Acute Appendicitis in the Early Stage after Orthotopic Liver Transplantation

Jun-Feng Huang1, Jie-Fei Ma2, Yu Gong1, Ling-Ling Yu1, Chun-Xiao Cui1, Liu-Xiao Yang1, Jian Zhou1, Du-Ming Zhu1, Ting Wang1

1Department of Intensive Care Medicine, Zhongshan Hospital, Fudan University, Shanghai 200032, China
2Department of Liver Surgery, Zhongshan Hospital, Fudan University, Shanghai 200032, China

Jun-Feng Huang and Jie-Fei Ma contributed equally to this work

Key words: Appendicitis; Immunosuppression; Liver Transplantation

INTRODUCTION

Acute appendicitis is one of the most common surgical diseases in the general population, but it rarely happens after orthotopic liver transplantation (OLT). The impaired immune function in these patients usually predisposes them to a delay in diagnosis owing to an atypical presentation, which might increase complications including death. It is reported that acute appendicitis after liver transplantation happens mostly after postoperative day (POD) 14. Herein, we presented two cases of acute appendicitis after OLT happened within POD 14.

CASE REPORT

Both patients underwent OLT for hepatocellular carcinoma with cirrhosis. Antibiotics postoperatively administered included cefepime 2.0 g intravenous (IV) injection every 12 h and micafungin 100 mg IV once a day within POD 7. The immunosuppression regimen after liver transplantation included the steroid methylprednisolone, tacrolimus, mycophenolate mofetil, and interleukin-2 receptor monoclonal antibody (basiliximab). Steroid was withdrawn as follows: 500 mg IV initially, 240 mg IV POD 1, and then tapered 40 mg every day from POD 2 until POD 6. IV use of methylprednisolone was converted to oral tablets on POD 7, and then maintained at 16 mg. The patients were on mycophenolate mofetil 750 mg twice a day from POD 1. Starting from POD 3, tacrolimus was added to the regimen at 1.5 mg twice a day. Basiliximab induction immunosuppression was used intraoperatively and on POD 4.

Liver function and blood concentration of the immunosuppressant were monitored after surgery. Each organ donation and transplantation was approved by our local institutional ethics committee and conformed with the ethical guidelines of the Helsinki Declaration.

One patient was a 58-year-old man who had begun to complain of sudden onset of right lower abdominal quadrant (RLAQ) pain and fever with nausea, but nonbloody, nonbilious emesis, and also without diarrhea, anorexia, or any other gastrointestinal symptoms on POD 9. He was febrile (38.4°C) and had a heart rate of 117 beats/min, blood pressure of 116/68 mmHg (1 mmHg = 0.133 kPa), a respiratory rate of 22 breaths/min, and oxygen saturation of 95% on room air. Physical examination revealed fixed RLAQ pain without rebound tenderness. The peripheral white blood cell count was elevated to 11 × 10^9/L with 87% neutrophils, 8% lymphocytes, and 4% monocytes on the 1st day but the count increased to 17 × 10^9/L and 22 × 10^9/L 2 days after the onset of abdominal pain. The patient was examined by ultrasound which only showed a thickening of the appendix wall. A contrast computer tomography (CT) scan found diffuse thickening of the appendix which measured 1.4 cm in diameter and was surrounded by some exudates.

Address for correspondence: Dr. Ting Wang, Department of Intensive Care Medicine, Zhongshan Hospital, Fudan University, No. 180, Feng Lin Road, Shanghai 200032, China
E-Mail: wang.ting@zs-hospital.sh.cn

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A laparoscopic resection was performed immediately, and the appendix was found to be thickened and surrounded by a tan exudate. Acute appendicitis was demonstrated by biopsy. Meropenem was administered at 1.0 g every 8 h for 7 days after the surgery. At present, at 9-month follow-up, the patient is free with issues.

The other patient was a 56-year-old woman who had a sustained fever and vague lower abdominal pain without vomiting, diarrhea, anorexia or any other gastrointestinal symptoms, and RLAQ without rebound pain or knocking pain on POD 9. No abnormalities were found by abdominal plain film or ultrasound. She presented with worsening abdominal pain on POD 11 with a fever (38.8°C), heart rate of 120 beats/min, and blood pressure of 88/65 mmHg. On physical examination, she looked seriously ill with a high-grade fever and marked tenderness with muscle guarding of the entire abdomen. However, the white blood cell count only increased to 14 × 10⁹/L. Urgent CT scan also showed a dilated appendix and some infiltration, with free fluid around the cecum. Diagnostic laparoscopy identified acute perforated appendicitis, and she accepted open appendectomy. Intraoperative peritoneal fluid cultures were obtained and showed mixed enteric flora. Meropenem was administered for 7 days at 1.0 g every 8 h for preoperative prophylaxis and postoperative treatment based on the culture results. The postoperative recovery was uneventful.

**DISCUSSION**

Appendicitis rarely happens in the liver transplant population. The reported incidence of acute appendicitis in liver transplant recipients is 0.01–0.49%.¹⁻² de’Angelis *et al.*³ reported that only 2% of solid organ transplant patients experienced appendicitis, and the median time from transplantation to emergency surgery was 2.4 years (range: 0.1–20.0 years). In this study, the patients had acute appendicitis in the early stage after OLT (POD 9 and POD 11), which is much earlier than previous reports.¹⁻² However, the risk factors remain unclear.

In liver transplant recipients, especially in the early stage of the postoperative period (<14 days), acute inflammation is atypical owing to the use of immunosuppressive and antibiotic therapy. Fever, nausea and vomiting, abdominal pain, RLAQ tenderness, and leukocytosis are still the most common symptoms. With immunosuppression, particularly with the use of a combinational regimen, the clinical symptoms were atypical.¹⁻³ The two patients began with the symptoms of limited RLAQ pain or mild leukocytosis. And acute appendicitis was diagnosed by CT imaging and was confirmed intraoperatively during a laparoscopic procedure.

Bedside ultrasound showed no abnormality of the two patients. CT scans have been used in most studies and have become the recommended diagnostic tool. Common findings include swelling of the appendix cavity and thickening of the appendix wall. If ascites is found around the appendix, perforation should be highly suspected.¹⁻³ In this situation, an ultrasound-guided abdominal puncture is helpful.

Appendectomy is the most effective treatment and is strongly recommended. It is fast, and the appendix could easily perforate without immediate treatment when appendicitis develops during the early stage after OLT with immunosuppressive therapy. The rate of perforation might increase about 10% by 24 h and up to 50% by 48 h.¹⁻³ Open appendectomy is common, but the appropriate use of laparoscopy is feasible for rapid diagnosis and treatment, especially in the early stage after OLT.

**Declaration of patient consent**

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

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**Conflicts of interest**

There are no conflicts of interest.

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