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## Afferent loop syndrome of a patient with recurrent fever: A case report

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### Abstract

#### BACKGROUND

Afferent loop syndrome (ALS) is a rare complication, Aoki *et al* reported that the incidence of distal gastrectomy in Billroth-II is 0.3%-1.0%. The clinical manifestations of ALS are atypical, which can manifest as severe abdominal pain, vomiting, obstructive jaundice, malnutrition, *etc*.

#### CASE SUMMARY

The patient was a 58-year-old man who complained of recurrent high fever for more than 1 week. Laboratory tests showed an increase in neutrophil ratio, procalcitonin, C-reactive protein, and abnormal liver function. Enhanced computed tomography scan of the abdomen showed small intestinal obstruction between the anastomosis of the gastrojejunum, bile duct, and pancreaticoduodenum. Gastroscopy revealed significant narrowing of the lumen 15 cm from the anastomosis into the afferent loop. After performing balloon dilation and placement of the nutrition tube, the patient did not experience further fever.

#### CONCLUSION

ALS is relatively rare after pancreaticoduodenectomy, and the treatment depends on the nature of the obstructive lesion. The traditional treatment method is

surgery, and in recent years, endoscopy has provided a new treatment method for ALS.

**Key Words:** Afferent loop syndrome; Recurrent fever; Digestive tract radiography; Endoscopic; Case report

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**Core Tip:** The manifestations of the afferent loop syndrome vary, and the patient we reported presented only with recurrent fever. Instead of surgery, we managed to relieve the patient's symptoms through endoscopic and minimally invasive interventions.

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## INTRODUCTION

Afferent loop syndrome (ALS) is a rare complication, Aoki *et al*[1] reported that the incidence of distal gastrectomy in Billroth-II is 0.3%-1.0%. It has been reported to occur in 0.2%-1% of patients after surgery, depending on the type of surgery and reconstruction[2]. After the afferent loop is partially or completely obstructed and a closed loop is formed, bile and intestinal secretions accumulate internally, resulting in increased intracavitary pressure and causing clinical symptoms. Termsinsuk *et al*[3] reported that the clinical manifestations of ALS are atypical, which can manifest as severe abdominal pain, vomiting, obstructive jaundice, malnutrition, *etc.*[3]. We report a case of ALS patient with recurrent fever as the main clinical manifestation after undergoing expanded pancreaticoduodenectomy for malignant tumors of the pylorus for 11 months.

## CASE PRESENTATION

### Chief complaints

His chief complaint was recurrent high fever for more than 1 week.

### History of present illness

ALS.

### History of past illness

Gastric malignant tumor.

### Physical examination

Physical examination showed that the patient only had mild tenderness in the upper abdomen.

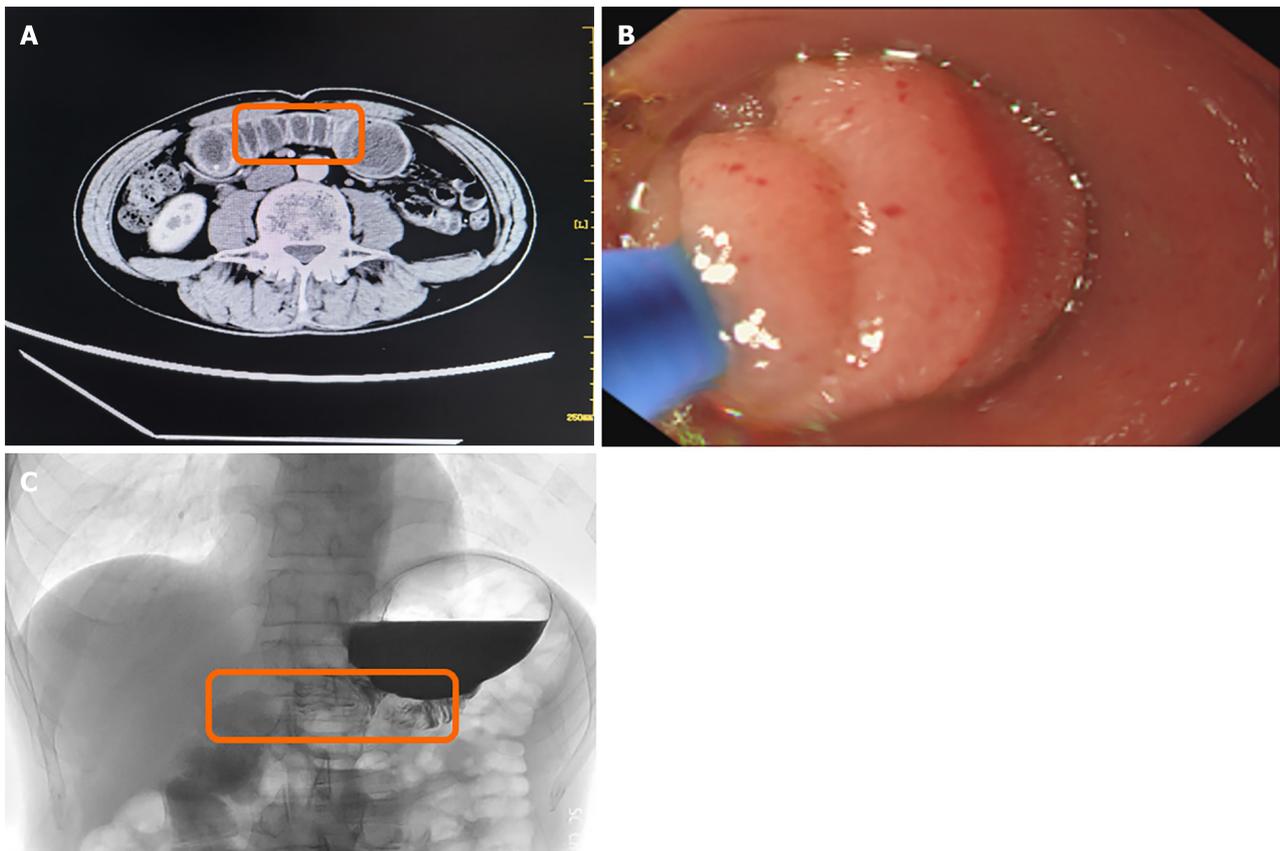
### Laboratory examinations

Laboratory examination results showed a white blood cell count of  $6.67 \times 10^9/L$ , a neutrophil ratio of 92.7%, procalcitonin of 8.46 ng/mL, C-reactive protein of 25.8 mg/L, alanine aminotransferase of 139 U/L, and aspartate aminotransferase of 191 U/L, gamma-glutamyl transpeptidase is 141 U/L. Direct bilirubin is 11.6  $\mu\text{mol/L}$ .

### Imaging examinations

Based on laboratory results, the patient was preliminarily diagnosed with liver dysfunction and concurrent infection, but the infection site is unknown.

To clarify the diagnosis and search for the infection site, the patient underwent enhanced computed tomography (CT) scanning. Surprisingly, small intestine obstruction was found between the gastrojejunum, bile duct, and pancreaticoduodenal anastomosis, and the small intestine content was a non-contrast liquid (Figure 1A). On this basis, we performed gastroscopy on the patient and found significant narrowing of the lumen 15 cm from the anastomotic opening into the afferent loop (Figure 1B). Based on these findings, the patient was diagnosed with a biliary infection secondary to obstruction of the afferent loop.



**Figure 1 Imaging examinations.** A: Enhanced computed tomography indicated small intestinal obstruction between gastrojejunum, biliary intestine and pancreatic intestine anastomosis; B: When the gastroscope entered the afferent loop about 15 cm from the anastomosis, it was found that the lumen was narrow and could not be entered. Disposable zebra guide wire was implanted through the biopsy hole, and the position of the guide wire was adjusted with the aid of X-ray so that it passed the distal end of the narrow intestinal tube, and the angiography catheter was implanted with the aid of the guide wire; C: The contrast agents were injected into the anastomotic stoma through the angiographic catheter, it was shown that the narrow section of the intestine was about 3 cm, and the distal intestine of the afferent loop was obviously dilated segment.

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## FINAL DIAGNOSIS

ALS.

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## TREATMENT

The Zebra Guidewire was implanted through the biopsy clamp, and the position was adjusted with the assistance of X-ray to make it pass the distal end of the narrow intestinal tract smoothly. The angiography catheter was implanted with the aid of the Zebra Guidewire, and the contrast agents were injected at the anastomosis. The contrast agents were slowly discharged into the afferent loop, and the narrow section of the intestinal tract was about 3 cm, and the distal intestinal tube of the afferent loop was significantly expanded (Figure 1C). Therefore, we used a balloon to perform a dilation of the digestive tract stenosis, after that we put intestinal feeding tube for the patient.

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## OUTCOME AND FOLLOW-UP

Observing the patient for 72 hours after the procedure, the patient did not experience any further fever. Five days later, the nutrition tube was removed, and a follow-up digestive tract radiography showed no gastrointestinal obstruction. We asked the patient to come to our hospital for regular follow-up visits, but the patient did not come to our hospital again because he lived in other provinces, so the long-term prognosis of the patient was unknown.

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## DISCUSSION

Gastrectomy combined with gastrojejunostomy is a surgical procedure in which the remaining stomach is anastomosed to

the proximal jejunum after resection of the stomach, resulting in the formation of an afferent loop and an efferent loop. The afferent loop is the intestinal limb composed of duodenum and proximal jejunum, also known as the biliopancreatic limb. ALS is a rare complication, Aimoto *et al*[4] reported that ALS is relatively common in Billroth II gastrectomy, and is relatively rare after pancreaticoduodenectomy. It can be caused by adhesions, strictures, or internal hernias after gastrectomy. Symptoms may appear in the early and late postoperatively. ALS may worsen rapidly, and some patients may have severe complications such as digestive tract perforation. Therefore, early diagnosis and treatment are very important to reduce the mortality associated with ALS and improve the long-term quality of life of patients.

The etiology of ALS can be divided into benign and malignant causes. The benign causes of ALS include foreign bodies, stones, intestinal stones, adhesions, internal hernias, and torsion of the afferent loop. The malignant causes of ALS are usually local tumor recurrence, regional lymph node metastasis, and peritoneal malignant tumors[2,5,6].

ALS can manifest as acute or chronic onset. The onset time of acute ALS varies, and patients may experience sudden severe abdominal pain and vomiting several hours or even years after anastomotic reconstruction[2,7,8]. Acute ALS is caused by complete obstruction of the afferent loop, which is very rare and characterized by the patient's vomit being bile free[9]. It has to be diagnosed as soon as possible, otherwise patients may develop serious complications such as intestinal perforation, intestinal necrosis, and may even lead to death.

Compared with acute ALS, the symptoms of chronic ALS are more atypical, usually manifested as periumbilical discomfort 15-30 minutes after eating, which makes patients fearful of eating, leading to malnutrition and significant weight loss. In addition, when patients with chronic ALS experience vomiting, the vomit often contains a large amount of bile[10]. However, the clinical manifestation of the patient we reported was high fever, which suggests that in patients with unexplained fever after pancreaticoduodenectomy, active imaging examination is necessary. Zissin[11], Juan *et al*[12] pointed out that CT is the main examination method for ALS.

The treatment of ALS depends on the nature of the obstructive lesion, the location of the obstruction, and the patency of hepatojejunostomy and pancreaticojejunostomy. Previously, the main treatment methods were re anastomosis or bypass surgery[13,14]. In recent years, endoscopy has provided new treatment methods for ALS. Cao *et al*[15] reported that 23 patients with ALS caused by postoperative inflammatory stenosis experienced relief in symptoms after undergoing endoscopic nasogastric decompression[15]. Kuo *et al*[16] reported that 11 ALS patients were successfully cured by endoscopic electrohydraulic lithotripsy for crushing fecal stones[16]. In addition, a multicenter study has shown that endoscopic ultrasound-guided enterostomy (EUS-EE) is one of the safe and effective methods for treating ALS[17]. They also point out that patients treated with EUS-EE group had higher rates of complete resolution of symptoms compared with patients who were treated with enteroscopy-assisted luminal stenting. Moreover, for patients with malignant ALS, palliative treatment is the first choice, as there is currently no data indicating a difference in survival rates between patients receiving palliative and curative treatment[11].

Our case also has limitations. One is that we should perform an endoscopic ultrasonography to better assess the nature of the lesion. The other is that we asked the patient to come to our hospital for regular follow-up visits, but the patient did not come to our hospital again because he lived in another province, so the long-term prognosis of the patient was unknown.

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## CONCLUSION

Patients with a history of previous gastrectomy or pancreaticoduodenectomy who experience fever, abdominal pain, vomiting, and other conditions should be alert to ALS. CT is the preferred imaging examination, and personalized treatment methods should be selected based on different etiologies during treatment.

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## FOOTNOTES

**Author contributions:** Yuan J was responsible for the whole management of the patient and wrote the manuscript; Zhang YJ, Wen W led the operation of the patient; Liu XC directed the revision of the manuscript; Yang Y and Chen FL followed up the patient.

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