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Bile cast syndrome: Diagnosis and management, a case series

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submitted 10.8.2016
accepted after revision 17.11.2016

Bibliography
DOI https://doi.org/10.1055/s-0042-123705 |
Endoscopy International Open 2017; 05: E321–E323

ISSN 2364-3722

Background and study aims Bile cast syndrome (BCS) is a complication of orthotopic liver transplantation (OLT). It occurs in 4% to 18% of OLT recipients and can present as cholangitis and graft damage or loss. Twenty-two percent of patients with BCS require repeat OLT. The diagnosis and management of BCS can be challenging. Our aim is to share our experience with BCS and to briefly review the diagnosis and management of the condition.

Introduction

Bile cast syndrome (BCS) is a complication of orthotopic liver transplantation (OLT). It is characterized by the presence of biliary casts and debris causing biliary obstruction. It occurs in 4 %-18% of OLT recipients [1]. It can present as cholangitis and graft damage or loss. Twenty-two percent of patients with BCS require repeat OLT [1]. Symptoms include high fever, jaundice and cholestatic liver enzyme elevation [2]. We describe 2 patients with BCS who were successfully diagnosed with endoscopic retrograde cholangio pancreatography (ERCP) and one of whom was successfully treated endoscopically.

Case Reports

Patient 1

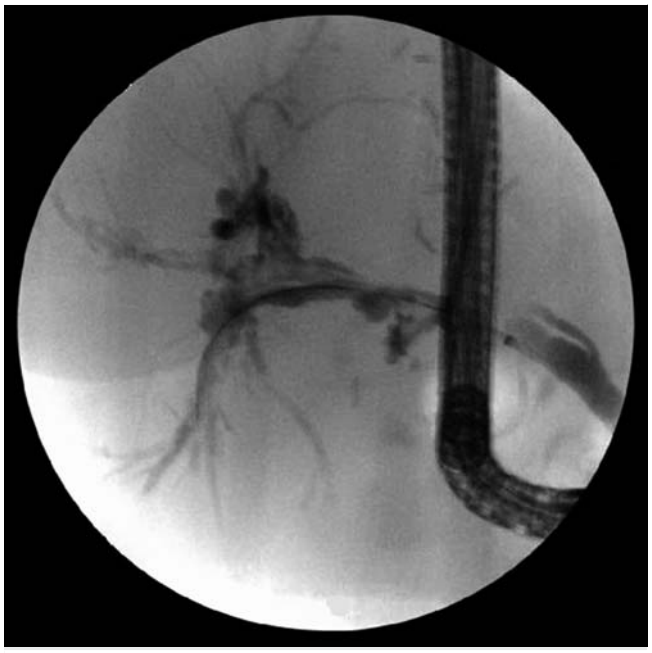
A 65-year-old female underwent OLT 6 months prior to presentation for chronic hepatitis C and hepatocellular carcinoma. Her intraoperative course during liver transplantation was complicated by a significant amount of blood loss from hepatic veins. She had a complicated postoperative course including hemorrhagic shock, abdominal compartment syndrome and acute renal failure which required hospitalization for 2 months after the transplantation. She developed an anastomotic bile leak which was treated with placement of a 10 Fr stent. At 4 weeks and 8 weeks after initial ERCP, the CBD stents were exchanged and secondary sclerosing cholangitis was suspected based on cholangiographic appearance. Her immunosuppression regimen included tacrolimus 9 mg BID and mycofenolic acid 180 mg BID.

Laboratory data showed bilirubin of 1.1 mg/dL (reference range: 0.2 mg/dL-1.3 mg/dL), alanine aminotransferase of 53 IU/L (reference range: 13 IU/L-69 IU/L), aspartate aminotransferase of 60 IU/L (reference range: 15 IU/L-46 IU/L), alkaline phosphatase of 257 IU/L (reference range: 42 IU/L-140 IU/L), γ-glutamyl transferase of 466 IU/L (reference range: 5 IU/L-55 IU/L) and white blood cell count of 14.71×10^9 cells/L. Imaging revealed patent hepatic arterial and venous flow.

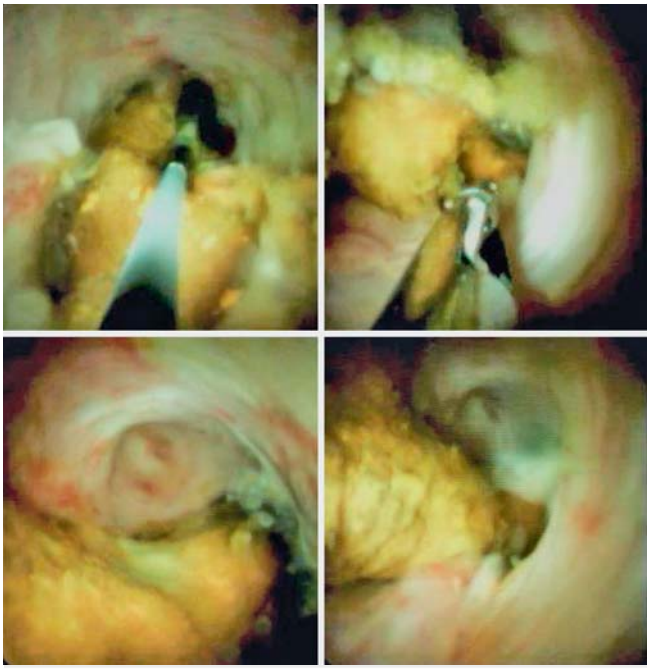
Occlusion cholangiography (▶ **Fig. 1**) revealed near complete resolution of the previously described anastomotic stricture. Balloon sweeps yielded a small amount of debris, but cholangiographic findings persisted that were concerning for filling defects or marked ductal irregularity in the region of the common hepatic duct and bifurcation. Cholangioscopy (▶ **Fig. 2**) was performed with the SpyGlass™ single operator biliary visualization system (Boston Scientific, Natick, MA, USA). A tubular biliary cast, in the shape of the bile duct, was seen in the donor bile duct extending from the anastomosis into the intrahepatic ducts. Attempts to extract the cast with a snare, basket, mechanical lithotripter, balloon, SpyBite™(Boston Scientific, Natick, MA, USA) biopsy forceps, and standard EGD forceps were all unsuccessful due to inability to grasp the cast and tethering of the cast to intrahepatic extension. A 10 Fr 12-cm CBD stent was placed. In subsequent months, periodic stent changes with continued attempts of removing the bile cast were unsuccessful. The patient's anastomotic stricture has resolved with endoscopic treatment.

Patient 2

A 58-year-old male with a history of hepatitis C and cirrhosis presented with fevers, chills, and a headache. He also complained of diffuse itching which was affecting his quality of life. He underwent deceased donor liver and kidney transplan-

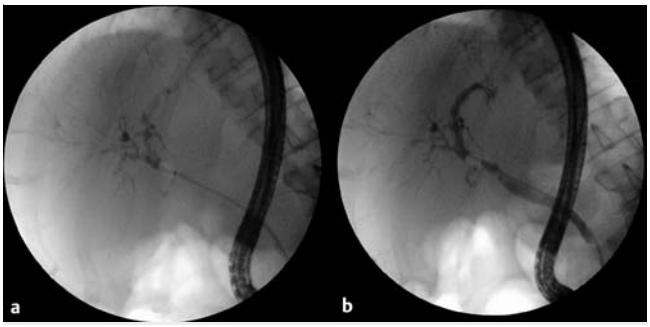


▶ **Fig. 1** Patient 1 cholangiogram. Mild anastomotic narrowing proximal to the anastomosis is seen. The donor duct is dilated and irregular in contour. It appears to contain filling defects which retrospectively are related to presence of biliary cast material in the right and left main hepatic ducts.



▶ **Fig. 2** SpyGlass cholangioscopy showing bile cast material in the ductal system. Removal is being attempted with forceps in Patient 1.

tation two months prior to his presentation. The patient's immunosuppression regimen included mycophenolate 360 mg BID, prednisone 5 mg daily and tacrolimus 8 mg BID.



▶ **Fig. 3** **a** Cholangiogram prior to intervention shows diffuse stricturing of the left and right hepatic ductal system in Patient 2. **b** Cholangiogram after removal of the biliary cast showing a widely patent left hepatic duct in Patient 2.

Laboratory data showed bilirubin of 2.2 mg/dL (reference range: 0.2 mg/dL-1.3 mg/dL), alanine aminotransferase of 162 IU/L (reference range: 13 IU/L-69 IU/L), aspartate aminotransferase of 159 IU/L (reference range: 15 IU/L-46 IU/L), alkaline phosphatase of 1277 IU/L (reference range: 42 IU/L-140 IU/L) and white blood cell count of 8.17×10^9 cells/L. Imaging revealed patent hepatic arterial and venous flow.

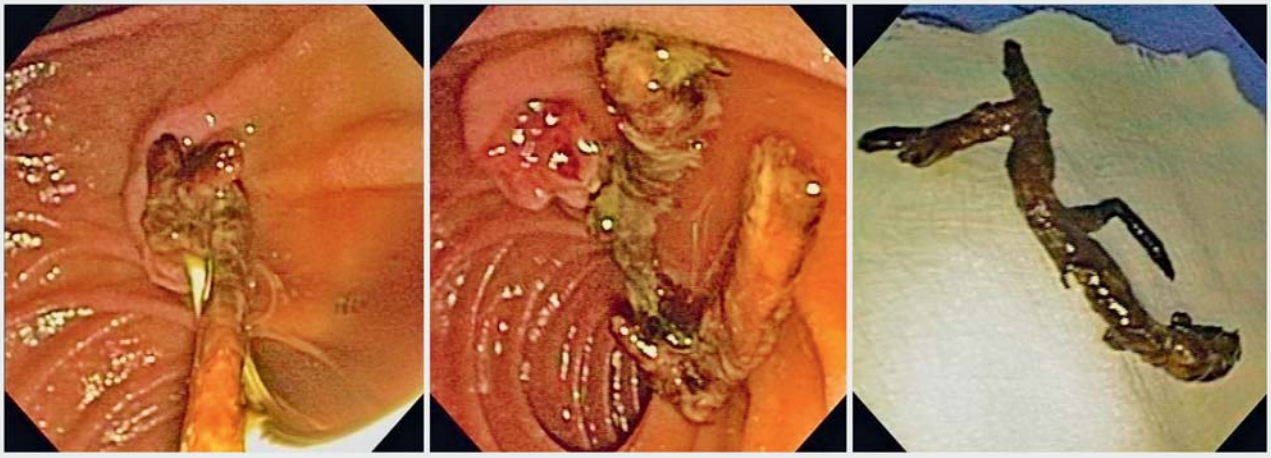
Cholangiography revealed filling defects in the left main system (▶ **Fig. 3a**). Flecks of purulent material were noted in the biliary drainage. The left main hepatic duct was dilated with a 4-mm dilating balloon to facilitate clearance of the filling defects. Subsequent balloon sweeps retrieved a 1.5-inch bile duct cast (▶ **Fig. 4**). Following extraction, cholangiograms revealed a widely patent left main duct (▶ **Fig. 3b**).

Subsequent to removal of the biliary cast, endoscopic treatment for the anastomotic stricture resulted in resolution of the stricture.

Discussion

Bile casts occur in 4 % to 18 % of OLT recipients [1]. More than 70 % of casts are identified in the first 16 weeks after transplant [1]. However, they can occur several years after transplant. Bile casts are dark and hard in appearance and formed by lithogenic material confined to the bile duct dimensions [3, 4]. BCS has also been known to occur in non-transplant patients. Although the exact mechanism of injury is unknown, ischemic injury to the biliary epithelium is most common [5 – 7]. Other mechanisms including anastomotic and non-anastomotic strictures leading to accumulation of biliary sludge can lead to formation of casts [5]. Bacterial infection and stones are also predisposing factors for biliary ductal injury and cast formation [6]. Microcirculatory dysfunction is also suggested, given the higher prevalence of renal failure and need for renal replacement therapy in patients with BCS [7].

BCS may lead to cholangitis, graft failure or need for retransplantation. Clinical presentation includes fever, elevated liver function tests, and jaundice. Abdominal ultrasound and magnetic resonance cholangiopancreatography have been used as initial imaging modalities. Cholangioscopy can be used for further evaluation. The central bile ducts are often inacces-



▶ **Fig. 4** Bile casts as seen after extraction in Patient 2.

sible for evaluation with an echoendoscope. ERCP can be attempted when casts involve the extrahepatic ductal system. A combination of endoscopic interventions is considered including sphincterotomy, balloon and basket extraction, lithotripsy and stent placement. In one study, re-transplantation and 12-month mortality rates were significantly higher with BCS (30 % vs. 7 %) and BCS patients also required a longer intensive care unit stay post-OLT [7]. Success rates with endoscopic therapy for BCS have been reported to be 70 % recently [7]. Previously in a large study of post-OLT adverse events, biliary cast syndrome occurred in 4/260 patients and a median of 3.5 ERCP treatments attempted over a median of 21 weeks achieved a success rate of 25 % [8]. Percutaneous drainage has also been advocated, especially in the setting of cholangitis or with Roux-en-Y choledochojejunostomy. Percutaneous transhepatic choledocoscopy via a tract created with radiographic assistance is a novel approach used for management of BCS. When there is intrahepatic biliary system involvement, management becomes even more challenging. Retransplantation is considered when complete removal is not feasible and if the patient's clinical condition deteriorates [2, 7]. A combined endoscopic and percutaneous method was able to successfully clear the casts in 60 % of patients in one study [9]. Surgical intervention including hepaticojejunostomy, choledochojejunostomy and revision of choledochocholedocostomy reportedly has had success rates above 85 % [10]. However, this carries significant morbidity.

Competing interests

None

References

[1] Gor NV. Levy RM. Ahn J et al. Biliary cast syndrome following liver transplantation: Predictive factors and clinical outcomes. Liver Transpl 2008; 14: 1466 – 1472

[2] Yang YL. Zhang C. Ping W et al. Successful diagnosis and treatment of biliary cast syndrome after orthotopic liver transplantation by percutaneous transhepatic choledochoscopy: A case report. Gastroenterol Hepatol Open Access 2015; 2: 00051

[3] Starzl TE. Putnam CW. Hansbrough JF et al. Biliary complications after liver transplantation: with special reference to the biliary cast syndrome and techniques of secondary duct repair. Surgery 1977; 81: 212 – 221

[4] Shah JN. Haigh WG. Lee SP et al. Biliary casts after orthotopic liver transplantation: clinical factors, treatment, biochemical analysis. Am J Gastroenterol 2003; 98: 1861 – 1867

[5] Verdonk RC. Buis CI. van der Jagt EJ et al. Nonanastomotic biliary strictures after liver transplantation, part 2: Management, outcome, and risk factors for disease progression. Liver Transpl 2007; 13: 725

[6] Cillo U. Burra P. Norberto L et al. Bile duct stones and casts after liver transplantation: Different entities but similar prevention strategy? Liver Transpl 2008; 14: 1400

[7] Voigtlander T. Negm AA. Strassburg CP et al. Biliary cast syndrome post–liver transplantation: risk factors and outcome. Liver Int 2013; 33: 1287 – 1292

[8] Pfau PR. Kochman ML. Lewis JD et al. Endoscopic management of postoperative biliary complications in orthotopic liver transplantation. Gastrointest Endosc 2000; 52: 55 – 63

[9] Srinivasaiah N. Reddy MS. Balupuri S et al. Biliary cast syndrome: literature review and a single centre experience in liver transplant recipients. Hepatobiliary Pancreat Dis Int 2008; 7: 300 – 303

[10] Barton P. Steininger R. Maier A et al. Biliary sludge after liver transplantation: 2) Treatment with interventional techniques versus surgery and/or oral chemolysis. AJR Am J Roentgenol 1995; 164: 865 – 869