

Explanation: Multiple techniques are available for the positioning of post-pyloric feeding tubes; some of these include air insufflation, pH-assisted and spontaneous passage with or without motility agents.

Question 5: Which of the following are the complications of acute pancreatitis?

1. Pancreatic pseudocyst(applies)
2. Pseudoaneurysm(applies)
3. Venous thrombosis(applies)
4. Pancreatic abscess(applies)
5. Chronic pancreatitis(applies)

Explanation: Patients with moderately severe and severe acute pancreatitis often have a protracted course over weeks to months due to local complications and organ dysfunction.

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FIGURES

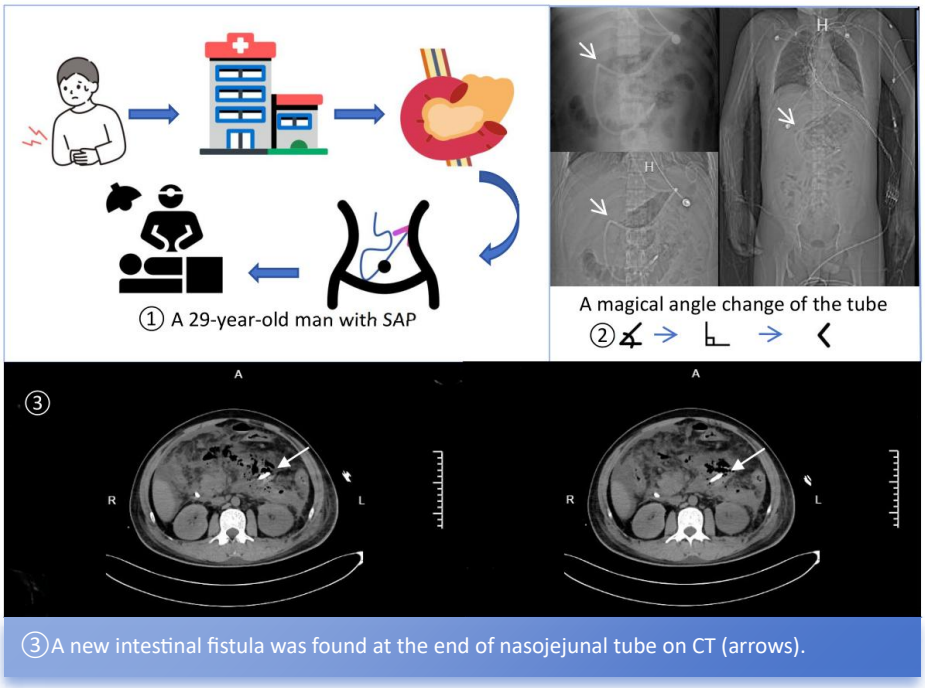

Figure 1 Radiographic changes of the right upper abdomen of the nasointestinal tube indicated duodenal perforation.
SAP, severe acute pancreatitis; CT, computed tomography.

Figure 1: Radiographic changes of the right upper abdomen of the nasointestinal tube indicated duodenal perforation. SAP: Severe Acute Pancreatitis; CT: Computed Tomography

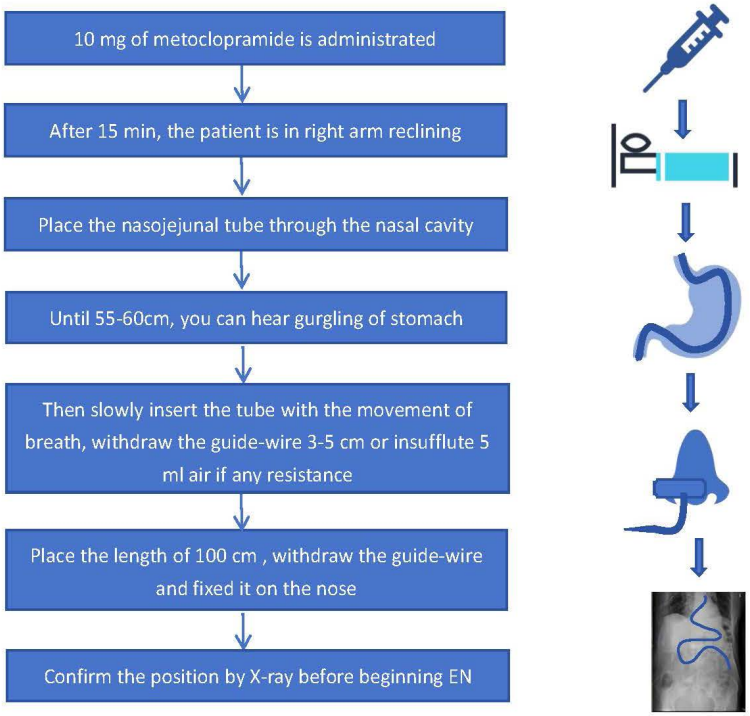

Figure 2: The protocol called 'M-R-S-J-F-C': M: Metoclopramide, R: Reclining; S: Stomach; J: Jejunal; F: Fixed; C: Confirm

KEYWORDS

Acute pancreatitis, nasojejunal tube, post-pyloric feeding, enteral nutrition,intestinal perforation

ABBREVIATIONS

ICU = Intensive Care Unit
CT = Computed Tomography
WBC = White Blood Cell
CRRT = Continuous Renal Replacement Therapy
EN = Enteral Nutrition
AP = Acute Pancreatitis

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