

# Incomplete duodenal obstruction caused by cholecystitis in an extensive burn patient

Xin Chen<sup>1</sup>, Qian Wang<sup>2</sup>, Feng Li<sup>1</sup>

<sup>1</sup>Department of Burn and Plastic Surgery, Fourth Medical Center of PLA General Hospital, Beijing 100048, China;

<sup>2</sup>Medical School of Chinese PLA, Chinese PLA General Hospital, Beijing 100853, China.

*To the Editor:* Incomplete intestinal obstruction, which can be seen in extensive burn patients, can be caused by superior mesenteric artery (SMA) syndrome, abdominal and intestinal tumors, an inflammatory mass near the ligamentous ligament, presence of a congenital giant duodenum, or other conditions. Cholecystitis is a rare cause of incomplete intestinal obstruction that can result in serious consequences for burn patients who are not diagnosed early, and do not receive timely treatment. Currently, there are few published reports of intestinal obstruction secondary to cholecystitis in these patients. We present a case and discuss complications in management of incomplete intestinal obstruction caused by cholecystitis and pericholecystic fluid in extensive burn patients.

A 28-year-old man presented with multiple burns caused by electric sparks from a short-circuited wire on April 14, 2018. His first diagnosis was burns: 95% II°, 5% III°, with 90% covering multiple parts of his body. The doctor at the local hospital provided treatment immediately with rehydration antishock, organ protection, a tracheotomy, nutritional support, and additional methods, followed by five debridements and skin graft surgeries. After 2 months of treatment, 85% of wounds were unhealed. Due to local medical capacity, he was transferred to our department for further treatment. His history was unremarkable, with no history of digestive disease.

Physical examination data on admission were as follows: body weight, 50 kg; body mass index, 16.7; blood pressure, 132/70 mmHg; pulse rate, 121 beats/min; body temperature, 37.2°C; respiratory rate, 23 breaths/min. Burn wounds were distributed on face, neck, trunk, limbs, and buttocks, and covered 85% total body surface area. Granulation tissue was visible in most of the wound. Transplanted flaps were seen on thoracic abdomen and lower extremities. The patient was thin, with a navicular abdomen.

Laboratory results were as follows: blood routine examination: white blood cell count,  $11.11 \times 10^9/L$ ; neutrophil granulocyte, 85.4%; hemoglobin, 115 g/L; platelet count,  $177 \times 10^9/L$ . Liver and kidney function: albumin quantitation, 36.2 g/L; fast total protein, 59.6 g/L; total bilirubin, 20.9  $\mu\text{mol/L}$ ; direct bilirubin, 17.4  $\mu\text{mol/L}$ ; blood glucose, 4.93 mmol/L.

After admission, the patient underwent anti-infection treatment, debridement dressing, organ protection, enteral nutrition, and several debridement and skin grafting operations. Ninety percent of the wounds were healed. On August 2, 2018, the patient complained of abdominal pain, and had abdominal distension and intermittent vomiting with no obvious causes. These symptoms became more severe after meals and were relieved by placing patient in a supine position. Yellow-green bile was seen in the jejunal nutrition tube. Upon physical examination, the patient showed tenderness in the slightly upper right abdomen, without rebound pain. Murphy sign was negative. Blood routine examination results were as follows: white blood cell count,  $6.56 \times 10^9/L$ ; neutrophil granulocyte, 75.5%; hemoglobin, 122 g/L; platelet count,  $327 \times 10^9/L$ ; albumin, 30.8 g/L; total protein, 56.6 g/L; total bilirubin, 17.9  $\mu\text{mol/L}$ ; direct bilirubin, 7.4  $\mu\text{mol/L}$ .

Considering the patient's medical history, symptoms, and examination results, we concluded that the diagnosis was SMA syndrome. We provided treatments including fasting, promotion of gastrointestinal motility, protection of gastric mucosa, and acid suppression, but there was no relief. Computed tomography angiography (CTA) showed no abnormality in abdominal arteries, but indicated possible cholecystitis and gallbladder empyema, and that the duodenum was compressed by an enlarged gallbladder and surrounding effusion [Figure 1B and 1C].

Because invasive treatment might cause infection due to the abdomen wound, we decided on conservative treatment.

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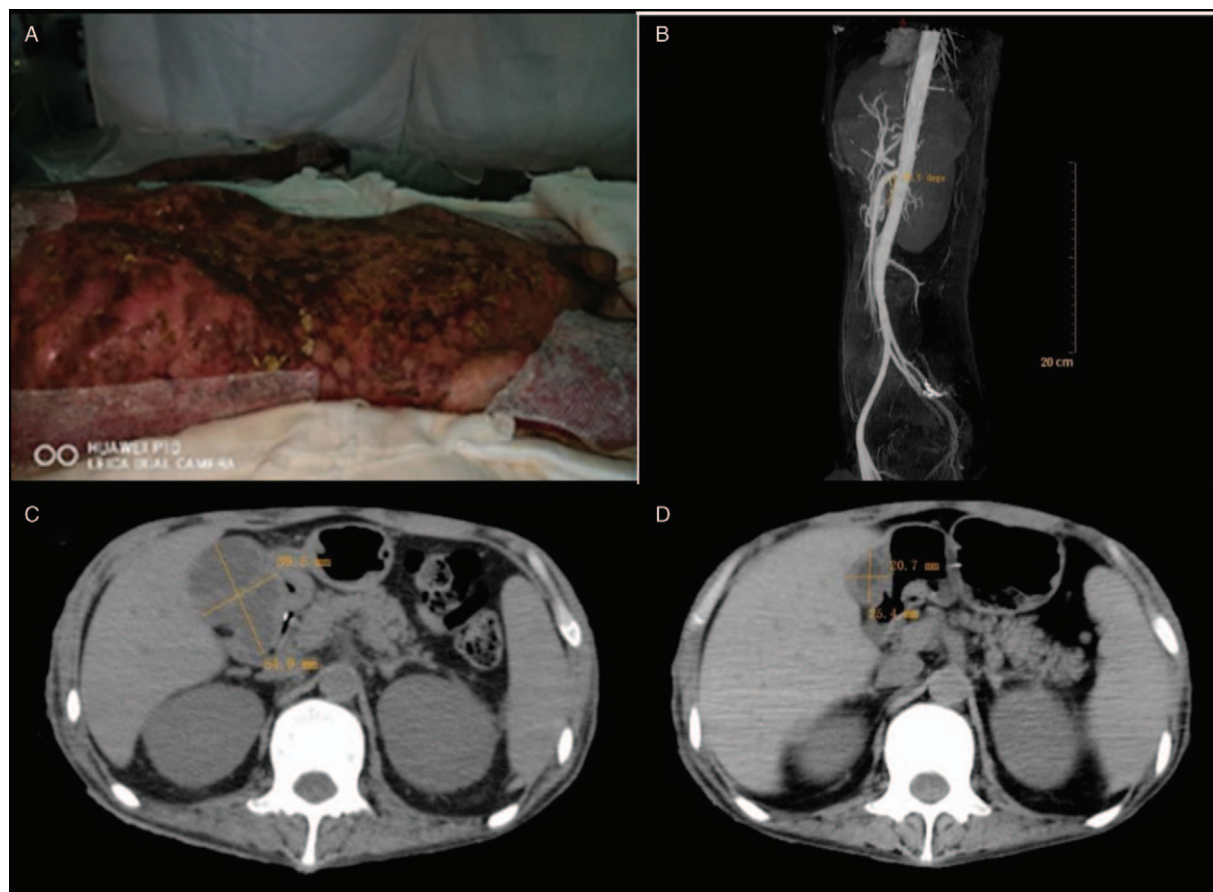
DOI:  
10.1097/CM9.0000000000000189

**Correspondence to:** Dr. Feng Li, Department of Burn and Plastic Surgery, Fourth Medical Center of PLA General Hospital, Beijing 100048, China  
E-Mail: lifeng5586@163.com

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Chinese Medical Journal 2019;132(10)

Received: 25-12-2018 Edited by: Li-Min Chen



**Figure 1:** Imaging of the patient and abdominal CT examination. (A) Patient, August 2, 2018. (B) CTA, August 7, 2018. Angle between superior mesenteric artery and abdominal aorta: 46.2°. (C) CTA, August 7, 2018. Duodenum compressed by enlarged gallbladder. (D) CT August 29, 2018. Gall bladder/fluid reduced; pressure on duodenum reduced; duodenal cavity increased. CT: Computed tomography; CTA: Computed tomography angiography.

According to the diagnosis and treatment guidelines of acute biliary tract infection (2011 edition), we administered anti-infection treatment with cefoperazone sulbactam sodium injection 3 g each time, every 12 h, and ornidazole 0.5 g, two times per day beginning August 11, 2018. On August 16, 2018, the patient tolerated small amounts of food, and the abdominal distension was relieved. By August 20, 2018, all of these symptoms were significantly relieved, and the patient's appetite improved. On August 29, 2018, we performed a computed tomography (CT) scan that showed that the gallbladder had become smaller, surrounding fluid had reduced [Figure 1D], pressure on the duodenum had reduced, and the duodenal cavity had become larger.

SMA syndrome, also known as Wilkie's syndrome,<sup>[1]</sup> is a complication of extensive burns and can be a rare cause of intestinal obstruction. Its incidence rate, based on barium studies, is reported to be 0.1% to 0.3%.<sup>[2]</sup> This rare, potentially life-threatening syndrome occurs when an angle of  $<35^\circ$  exists between the abdominal aorta (AA) and the SMA,<sup>[3]</sup> due to reduction of retroperitoneal fat. The SMA compresses the third part of the duodenum, causing partial or complete intestinal obstruction.<sup>[4]</sup> SMA syndrome can result from many factors, but emaciation is a direct cause.<sup>[5]</sup> Patients present with nausea, vomiting,

postprandial epigastric pain, and/or fullness. The vomitus contains bile, and pain is typically relieved when the patient is in the prone or left lateral decubitus position. Clinical diagnosis depends largely on symptoms, gastrointestinal barium meal imaging, and angiography. Enhanced CT scans are important and provide diagnostic information.<sup>[6]</sup> Conservative treatment includes gastrointestinal decompression, nutritional support, and correction of water and electrolyte disorders. Special posture, such as a prone position, can alleviate symptoms. Surgical intervention may be considered if symptoms persist. In our case, the patient had typical clinical symptoms—emaciation, vomiting, relief of symptoms in prone position—which led us to first misdiagnose SMA syndrome. It should be noted that CTA results showed that the angle between the SMA and AA was approximately  $45^\circ$ , which helped us ultimately exclude SMA syndrome. The duodenum being compressed by cholecystitis and peri-gallbladder fluid led to exclusion of abdominal and intestinal tumors, inflammatory masses near the flexor ligament, and other abdominal diseases.

Acute noncalculous cholecystitis (ACC) is a rare complication of severe burns with a high mortality.<sup>[7]</sup> It may be caused by gallbladder dysfunction, cholestasis, excessive bile pigment load, or bacterial infection. Cholestasis may be caused by fasting, obstruction, postoperative

stimulation, or parenteral nutrition. Due to nonspecific symptoms in burn patients, including pain in upper right abdomen, fever, leukocytosis, and liver abnormalities, early diagnosis is difficult, especially in patients who received intubation or analgesic drugs. Walsh *et al*<sup>[7]</sup> have collected cases of cholecystectomy and conservative treatment combined with choledochotomy or drug therapy in the treatment of ACC since 1950. Only 12% of these patients survived with conservative treatment (intravenous infusion and antibiotics). Failure might be associated with delayed diagnosis. Due to high mortality of gallbladder perforation and gangrene, timing of diagnosis of ACC is crucial. Ultrasound, CT, and magnetic resonance imaging are useful in assessing suspected cases of cholecystitis.<sup>[8]</sup>

In this case, incomplete intestinal obstruction symptoms<sup>[9]</sup> caused misdiagnosis of SMA syndrome. The patient had inducements of cholecystitis, including multiple blood transfusions, fasting during the treatment, systemic wound infection, and a positive blood culture. The duodenum is close to the gallbladder, making it easily oppressed by its swelling and surrounding effusion. Our patient was very thin, and abdominal organs had limited movement range, making the symptoms of obstruction obvious. As the duodenum is located behind the gallbladder, compression can be relieved in the prone position and aggravated in the supine position. We found the enlarged gallbladder through CTA, and performed CTA again after antibiotic treatment, showing a smaller gallbladder and widened duodenal bowel cavity.

At present, there are few reports in China of intestinal obstruction in burn patients due to cholecystitis and fluid around the gallbladder. This case suggests that imaging should be emphasized in patients with intestinal obstruction. CT plays an extremely important role and provides essential information for diagnosis and treatment.

Symptoms such as abdominal distension and persistent vomiting should alert physicians to the possibility of noncalculous cholecystitis and SMA syndrome. Abdominal color ultrasound, CT, and other auxiliary examinations are useful in diagnosis. In the treatment of patients with extensive burns, early recovery of oral intake, maintenance of normal blood pressure, and active control of infection are important in avoiding cholecystitis.

### Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient has given his consent for his images and other clinical information to be reported in the journal. The patient understands that his name and initials will not be published and due efforts will be made to conceal his identity, but anonymity cannot be guaranteed.

### Funding

This study was supported by a grant from Beijing Science and Technology “Capital Specialty” Program (No. Z181100001718037).

### Conflicts of interest

None.

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**How to cite this article:** Chen X, Wang Q, Li F. Incomplete duodenal obstruction caused by cholecystitis in an extensive burn patient. *Chin Med J* 2019;132:1241–1243. doi: 10.1097/CM9.0000000000000189