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Case Report

A rare case: Transcatheter coil embolization in a patient with cystic duct stump injury following cholecystectomy $\stackrel{\diamond}{}$

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ARTICLE INFO

Article history: Received 23 September 2024 Accepted 3 October 2024

Keywords: Cystic duct injury Bile leakage Coil embolization Interventional radiology

ABSTRACT

Acute cholecystitis is a common inflammatory condition of the gallbladder, primarily associated with gallstones. Complications such as bile duct injury and bile leakage can occur following cholecystectomy, significantly impacting morbidity and mortality. Early diagnosis and intervention are essential to improve patient outcomes, with treatment options including endoscopic sphincterotomy and stenting. However, percutaneous coil embolization has emerged as a critical intervention due to the anatomical complexity of the region.

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Introduction

Acute cholecystitis is an acute inflammation of the gallbladder, most commonly associated with gallstones (90-95%). Gallstones typically cause obstruction at the neck of the gallbladder or the cystic duct, leading to distension and bile stasis within the gallbladder. This condition subsequently triggers inflammatory processes due to bacterial colonization. Acute cholecystitis develops without gallstones in 5%-10% of cases, a condition known as acalculous cholecystitis. Clinically, acute cholecystitis usually presents with right upper quadrant pain, which is often accompanied by fever, nausea, vomiting, fatigue, and anorexia [1,2]. Laparoscopic cholecystectomy is currently the most commonly and primarily preferred minimally invasive surgical method for the treatment of various biliary conditions, including acute and chronic cholecystitis, biliary colic, gallstone pancreatitis, and biliary dyskinesia [3]. Bile duct injury and bile leakage following cholecystectomy are rare but serious complications that increase mortality and morbidity. Early diagnosis and management are crucial for the patient's prognosis. While treatment options such as endoscopic sphincterotomy and stenting are available, the anatomical complexity of the region has led to the increasing importance and frequency of percutaneous coil embolization in recent times [4,5].

https://doi.org/10.1016/j.radcr.2024.10.024



^{*} Competing Interests: Furkan Özdem has read and approved the manuscript, and, subject to acceptance, authors will transfer copyright to the Publisher; there is no ethical problem or conflict of interest, and there has been no duplicate publication or submission elsewhere. E-mail address: furkaneren653@gmail.com

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Fig. 1 – In the contrast-enhanced abdominopelvic CT imaging, axial (A) and coronal (B) sections demonstrate a hydropic gallbladder (white arrows) and free fluid associated with heterogeneous density increases consistent with an inflammatory process in the pericholecystic region (white arrowheads).

In this study, we present a case of percutaneous transcatheter coil embolization in a patient who developed bile duct leakage following cholecystectomy.

Case presentation

A 65-year-old male patient, with no known history of surgical or systemic disease, presented to the emergency department with severe pain in the right upper quadrant and epigastric region. On physical examination, the Murphy sign was found to be positive. Laboratory investigations revealed an elevated white blood cell count of 27,760 cells/mL (Normal range [N]: 4500-10,000 cells/mL), which was notably high. Based on the clinical and laboratory findings, acute cholecystitis was considered the primary diagnosis. Further evaluation of the hepatobiliary system was conducted using abdominal ultrasonography (USG) and contrast-enhanced abdominopelvic computed tomography (CT). The USG findings demonstrated that the gallbladder was hydropic with mild thickening of the gallbladder wall, and no significant stones or sludge were detected within the gallbladder lumen. Similarly, contrastenhanced abdominopelvic CT findings did not reveal any significant stones or sludge within the gallbladder lumen; however, the gallbladder's transverse diameter was measured at 45 mm (Normal range [N]: < 40 mm), indicating an increase in wall thickness. Additionally, pericholecystic fat stranding and free fluid accumulation with inflammation were observed (Fig. 1). These findings were supportive of a diagnosis of acalculous cholecystitis, and the patient subsequently underwent laparoscopic cholecystectomy.

On the fifth day following laparoscopic cholecystectomy, the patient developed widespread abdominal pain, defense, rebound tenderness, and fever. The presence of significant bile content in the drainage catheter, which had been intraoperatively placed in the surgical site, raised suspicion of a common bile duct injury, and the patient was consulted to



Fig. 2 – illustrates a percutaneous transhepatic cholangiography examination. The image shows a percutaneous drainage catheter (white arrowheads) and a percutaneous internal-external biliary drainage catheter (white arrows). Additionally, retrograde contrast filling of the cystic duct and contrast flow towards the drainage bag are observed (white circle).

the Interventional Radiology (IR) unit. A percutaneous transhepatic cholangiography (PTC) was performed in the IR unit, revealing no intrahepatic bile duct dilatation, and the common bile duct was found to be patent. However, retrograde filling of the cystic duct stump into the subhepatic space and the drainage pouch was observed, indicating an injury to the





cystic duct stump. Based on these findings, a percutaneous internal-external biliary drainage catheter was placed, and catheter monitoring was performed (Fig. 2). Four days later, the patient was re-evaluated in the IR unit, and a 4F cobra catheter and microcatheter were inserted via the guidewire through the internal-external biliary drainage catheter. Following catheterization, coil embolization was performed on the cystic duct stump. Follow-up imaging revealed no passage of contrast material into the cystic duct (Fig. 3).

Discussion

Bile leakage can occur as a result of surgical, endoscopic, and radiological procedures, but also due to other factors such

as trauma, congenital diseases, and infections [4]. Postlaparoscopic cholecystectomy bile leakage is observed in 0.2%-2% of cases and is recognized as a serious complication that, if not treated promptly, prolongs hospital stays and increases morbidity and mortality rates. The cystic duct stump is the most common site of bile leakage, occurring in 94.5% of cases [5]. Although biliary diversion, endoscopic sphincterotomy, and/or stenting are initially preferred treatment options, these methods fail in 25% of cases. However, spontaneous resolution of bile leakage has been reported in many instances. In patients with bile leakage, percutaneous drainage for biliary decompression can achieve clinical success; however, prolonged catheterization and extended hospitalization may negatively impact the prognosis. In cases where endoscopic and percutaneous treatments are inadequate, persistent bile leakage can lead to subhepatic/subphrenic abscesses, bilomas, biliary

peritonitis, biliary stricture and other serious complications. Therefore, rapid and effective identification and closure of the leakage source is crucial [6].

In cases where endoscopic and percutaneous treatments are inadequate following bile leakage, transcatheter embolization emerges as a frequently preferred treatment method. To seal bile leaks, various agents such as ethanol, N-butyl cyanoacrylate (glue), ethylene-vinyl alcohol copolymer (Onyx), vascular occluders, and occlusion balloons can be utilized in embolization therapy [6,7].

Percutaneous coil embolization is one of the most commonly used techniques following bile leakage. The minimally invasive nature of this method, along with its applicability under mild sedation and local anesthesia, stands out as a significant advantage. Performing coil embolization through an existing percutaneous biliary drainage catheter without the need for a new entry site reduces the risks of infection, bleeding, and pain. Coil migration is a rare complication of coil embolization that can lead to bile duct obstruction and recurrence of bile leakage [7,8].

Conclusion

Bile leakage following cholecystectomy, although rare, is a serious complication that can adversely affect the prognosis. A multidisciplinary approach involving surgeons, gastroenterologists, and interventional radiologists plays a critical role in early diagnosis and effective treatment. Transcatheter coil embolization is a reliable, effective, and feasible treatment method that can effectively seal bile leaks, reducing the need for surgical and endoscopic interventions in selected patient populations.

Ethical approval

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Author contributions

Furkan Özdem: Conception, design, literatüre review, supervision, critical review, writer.

Patient consent

Informed consent was obtained from all individual participants included in this study.

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