

Minimally Invasive Interventional Therapy for Liver Abscess with Bloodstream Infection Caused by a Fishbone Perforation of the Stomach Wall: A Case Report

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Abstract: Liver abscess is a common disease in clinical practice, whereas liver abscess resulting from the penetration of a fishbone through the gastric wall is infrequently observed. Herein, we present the case of a 67-year-old male patient of Chinese origin. The patient had been experiencing a fever for 10 days and was subsequently admitted to the hospital. Laboratory investigations revealed elevated levels of inflammatory markers, with blood cultures identifying *Streptococcus anginosus* (*S. anginosus*). Imaging studies including abdominal ultrasound and contrast-enhanced computerized tomography (CT) confirmed the presence of an abscess in the left hepatic lobe, along with foreign bodies located within both the liver parenchyma and the gastric wall. Based on the patient's medical history and imaging results, the ultimate diagnosis indicated that a fishbone had perforated the stomach wall, resulting in an intrahepatic abscess and subsequent bacteremia. The patient underwent anti-infection therapy followed by a minimally invasive interventional technique to remove the fishbone. This case shows that interventional technique presents an alternative treatment approach for managing foreign bodies within the liver.

Keywords: liver abscess, fishbone, *Streptococcus anginosus*, minimally invasive interventional technique

Introduction

Liver abscesses are divided into bacterial liver abscess (PLA), amoebic liver abscess, fungal liver abscess and circumcised liver abscess according to the cause, among which PLA is the most common. Liver abscess is predominantly associated with pathogens infiltration of the liver through several pathways, such as the biliary tract, portal vein, hepatic artery, or direct trauma to the liver. In contrast, the occurrence of abscess formation due to the ingestion of foreign bodies that perforate the gastric wall and subsequently invade the liver is rare.^{1,2} Treatment for liver abscesses caused by foreign bodies typically involves antimicrobial therapy and abscess drainage or surgery.^{1,3} Anti-infection treatment is the basis, and abscess drainage guided by ultrasound has the advantage of less trauma, but it may not be able to drain foreign bodies. The operation can be divided into open surgery and laparoscopic surgery, which can perform hepatic lobe resection or incision drainage to remove foreign bodies, but the trauma is relatively large and costly. It may cause secondary abdominal infection after the operation. In order to reduce surgical trauma, shorten hospital stay and reduce treatment costs, this case explores minimally invasive interventional technique. Here we report a case of liver abscess with bloodstream caused by a fishbone and treated with minimally invasive interventional technique.

Case Presentation

A 67-year-old Chinese male was admitted to our hospital for complaints of fever. There was no abdominal pain, nausea, or abdominal distension. He had a high fever, diarrhea, vomiting, and poor appetite. He had no comorbidities or surgical history. The physical examination revealed that the skin and sclera of the entire body showed no jaundice. The abdomen was soft, without tenderness, rebound tenderness, muscular rigidity, or palpable masses. The liver and spleen were not palpable beneath the costal margins. The liver percussion pain was weakly positive, and the shifting dullness was negative. In laboratory examination, the white blood cell (WBC) count was $11.0 \times 10^9/L$, the ultrasensitive C-reactive protein (CRP) level was 182.34 mg/L, and the procalcitonin (PCT) level was 100 ng/mL. Serum biochemical analyses including glucose level, renal function, liver enzymes, amylase, lipase, and alpha-fetoprotein, were all within normal limits. Abdominal ultrasonography identified a heterogeneous solid-fluid mass in the left outer lobe measuring approximately 55mm×41mm, with a 25mm high-density shadow (Figure 1A). Additionally, an 11mm high-density shadow was observed on the gastric wall (Figure 1B). Abdominal enhanced computed tomography (CT) further demonstrated the presence of a liver abscess containing foreign bodies within the liver and stomach wall (Figure 1C and D). Both thoracic CT and echocardiography revealed no notable anomalies. The patient has a medical history of frequent fish consumption and experienced an incident of accidentally ingesting a fishbone one month prior. These factors prompted suspicion of a liver abscess resulting from a gastric perforation caused by the fishbone. Subsequent gastroscopy did not identify any abnormalities in the stomach and duodenum. Blood culture results indicated the presence of *Streptococcus anginosus* (*S. anginosus*). The patient was treated with levofloxacin (0.4g, iv, QD) combined with piperacillin-tazobactam (3.375g, iv, Q8H) for anti-infective therapy.

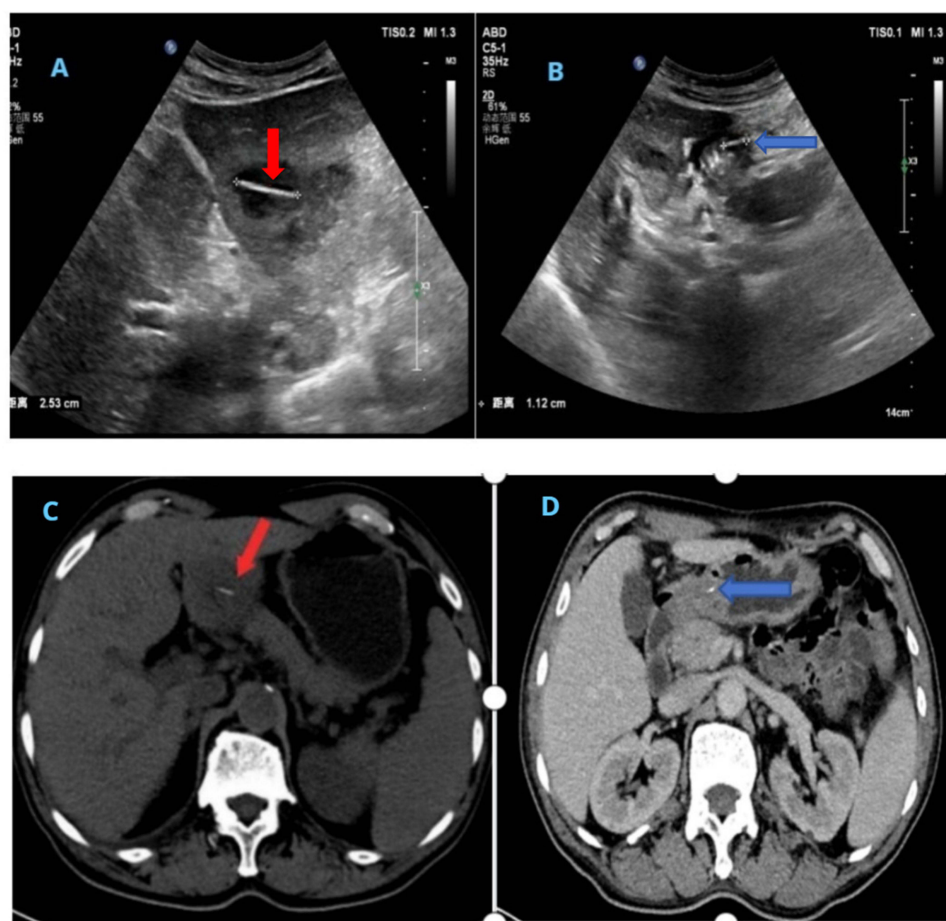


Figure 1 (A and B) Abdominal ultrasonography findings. (A) A hyperdense linear body (red arrow) was located in the left lobe of the liver; (B) A hyperdense linear body was found in the stomach wall (blue arrow). (C and D) Abdominal contrast-enhanced computed tomography findings. (C) A hyperdense linear body (red arrow) was found in the liver abscess. (D) A hyperdense linear body was found in the stomach wall (blue arrow).

Following two days of combined anti-infection treatment, the patient's body temperature returned to normal. Subsequently, consolidation treatment was carried out for an additional three days. Later, levofloxacin monotherapy was selected based on the drug sensitivity results of *S. anginosus*. To remove the foreign body in the liver, after comprehensive communication with the patient and his family, the decision was made to forego laparoscopic surgery in favor of an interventional technique. During the interventional procedure, an 18-gauge puncture needle was employed to access the foreign bodies within the liver under ultrasound (US) guidance. Following confirmation of the needle tip's proximity to the foreign bodies via digital subtraction angiography (DSA) fluoroscopy, a rigid guide wire was inserted and an 8F vascular sheath was exchanged with the assistance of the guide wire. The inner core was extracted, and crocodile forceps were introduced through the outer sheath to effectively grasp (Figure 2A and B) and extract the foreign body (1.6 cm fishbone) (Figure 2D). Drainage was not performed due to the absence of liquefaction in the abscess cavity. The pus on the fishbone was examined using metagenomic next-generation sequencing (mNGS) technology, which revealed the presence of *S. anginosus* (number of sequences: 1163), consistent with the result of the blood culture. The patient experienced no postoperative fever, abdominal pain, or discomfort, and laboratory tests (WBC, CRP and PCT) were all returned to normal limits. Abdominal ultrasonography demonstrated a decrease in the dimensions of the hypoechoic area, with a residual fishbone measuring approximately 7.1mm observed within the abscess (Figure 2C). Consider that the residual fishbone is small and that there is no recurrence of the condition after the abscess has mechanized to form a granuloma. The patient was discharged on the 4th postoperative day without other complications. Upon follow-up six-month post-surgery, the patient was noted to have made a satisfactory recovery and no recurrence.

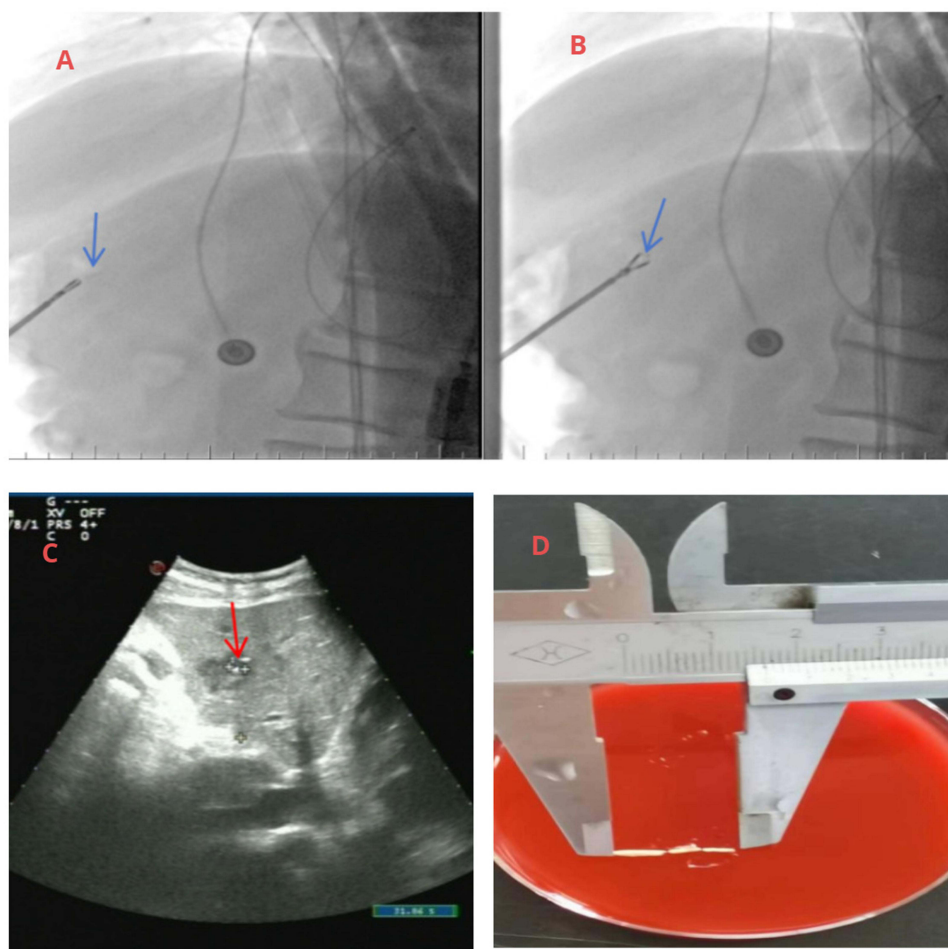


Figure 2 (A and B) Use Crocodile forceps to remove foreign body under US and DSA guidance (blue arrow); (C) Postoperative abdominal ultrasonography findings. The abscess became smaller and a residual fishbone (7.1mm) (red arrow); (D) Fishbone (16mm).

Discussion

PLA is a common clinical infectious disease characterized by a gradual onset and rapid progression, posing risks of bloodstream infection, sepsis, and infectious shock. Common pathogenic bacteria implicated in clinical cases include *Klebsiella pneumoniae*, *Escherichia coli*, and *Streptococcus sp.*⁴ However, *Streptococcus sp.* (72.3%) was the organisms identified in the reported cases of liver abscesses caused by foreign bodies.⁵ Among them, *Streptococcus constellatus* (*S. constellatus*) and *S. anginosus* were reported more frequently.^{6–8} In this case, blood culture and pus samples identified *S. anginosus*, which belongs to the *Streptococcus milleri* group, along with *S. constellatus* and *S. intermedius*. This bacterium is commonly found on the human body surface, oral cavity, nasopharynx, and other parts of the human body. It is a conditionally pathogenic bacterium, capable of causing localized suppurative infections, especially when the body's immunity is compromised. Reports indicate that its infections can lead to brain abscesses, neck abscesses and liver abscesses, etc.^{9–11} The proclivity of *S. anginosus* infections to form abscesses may stem from its production of several extracellular enzymes, including hyaluronidase, chondroitin sulfate lyase, and deoxyribonuclease, which facilitate tissue liquefaction, ultimately leading to abscess formation.^{12,13}

The introduction of foreign bodies into various regions of the digestive tract can lead to the the formation of abdominal abscesses, affecting organs such as the liver, pancreas, gastrointestinal tract, abdominal cavity, and abdominal wall.^{14–18} Liver abscesses are relatively prevalent, with the left hemiliver being a common site for abscess formation due to its anatomical proximity to the stomach, which facilitates foreign body perforation.¹ However, gastric wall perforation by a foreign body is a chronic process, involving the gradual encapsulation of the perforation by the greater omentum and adjacent organs.¹⁹ Consequently, initial symptoms are often atypical. When foreign bodies invade the liver, resulting in hepatic abscess formation, patients typically present with symptoms such as chills and fever, prompting them to seek medical evaluation. Diagnosis primarily relies on the patient's history of foreign body ingestion and corroborative imaging findings. It has been reported that the foreign bodies that can cause gastrointestinal perforation include fishbones, chicken bones, toothpicks, needles, or pens.^{14,20–23} Fishbone accounts for 33% of these cases, followed by toothpick (27.3%) and chicken bone (12.5%).⁵ And literature suggests that the interval between ingestion of a foreign object and the manifestation of symptoms or abscess development typically spans from 1 week to 3 months.^{3,24} In this case, one month elapsed between the ingestion of a fishbone and the onset of symptoms before a conclusive diagnosis was reached. The variability in onset duration may be influenced by various factors, including age, immune status, comorbidities, size of the foreign body, extent of gastrointestinal perforation, and the anatomical location of the foreign object.

For the treatment of liver abscesses caused by foreign bodies, in addition to anti-infection and percutaneous liver abscess puncture and drainage, minimally invasive management can be adopted according to the specific situation. If the foreign body has not completely entered the abdominal cavity and has not caused gastrointestinal perforation, ultrasonic endoscopy can be utilized for its removal after precise localization. One study showed that only 16% of liver abscesses caused by foreign bodies were found through gastroduodenoscopy.²⁵ It may be that the foreign body has penetrated the liver from the gastrointestinal tract after peristalsis in the gastrointestinal tract, and the perforation is small and has been healed. In cases where the foreign body has caused gastrointestinal perforation and entered the abdominal cavity, either open or laparoscopic surgery may be necessary.^{26,27} Intrahepatic foreign bodies can be surgically resected or treated with interventional techniques.⁷ Chong et al⁵ have conducted a review of 88 liver abscesses due to foreign bodies. All patients with a diagnosis established during hospitalization eventually recovered regardless of the treatment strategy chosen. In these cases, the overall rate of cure without foreign body removal is low (9.5%).²⁵ Therefore, removal of the foreign body is critical for resolving the abscess compared with other bacterial liver abscess. In this case, it was determined that the fishbone fragments embedded in the stomach wall had been present for an extended period and were encapsulated by granulation tissue. No abnormalities were detected during gastroscopic examination, rendering endoscopic foreign body removal infeasible. To minimize surgical trauma, a minimally invasive intervention technique was employed. The patient demonstrated a favorable postoperative recovery. Based on this case, we summarized the inclusion criteria of this technique: a. Foreign bodies with complete shape; b. Foreign bodies with length less than 2.5 cm (the diameter of an 8F vessel sheath is 2.67 cm); c. Foreign bodies exist in a single abscess; d. No digestive tract perforation, no peritonitis, no other organs involved; e. Refuse open or laparoscopic surgery. The advantages of this minimally invasive interventional technique are as follows: a. Less trauma and faster recovery;

b. Low cost; c. Short hospital stay; d. Suitable for elderly people who cannot tolerate surgery. Xia et al²⁶ reported a case of fishbone located in the caudate lobe of the liver, the patient underwent laparoscopic partial caudate lobectomy, incision and drainage of the liver abscess, and fishbone removal. The patient was discharged on the 9th postoperative day. Bekki et al²⁸ reported a case of fish bone located in the left lobe of liver, which was removed by laparoscopic surgery and discharged on on postoperative day 11. In this case, the patient was discharged on the 4th postoperative day, which greatly shortened the length of hospitalization and cost. For liver abscesses caused by foreign bodies, most cases are to remove foreign bodies through open or laparoscopic surgery.^{28–30} The operation can completely remove foreign objects, but the operation is traumatic, high cost, long hospitalization time, and people with poor physical conditions cannot tolerate surgery. Consequently, this interventional method for the removal of foreign bodies from the liver presents a viable treatment option. However, a potential limitation of this interventional technique is the possibility of residual foreign bodies remaining within the hepatic tissue. To address this concern, it is crucial to identify the type and size of the foreign body preoperatively. Additionally, the postoperative placement of drainage tubes for irrigation and drainage may be considered. In the future, I hope that by constantly exploring the applicable population of minimally invasive interventional technique, foreign bodies in the liver can be completely removed, avoid recurrence and completely cured.

Conclusion

In conclusion, the incidence of a fishbone perforating the gastric wall and subsequently causing a liver abscess is uncommon. A thorough medical history and accurate imaging are essential for proper diagnosis. Open or laparoscopic surgery is commonly used, but now minimally invasive interventional techniques present an additional alternative for the removal the foreign bodies from the liver.

Ethics Approval and Informed Consent

This study was approved by the Ethics Committee of Yijishan Hospital of Wannan Medical College. Written informed consent for the publication of images and other clinical information were obtained from the patient. And we confirm that institutional approval was not required to publish the case details, as all patient information has been anonymized and there are no identifying details included in the manuscript. The authors confirm that the study complied with the Declaration of Helsinki.

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Disclosure

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