



## CASE REPORT

# Successful Treatment of *Achromobacter xylosoxidans*-Induced Liver Abscess with Levofloxacin and Sulfamethoxazole: A Case Study

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treatment**Abstract**

*Achromobacter xylosoxidans* (AX) is a gram-negative bacterium infrequently implicated as the etiological agent of liver abscess. Previous reports have documented a 100% mortality and recurrence rate among the limited number of AX-related liver abscess cases. Herein, we present a case study of a 49-year-old male with a confirmed AX-induced liver abscess who achieved successful remission following treatment with levofloxacin and sulfamethoxazole. Our findings contribute valuable insights into the diagnosis and management of AX-associated liver abscesses, while emphasizing the potential therapeutic efficacy of levofloxacin and sulfamethoxazole.

**Introduction**

Pyogenic liver abscesses are commonly caused by Gram-negative bacteria such as *Escherichia coli*, *Klebsiella*, *Pseudomonas*, and *Enterobacter* species. However, liver abscesses caused by *Achromobacter xylosoxidans* (AX) infections are extremely rare (Warner et al., 2021). The first reported cases of AX-induced liver abscesses were documented by Kouichi Asano et al. in 2005, involving three patients from Japan (Asano et al., 2005). Unfortunately, all reported cases demonstrated a 100% mortality and recurrence rate. AX infections pose diagnostic challenges as they can be mistaken for other gram-negative rods, particularly *Pseudomonas* species (Nielsen et al., 2019). Moreover, treatment options are limited due to AX's resistance to commonly available antibiotics (Fleurbaaij et al., 2018; Amoureux et al., 2016; Istiaq et al., 2019). To date, there are few reports on the treatment of liver abscesses caused by

AX. In this study, we present a case of liver abscess caused by AX that was successfully treated with a combination of levofloxacin and sulfamethoxazole. This clinical experience provides a significant reference for the diagnosis and treatment of AX-induced liver abscesses.

**Case Report**

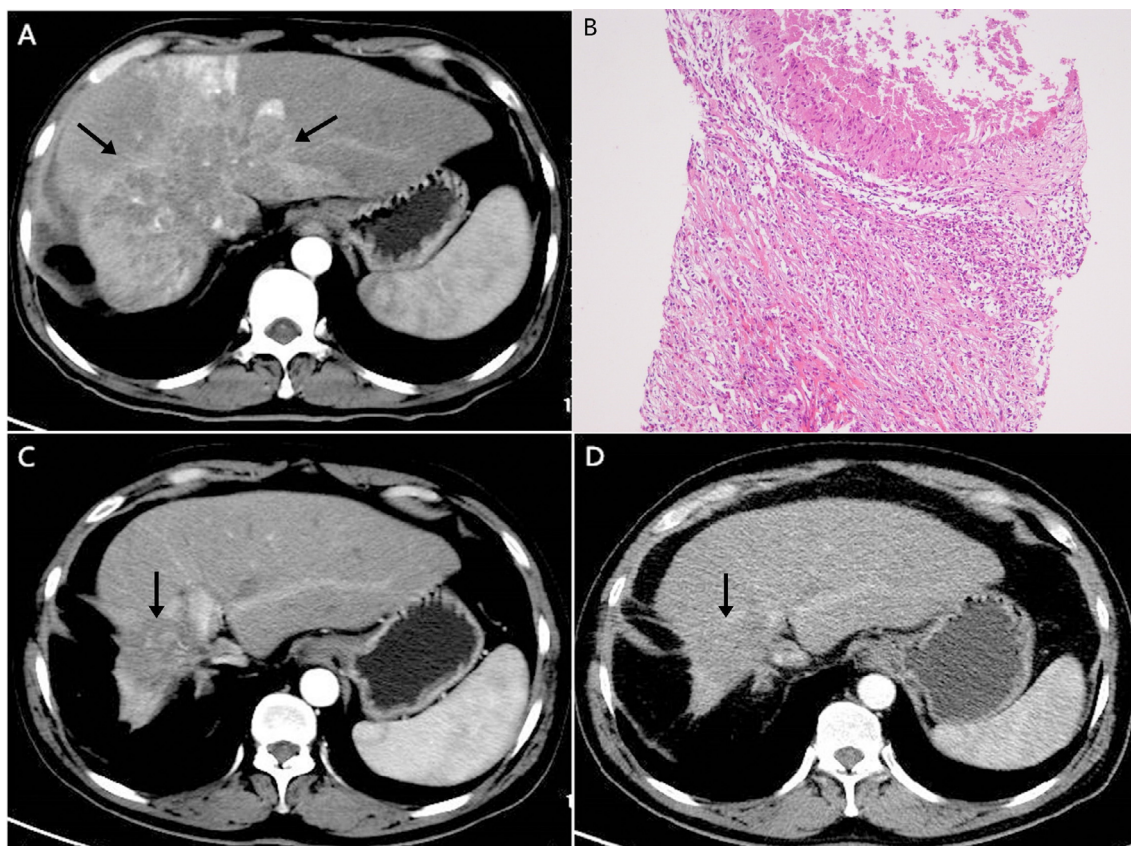
A 49-year-old male with a 4-year history of intermittent fever and right upper abdominal pain presented to the hospital with a fever of 40°C. Abdominal computed tomography (CT) scans revealed areas of low density in the right hepatic lobe (Figure 1A). The patient had a medical history of receiving 6-8 weeks of various antibacterial treatments (such as Cefperazone-Sulbactam, Quinolones, Carbapenems, etc.) during the past 4 years. However, the symptoms of fever and right upper

abdominal pain only improved during antibiotic treatment and recurred upon discontinuation. Liver biopsy performed during this period showed chronic liver abscess accompanied by granulomatous inflammation (Figure 1B), although bacterium culture results were negative. After 11 days, another liver biopsy was conducted, but the bacterium culture still yielded negative results. Two weeks later, a subsequent liver biopsy confirmed AX infection through bacterium culture. Antimicrobial susceptibility testing revealed resistance to most tested antibiotics but susceptibility to Levofloxacin, Sulfamethoxazole, and Imipenem. The isolated bacterial strain DNA was sequenced, and a BLAST search indicated the presence of multiple resistance genes, including *aadB*, *aadA2*, *blaPSE-I*, and *acc(6')-II*. Subsequently, prompt therapy with levofloxacin and sulfamethoxazole was initiated, resulting in resolution of fever and right upper abdominal pain. The patient was discharged from the hospital after 7 days, and the treatment continued for 9 months. A follow-up CT scan performed 12 months after therapy discontinuation demonstrated a reduction in the lesion size, atrophy of the right hepatic lobe, and compensatory hyperplasia of the left hepatic lobe (Figure 1C and 1D). No signs of recurrence have been observed to date.

## Discussion

*Achromobacter xylosoxidans* (AX) is a nonfermenting gram-negative bacillus first described in 1971. It is an opportunistic bacterium known to cause sepsis, meningitis, pneumonia, urinary tract infections, and peritonitis in immunocompromised patients (Igra-Siegmán et al., 1980). The exact transmission mechanism of this bacterium remains unknown.

Although AX has been isolated from various clinical samples such as urine, sputum, blood, cerebrospinal fluid, otopyorrhea, and bile juice, it is rarely reported as a causative agent of liver abscess (Saiman et al., 2001; Marion-Sanchez et al., 2018; Manckoundia et al., 2011). To date, only three cases of liver abscess caused by AX have been reported (Asano et al., 2005). Unfortunately, all of these cases resulted in 100% mortality and recurrence despite management efforts. The identification of AX can be challenging, as it can be mistaken for other gram-negative rods, particularly *Pseudomonas* species. Additionally, the therapeutic options are limited due to AX's resistance to commonly available antibiotics (Saiman et al., 2001). Previous studies have noted AX's sensitivity to carbenicillin, piperacillin, ceftazidime, and trimethoprim/sulfamethoxazole, as well as its resistance to first-generation



**Figure 1.** The results of CT scan and pathological examination of the patient

(A) CT scan showed a low density area in the right lobe of the liver; (B) Pathological examination showed multiple granulomas, neutrophilic infiltration and nuclear dust in the area of the necrosis; (C) and (D) CT scan showed the lesion became smaller, the right hepatic lobe was atrophied, the left hepatic lobe was compensatory hyperplastic.

aminoglycosides and cephalosporins. However, there is no consensus on the optimal treatment for AX infections.

To the best of our knowledge, there are few reports on the successful treatment of liver abscesses caused by AX. This case represents the first reported successful cure of an AX-infected liver abscess using a combination of levofloxacin and sulfamethoxazole. Based on our experience, we suggest that when encountering pyogenic liver abscesses, physicians should consider AX as an uncommon causative agent. Repeat liver biopsies and bacterial cultures are necessary to establish the diagnosis. Furthermore, the combination therapy of levofloxacin and sulfamethoxazole has shown efficacy in treating liver abscesses caused by AX. This case provides important clinical insights and serves as a valuable reference for the diagnosis and treatment of AX-induced liver abscesses.

#### Authors contributions

EQ Qin was involved in patient's care. EQ Qin, YW Zhong were involved in data collection and analysis. EQ Qin, YW Zhong drafted the manuscript. All authors read and approved the final manuscript.

#### Potential conflicts of interest

The authors declare no conflict of interest.

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