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Superior mesenteric artery syndrome treated successfully by endoscopy-assisted jejunal feeding tube placement

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SUMMARY

We report the case of a 31-year-old man with superior mesenteric artery syndrome after reoperation due to postoperative complications from rectal cancer. Although initial total parenteral nutrition (TPN) therapy failed, he underwent endoscopy-assisted feeding tube placement without complications instead of surgery. After 2 weeks of dual feeding (enteral feeding and TPN), he improved, gaining 6 kg; and an oral diet was advanced.

BACKGROUND

Superior mesenteric artery (SMA) syndrome is a rare disease that presents with abdominal pain, vomiting and weight loss. Non-surgical therapy is recommended for the initial treatment of SMA syndrome, but surgery can be performed if conservative nutritional therapy does not address the condition. However, the surgical treatment itself has a risk of postoperative complications, and there are surgical risks to the patient due to poor nutritional status.

CASE PRESENTATION

A 31-year-old man, weighing 56.2 kg and 170 cm tall, was diagnosed with advanced rectal cancer, and after concurrent chemoradiation therapy, underwent laparoscopic low anterior resection. After 2 weeks from discharge, he was readmitted to the hospital for nausea and vomiting and was diagnosed with postoperative small bowel obstruction around the ileostomy. He underwent a small bowel resection because he did not improve from conservative treatment. After reoperation due to the small bowel obstruction, he reported abdominal discomfort and postprandial stabbing epigastric pain with nausea and vomiting. He showed a weight loss of 9 kg over 18 days since the readmission (figure 1). An abdominal CT scan was performed under suspicion of postoperative intestinal obstruction, which demonstrated moderate gastroduodenal dilation with compression of the SMA, and 7 mm of aortomesenteric distance, consistent with SMA syndrome (figure 2). Gastroduodenoscopy showed reflux oesophagitis grade III and a fluid-filled first and second portion of the duodenum, and stenosis of the third portion. Conservative medical treatment with high-calorie total parenteral nutrition (TPN) and anti-emetics was initially administered for 2 weeks. The administration of nutrients was set at 1500 kcal/day, and the total volume of TPN was 1440 mL. The ingredients of TPN administered

during this period were glucose 187 g/day, protein 72 g/day and lipid 58 g/day. Even after TPN treatment, his weight continued to decline. Although we tried to increase the total calorie of TPN, we could not afford it due to the fluid overload. So then surgery was considered first, but the perioperative risk was expected to be high in preoperative risk evaluation due to his poor nutritional status and severe bronchiectasis. Consequently, jejunal feeding tube placement past the obstruction via endoscopy was offered for the treatment of SMA syndrome.

An endoscopy-guided jejunal feeding tube (Abbott's 12 Fr) was passed through the third portion of the duodenum and successfully placed distally to the duodenojejunal junction (figures 3 and 4). After confirming that there were no complications or patient discomfort, we started both tube enteral feeding and TPN simultaneously. The initial enteral nutrition was set at 900 kcal, and the components were 143 g of glucose, 40 g of protein and 30 g of lipid. The previous calories of TPN decreased gradually from 1500 to 1000 kcal/day. Finally, the administration of total nutrients was set at 1900 kcal. On dual enteral and parenteral nutrition feeding, the patient gained 6 kg in 2 weeks and showed a relief of symptoms (figure 5). The jejunal feeding tube was removed, and an oral diet was advanced. The patient has signed the informed consent.

OUTCOME AND FOLLOW-UP

After successfully undergoing the procedure, the patient gained 6 kg in 2 weeks by simultaneously taking enteral and parenteral nutrition, and then an oral diet was advanced. This favourable outcome is comparable with other studies that showed weight gain after surgery.

DISCUSSION

This case report of feeding tube placement distal to the obstruction via the endoscopic approach for SMA syndrome in a postoperative patient showed that feeding tube placement was safe and useful, particularly in a perioperative high-risk patient, to improve SMA syndrome quickly. SMA syndrome studies have estimated the incidence at 0.013%–0.3% in the general population.¹ It is defined as the compression of the third part of the duodenum due to the narrowing of the space between the SMA and the aorta, mainly by the loss of the mesenteric fat pad.² The most common factor reducing the angle and distance between the aorta and the SMA is



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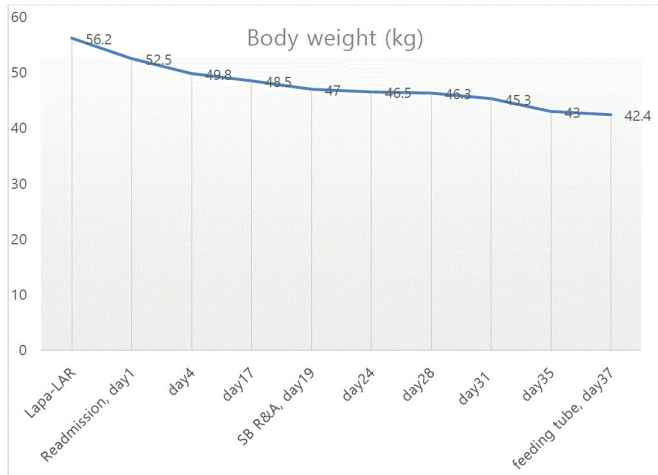


Figure 1 Weight change over time before dual enteral feeding and total parenteral nutrition treatment. Lapa-LAR, laparoscopic low anterior resection; SB R&A, small bowel resection and anastomosis.

significant weight loss leading to the loss of mesenteric fat pads due to a medical disorder, psychological disorder or surgery.³⁻⁷ Patients may have acute (eg, postoperative) or slowly progressive symptoms, consistent with the symptoms of proximal small bowel obstruction. Patients with mild obstruction may have only postprandial epigastric pain and early satiety, while those with more advanced obstruction may have severe nausea, bilious emesis and weight loss. Patients may also have symptoms of reflux.^{8,9} The diagnosis of SMA syndrome may be aided by radiological, angiographic, ultrasonic and endoscopic studies. CT angiography is now the investigation of choice, with endoscopy and ultrasound playing adjunctive roles.¹⁰ We employed a CT scan with confirmatory findings. As a general rule, few criteria should be present on imaging^{11,12}: (1) duodenal obstruction with an abrupt cut-off in the third portion and active peristalsis; (2) an aortomesenteric artery angle of $\leq 25^\circ$, which is the most sensitive measure of diagnosis, particularly if the aortomesenteric distance is ≤ 8 mm; and (3) high fixation of the duodenum by the ligament of Treitz, an abnormally low origin of the SMA, or anomalies of the SMA. The goal of SMA syndrome treatment is weight gain, the relief of intestinal obstruction symptoms and the correction of precipitating factors. Initial treatment is usually conservative non-operative treatment, which includes gastrointestinal decompression using nasogastric tube placement, the correction of electrolyte abnormalities and nutritional support.¹³ Among these, nutritional support is the major component of conservative treatment to increase the aortomesenteric angle and improve symptoms by increasing the intermembrane fat pad and prevent duodenal compression. Enteral nutrition is

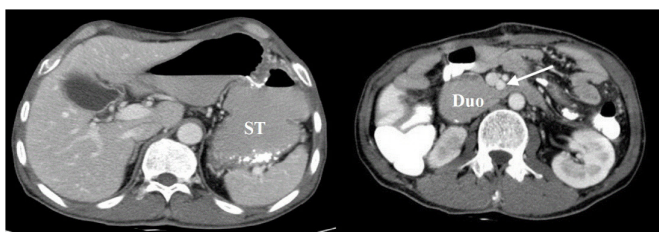


Figure 2 CT scan demonstrated a moderately dilated stomach and second part of the duodenum, and compression by the superior mesenteric artery (arrow). The aortomesenteric distance was measured at 7 mm.

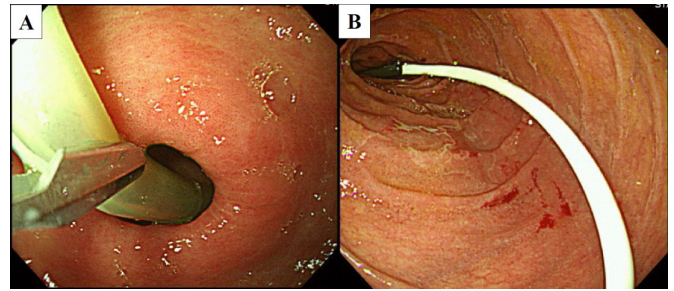


Figure 3 Endoscopy-guided jejunum feeding tube (Abbott's 12 Fr) passed the pyloric ring (A) and the third portion of the duodenum, and was successfully placed distally to the duodenojejunal junction (B).

preferred, taking frequent small meals of nutritious liquid, lying on the left side or prone following meals.^{6,13,14} Metoclopramide is also advised to relieve symptoms. TPN can be useful when enteral feedings are not tolerated.^{15,16}

However, except for paediatric patients and some adults who have a brief history of symptoms, the success rate of conservative treatment is not high. Particularly, patients who had chronic symptoms had unfavourable outcomes from nutritional support alone,¹⁷ and many patients failed and finally required surgical treatment.^{15,18-20} The patient in this case also did not gain body weight for 6 weeks despite TPN and electrolyte supplementation and did not experience symptom improvement. Surgery has still been the only accepted treatment if conservative treatment fails.¹⁸ Many surgical procedures have been developed over the years, and minimally invasive duodenojejunostomy is now widely accepted as the main treatment for SMA syndrome.⁴ Previous studies have shown a higher success rate of surgical treatment than conservative treatment and suggested an earlier surgical intervention to avoid creating a vicious cycle of symptoms.^{19,21,22}

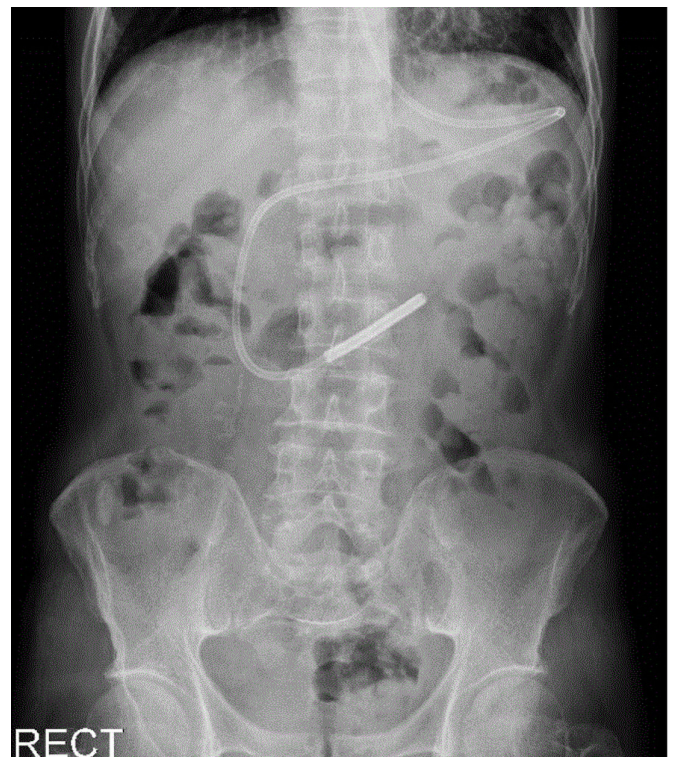


Figure 4 The erect view of the abdominal X-ray. A jejunum feeding tube was placed distally to the duodenojejunal junction.

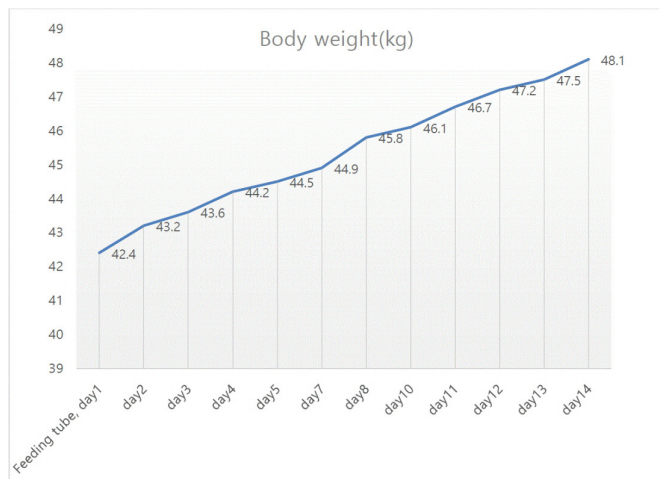


Figure 5 Weight change according to the time after dual enteral feeding and total parenteral nutrition treatment.

However, surgical treatment has potential operative and post-operative risks, particularly for the patients who underwent surgery, as in this case, and have (1) poor nutritional status, (2) changes in anatomical structures and intraperitoneal adhesions, and (3) not fully recovered from previous surgery and/or had comorbidities. In contrast, jejunal feeding tube placement past the obstruction to allow continuous enteral feeding is safe and useful. If the patient cannot tolerate oral feeding, this treatment can be employed to support weight gain.⁶ Several previous cases have reported the successful treatment of SMA syndrome by transpyloric jejunal feeding past the point of the obstruction.^{9 23 24} However, these were cases of paediatric patients or patients with no surgical history. These studies also did not report the detailed treatment and recovery process. In particular, there was no description of the role of endoscopy in jejunal feeding tube placement. The present case was performed safely by an endoscopist who had ample experience with colonic stent insertion. When passing through the obstruction of the duodenal third portion, the risk was evaluated by an endoscopist, who decided whether to proceed with the procedure. Endoscopy-assisted feeding tube placement followed by the dual enteral and parenteral nutrition might be applied as first-line therapy in the conservative treatment of SMA syndrome because (1) an experienced endoscopist can safely attempt it with a high success rate, (2) SMA syndrome can be diagnosed and treated simultaneously, (3) it allows the patient to reach the target weight faster than conventional TPN, and (4) it can also avoid electrolyte

Learning points

- ▶ The goal of superior mesenteric artery (SMA) syndrome treatment is weight gain, the relief of intestinal obstruction symptoms and the correction of precipitating factors.
- ▶ Initial treatment is usually conservative non-operative treatment, which includes gastrointestinal decompression using nasogastric tube placement, the correction of electrolyte abnormalities and nutritional support.
- ▶ Jejunal feeding tube placement past the obstruction to allow continuous enteral feeding is safe and useful.
- ▶ This treatment might be a valuable initial alternative to conventional conservative total parenteral nutrition therapy in high operative risk patients with SMA syndrome.

imbalance and hepatotoxicity due to TPN. If endoscopy-assisted feeding tube placement is available for highly selected patients, especially for the patients who have a high risk for surgery or have previously had surgery, the approach might be useful.

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Case reports provide a valuable learning resource for the scientific community and can indicate areas of interest for future research. They should not be used in isolation to guide treatment choices or public health policy.

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