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Candidal cholangitis: a rare case of invasive mycosis in an immunocompetent adult

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A B S T R A C T

Background and Purpose: Biliary tract infections, particularly cholangitis, pose a significant risk for sepsis, with high morbidity and mortality. Cholangitis is often associated with choledocholithiasis, biliary strictures, and iatrogenic interventions. It is typically bacterial, with *Enterobacteriaceae* being the most common culprit. Fungal infections of the biliary system are rare, typically occurring in immunosuppressed individuals or in those with foreign biliary devices, such as stents. *Candida albicans* is the predominant fungal species isolated in biliary infections.

Case presentation: This study aimed to report a case of a middle-aged, apparently immunocompetent male who presented with an acute onset of abdominal pain, fever, and jaundice. Imaging and laboratory investigations revealed features of cholangitis and pancreatitis. Blood and bile cultures yielded *Candida albicans*, confirming the diagnosis of fungal cholangitis. Notably, the patient had no prior history of immunosuppressive therapy, malignancy, diabetes, or biliary instrumentation. The patient underwent prompt endoscopic retrograde cholangiopancreatography with biliary drainage for source control, followed by targeted antifungal therapy. He demonstrated marked clinical and biochemical improvement, with complete recovery on follow-up.

Conclusion: This case highlights that fungal cholangitis can occur even in immunocompetent individuals without conventional risk factors. Clinicians should maintain a high index of suspicion for fungal pathogens in critically ill patients with cholangitis who are unresponsive to standard antibacterial therapy. Early recognition, timely biliary drainage, and appropriate antifungal management are essential for favorable outcomes. Further studies are warranted to elucidate the role of fungal organisms in biliary tract infections, particularly in immunocompetent individuals, and also to refine diagnostic and therapeutic algorithms for such rare clinical presentations.

Keywords: *Candida albicans*, Cholangitis, ERCP, Fungal infection, Pancreatitis

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Introduction

Biliary tract infections, unlike others, carry a high propensity to develop sepsis and subsequent high morbidity and mortality. Cholangitis is particularly severe and often related to choledocholithiasis, biliary strictures (more frequently benign than malignant), other structural anomalies, and iatrogenic manipulation. The most common offenders are Gram-negative bacteria, specifically *Enterobacteriaceae*, which ascend from the small bowel [1]. Fungal infections rarely involve the biliary tree; in most cases, they complicate severe immunosuppression and the presence of *in situ* biliary foreign bodies, such as stents [2,3].

Candida albicans is the most frequently isolated mycotic agent in biliary infections. A prospective multicenter trial by Lenz et al. isolated *Candida* species from 27.7% of bile samples obtained by endoscopic retrograde cholangiopancreaticography (ERCP) in patients with cholangitis and biliary stricture [4]. Retrospective trials in patients with primary sclerosing cholangitis have isolated *Candida* species in 12-20% of ERCP bile specimens [5,6]. *Candida* species is known to colonize the upper and lower gastrointestinal tracts. In the absence of biliary instrumentation or obstruction or prior sphincterotomy, the biliary tract is largely regarded as sterile. Possibility of contamination of the bile sample collected during the endoscopic procedure could not be excluded with certainty, and this could explain the high rates of *Candida* species isolation in bile cultures. However, studies on bile obtained during percutaneous transhepatic biliary drainage in patients with malignant biliary obstruction also reported positive fungal cultures in 23% of patients. This suggests that biliary candidiasis is common, even after accounting for possible gastrointestinal contamination of the bile specimen [7].

Case presentation

A 52-year-old apparently immunocompetent male presented with an acute onset of abdominal pain of three

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days duration. The pain was predominantly localized to the epigastrium, which was constant and non-colicky, reportedly worsening after oral intake. He also complained of nausea, vomiting, and an inability to tolerate oral intake. He did not show any lower gastrointestinal symptoms or overt bleeding manifestations.

Ethics approval was obtained from the institutional Ethics Committee (MOM/CPM/ETHICS/050225/003) on February 5, 2025, for publication in scientific journals.

He had no relevant past medical or surgical history and no history of drug or substance use or abuse. At presentation to the Emergency Department, he was in respiratory distress with dyspnea, tachypnea, and hypoxia with an oxygen saturation of 88% on a non-rebreather mask, requiring subsequent intubation and mechanical ventilation. Initial labs revealed mild leukopenia with a leukocyte count of 3460/µL and markedly elevated inflammatory markers, including a C-reactive protein level of 322 mg/L. Liver function tests showed a cholestatic pattern, with total/direct bilirubin of 36.2/21.9 µmol/L and alkaline phosphatase of 227 IU/L, associated with a prolonged prothrombin time of 19.5 s. Lipase was elevated to 637 IU/L, consistent with pancreatic involvement, while creatinine (90 µmol/L) remained within normal limits. The laboratory parameters of the patient, upon presentation and subsequent serial monitoring, are summarized in Table 1. Abdominal imaging with ultrasound (USG) and computed tomography (CT) with contrast revealed acute pancreatitis, Balthazar grade C, a prominent common bile duct (CBD) measuring 10 mm with sludge/small calculi and a cut-off distally (Figure 1).

Table 1. Patient laboratory parameters

Parameter	Day				Reference range
	Day 0	Day 3	Day 7	Follow up	
Hemoglobin (gm/dL)	14.5	12	13.7	13.5	14 - 17.5
Leukocyte count (cells/µL)	3460	4080	5300	5200	4400 - 11300
Platelet count (x 10^3 cells/µL)	118	129	168	176	150 - 450
Bilirubin Total/Direct (µmol/L)	36.2/21.9	19.2/12.8	13.2/6.5	12.8/4.3	0 - 21 / 0 - 5
AST/ALT (IU/L)	84/162	68/114	54/78	48/34	5 - 40
ALP (IU/L)	227	118	124	119	40 - 129
LDH (IU/L)	731			168	135 - 225
Lipase (IU/L)	637			34	13 - 60
Amylase (IU/L)	566			45	30 - 110
Prothrombin time (sec)	19.5`	15.9	12.6	11.9	9.1 - 12.1
Lactate (mmol/L)	5.8	1.7		0.7	0.5 - 1.8
CRP (mg/L)	322	218	65	4	0 - 5
BUN (mmol/L)	6.9	6	6.6	5.3	2.14 - 7.14
Creatinine (µmol/L)	90	78	82	68	62 - 106

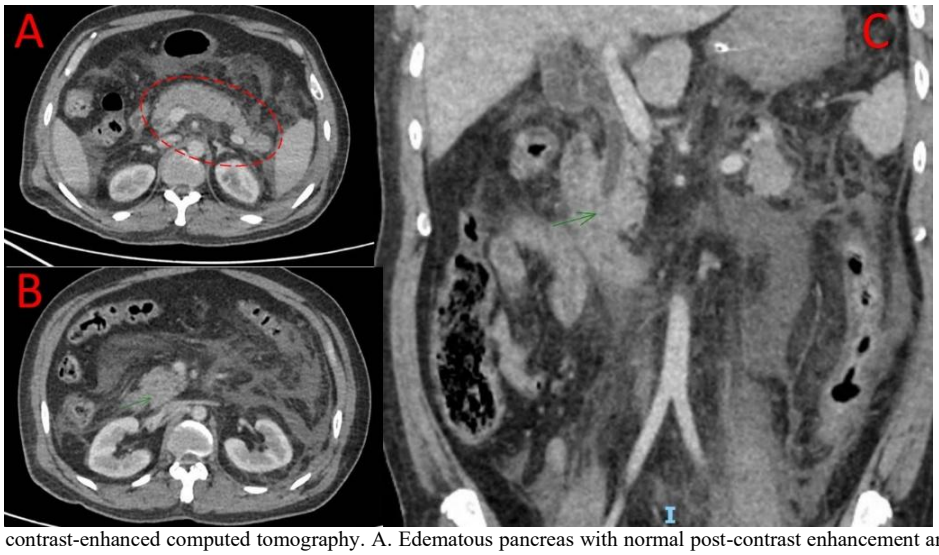


Figure 1. Abdomen contrast-enhanced computed tomography. A. Edematous pancreas with normal post-contrast enhancement and peripancreatic fat stranding; suggestive of acute pancreatitis. B. Dilated common bile duct with a maximum caliber measuring about 10 mm at mid-level and intraluminal sludge versus small calculi. C. Coronal image demonstrating dilated common bile duct with a distal cut-off.

The patient was admitted to the critical care unit with an initial diagnosis of biliary cholangitis and pancreatitis complicated by sepsis, septic shock, and acute hypoxic respiratory failure. Samples were collected for blood culture (two sets) directly from the emergency department. He was initiated on piperacillin-tazobactam, with the first dose administered immediately after blood cultures were collected in the emergency department. He required norepinephrine infusion for septic shock, with improvement in hypotension. The ERCP was performed once hemodynamic stability was achieved, approximately 6 h after admission.

The study revealed dilated CBD with a distal cut-off and a possible stricture, across which a 7Fr stent was deployed (Figure 2), with drainage of purulent bile. The samples were collected for culture and sensitivity. The blood and bile cultures yielded whitish, pasty colonies on blood agar, which were subcultured onto Sabouraud's Dextrose agar (Medisynal, United Arab Emirates). The isolate was identified as *Candida albicans*, and its susceptibility was determined using Vitek 2C (Biomérieux, France) (Figure 3). The isolate was sensitive to fluconazole (MIC ≤ 0.5 µg/mL), voriconazole (MIC ≤ 0.12 µg/mL), caspofungin (MIC ≤ 0.12 µg/mL), micafungin (MIC ≤ 0.06 µg/mL), and amphotericin B (MIC 0.5 µg/mL).

The patient was started on intravenous caspofungin at a loading dose of 70 mg on the first day, followed by 50 mg daily. Over the course of a week, his laboratory parameters improved (Table 1). The vasopressor was tapered off, and he was subsequently extubated. Repeat blood cultures were obtained at 48 and 72 h after initiation of antifungals; both were negative. Caspofungin was continued for a total duration of 14 days. The patient was subsequently discharged and remained asymptomatic, with normal laboratory parameters during his follow-up at two weeks after discharge. The lymphocyte subset panel and serum immunoglobulin assays performed during follow-up revealed no abnormalities. The biliary stent was removed after a relook endoscopy and cholangiography at four weeks following discharge. He remained on follow-up for approximately 6 months with no subsequent concerns.

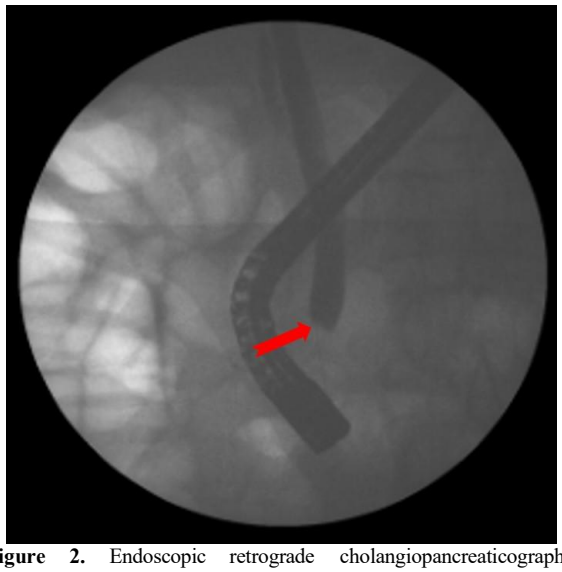


Figure 2. Endoscopic retrograde cholangiopancreaticography. Fluoroscopy image with a distal common bile duct cut-off (red arrowhead).

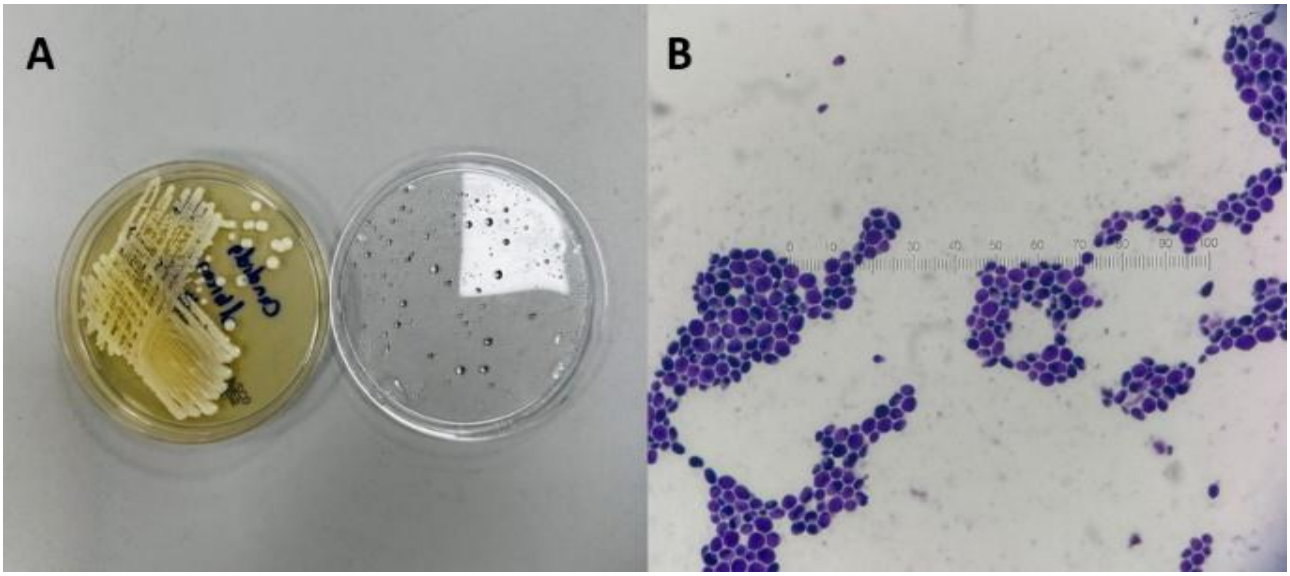


Figure 3. Microbiological analysis. A. White pasty colonies on Sabouraud's dextrose agar after 48 h of incubation. B. Oval gram-positive budding yeast cells

Discussion

The biliary tree, connecting the liver to the small bowel, is typically sterile, and infections involving this tract often carry worse outcomes if not identified and managed promptly. The most frequent biliary infections are cholecystitis, a disease of the gallbladder, and cholangitis, an infection of the bile ducts. Calculi (cholelithiasis or choledocholithiasis) constitute the most important predisposing factor for biliary infections. Others include strictures (benign or malignant), structural anomalies, iatrogenic manipulation, trauma, ischemia, and profound immunosuppression.

Conventionally, bacteria are the most common cause of

cholangitis, whereas parasitic, fungal, and viral etiologies are less common. Gram-negative *Enterobacter*iaceae, including *Escherichia coli, Klebsiella*, and *Enterobacter,* are often isolated, while polymicrobial cultures are not uncommon [8]. Fungal cholangitis is a rare condition that is increasingly reported and is typically associated with immunosuppression, long-term biliary stenting, prolonged antibiotic therapy, and critical care stays [2,4]. Cases of fungal biliary infections are also reported, complicating primary sclerosing cholangitis [9]. *Candida* species, including *Candida albicans, Candida tropicalis,* and *Candida glabrata*, and less frequently, *Aspergillus fumigatus*, have been isolated from patients with cholangitis [10-12]. A retrospective analysis performed by Al Manasra et al. reported a 7% incidence of candidiasis on bile cultures obtained via percutaneous transhepatic biliary drainage in patients with malignant obstructive jaundice [11]. Lenz et al. reported that 27.7% of bile cultures yielded candidal isolates in patients with cholangitis undergoing ERCP [4].

Cholangitis results from a complex interplay of biliary stasis and bacterial proliferation in the bile. Infection of the bile ducts leads to increased intraductal pressure and rapid translocation of bacteria and toxins into the circulation, resulting in bacteremia, toxemia, sepsis, and shock. Charcot triad, consisting of abdominal pain, jaundice, and fever, is highly specific (96%) but poorly sensitive (22%) for cholangitis. The Reynolds pentad, adding hypotension and altered mental status to the triad, suggests a severe disease with higher morbidity and mortality [13]. Due to the poor diagnostic accuracy of the triad and pentad, the diagnostic criteria proposed by the Tokyo Consensus, initially introduced in 2007 and subsequently updated in 2013 and 2018, are preferred for diagnosis of acute cholangitis. The diagnostic criteria include systemic inflammation (fever or inflammatory markers), cholestasis (jaundice or liver function tests), and imaging to diagnose cholangitis. In accordance with symptoms, signs, and organ involvement, acute cholangitis is graded 1 to 3 on a severity scale, per the Tokyo Consensus [14]. Biliary imaging is crucial for diagnosis of cholangitis. Conventional abdominal USG may reveal biliary dilatation and cholelithiasis; however, it has limited sensitivity for detecting choledocholithiasis or other CBD diseases. Abdominal CT is superior to USG, with a sensitivity and specificity of approximately 83% in the diagnosis of acute cholangitis. The MRI is the best non-invasive imaging modality for the diagnosis of biliary tract diseases, including choledocholithiasis, with sensitivity and specificity exceeding 95%. Invasive modalities, such as endoscopic ultrasound or ERCP, provide excellent diagnostic yield and allow therapeutic interventions in patients with cholangitis [13].

The recommended antibiotics include third-generation cephalosporins, quinolones, piperacillin-tazobactam, or carbapenems, depending on the regional sensitivity patterns, with the addition of metronidazole in the presence of a bilio-enteric anastomosis, for 4-7 days after source control. In cases of biliary obstruction, biliary drainage is recommended, along with biliary stenting, naso-biliary drainage, or transcutaneous external biliary drainage. With advancements in endoscopic and interventional radiology procedures, surgical biliary drainage is less often performed in acute settings [12,13]. In the present study, the patient had no past medical or surgical history and presented with a combination of cholangitis and pancreatitis complicated by sepsis, septic shock, and acute hypoxic respiratory failure, requiring intubation and mechanical ventilation. Initially, he was treated with antibiotics and ERCP biliary drainage with stenting. Subsequently, blood and bile cultures yielded *Candida albicans*, and the patient was treated with caspofungin, resulting in the resolution of the infection.

A critical dilemma with a positive bile culture for *Candida* is whether to use antibiotics. In this patient, there was little doubt about the decision for antifungal therapy as the patient had candidemia and evidence of systemic inflammatory response. In patients with isolated bile cultures positive for *Candida* species and no evidence of inflammation, tools such as ' Candida score' or 'Candida Colonization Index' or the Lenz algorithm may be utilized to guide the need for antifungal therapy [15,16].

Development of mycotic cholangitis is exceedingly rare in patients without underlying risk factors. This patient had no biliary interventions or trauma and was not immunosuppressed due to medications or HIV infection. However, he developed candidal cholangitis, making it an exceedingly rare clinical scenario worth reporting. Nevertheless, the patient was not tested for uncommon congenital or acquired immunodeficiency syndromes, which could have predisposed him to an invasive mycotic infection, despite having no clinical features to suggest this in his history or during the follow-up period. Biliary stricture-related obstructive biliary disease could have predisposed him to biliary candidiasis. Moreover, *Candida albicans* is a natural human commensal and an essential component of the gut mycobiome. An alteration in the gut microbiome or dysbiosis could render it pathogenic [17]. It could translocate to the gut and invade the circulation, culminating in invasive mycotic infections.

Conclusion

Fungal cholangitis is infrequent but potentially life-threatening and typically observed in immunosuppressed individuals or those with biliary interventions. *Candida* species are the most frequent causes of mycotic biliary infection. This illustrates an unusual case of candidal cholangitis in an immunocompetent patient, emphasizing the importance of considering fungal infections in the differential diagnosis of cholangitis, particularly in critically ill patients. Early recognition, biliary drainage, and targeted antifungal therapy are crucial for favorable outcomes. Further studies are needed to better characterize the role of fungal pathogens in biliary infections and refine diagnostic and therapeutic approaches.

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Authors' contributions

M. V. L., S. O., and D. L. B. evaluated and managed the patient. G. S. Z. and M. V. L. collected the clinical data. G. S. Z. performed the literature search and drafted the initial manuscript. M. V. L., S. O., and D. L. B. also contributed to the literature review. M. V. L., S. O., D. L. B., and G. S. Z. reviewed the initial draft and collectively decided on modifications. G. S. Z. revised the manuscript in accordance with the collective decision. All authors read and approved the final version of the manuscript.

Conflicts of interest

The authors have no conflicts of interest to declare

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