

## Case Report

# Acute Cholangitis Caused by The Migration of Metal Clips as A Nidus for The Formation of a Common Bile Duct Stone 13 Years After Undergoing Laparoscopic Cholecystectomy

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**Citation:** Yamamoto M, Yamamoto K, Sasaki T, Taketomi H, Yamamoto F, et al. (2019) Acute cholangitis caused by the migration of metal clips as a nidus for the formation of a common bile duct stone 13 years after undergoing laparoscopic cholecystectomy. Ann Case Report 12: 257. DOI: 10.29011/2574-7754/100257

**Received Date:** 14 October, 2019; **Accepted Date:** 24 October, 2019; **Published Date:** 28 October, 2019

## Introduction

We herein report a case of choledocholithiasis associated with the migration of surgical metal clips that had been used to close a cystic duct stump following laparoscopic cholecystectomy as the nucleus. A 63-year-old man presented to our department complaining of recurrent pain in the upper abdomen and a fever, and he was diagnosed with acute cholangitis due to choledocholithiasis. He had a history of laparoscopic cholecystectomy and therefore was converted to open choledochotomy with T-tube drainage for the treatment of a common bile duct injury due to severe inflammation 13 years prior to this presentation. Computed Tomography (CT) and Endoscopic Retrograde Cholangiography (ERC) revealed choledocholithiasis with endo-clips as the nucleus. The endoscopic removal of the stone with endo-clips was performed, and the postoperative course has been uneventful. This case suggested the importance of long-term postoperative follow-up, considering the possibility of the development of choledocholithiasis due to migration of endo-clips into common bile duct as a late complication of laparoscopic cholecystectomy.

**Keywords:** Clip; Common Bile Duct Stone; Laparoscopic Cholecystectomy; Migration

## Introduction

Cholecystolithiasis develops easily in the bile duct and can develop due to the presence of a foreign substance, such as artificial silk, inside the bile duct [1]. Laparoscopic cholecystectomy has been widely performed as the standard procedure for benign gallbladder lesions, and metal clips are often used to treat the stump of cystic duct and cystic artery. There have been some case reports of choledocholithiasis developing around these metal clips as a rare complication after laparoscopic cholecystectomy [2-32]. We herein report a case of choledocholithiasis with a migrated surgical metal clip used to close a cystic duct stump following laparoscopic cholecystectomy as the nucleus.

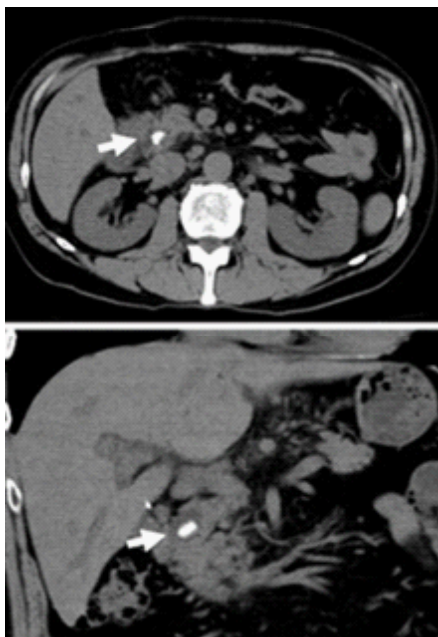
## Case Report

A 63-year-old man presented to our emergency room complaining of strong epigastric pain and a fever. The patient was

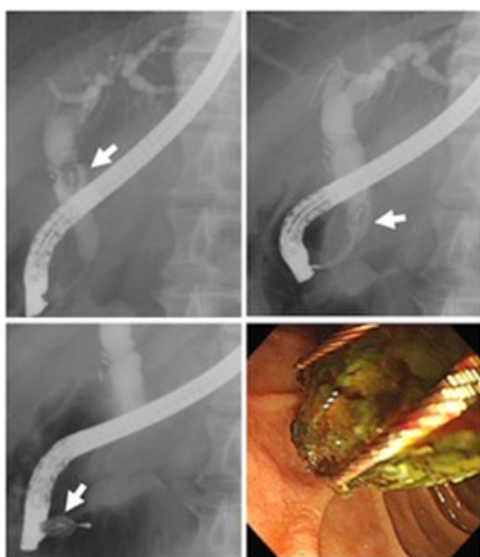
172 cm tall and weighed 68 kg; his blood pressure was 134/85 mmHg at the time of admission with a pulse rate of 66/min and a temperature of 36.6 °C. No signs of anemia in the bulbar conjunctiva or jaundice were found. No abdominal rigidity or tenderness was noted. He had no drinking or smoking history. The patient's medical records showed that he had received laparoscopic cholecystectomy for cholecystolithiasis and then was converted to open choledochotomy with T-tube drainage for the treatment of a common bile duct injury due to the remaining inflammation 13 years prior to this presentation. A blood analysis revealed an increase in total bilirubin 3.43 mg/dl, AST 137 IU/l, ALT 215 IU/l,  $\gamma$ -GTP 489 IU/l, and C-Reactive Protein (CRP) 1.1 mg/dl.

The development of choledocholithiasis with a foreign object including a metallic substance as the nucleus in the common bile duct was suspected based on the results of abdominal Computed Tomography (CT) (Figure 1). In addition, Endoscopic Retrograde Cholangiography (ERC) revealed the expansion of the common bile duct with a calculus 15 mm in diameter (Figure 2). At the center of the calculus, we detected a clip-like object that was believed to

be one of the metal clips used for laparoscopic cholecystectomy. Endoscopic removal of the calculus was performed. The removed calculus was calcium bilirubinate stone, and a part of a clip was found on the cut surface (Figure 3). The patient was discharged from the hospital in good condition. The postoperative course has been uneventful without recurrence of the choledocholithiasis.



**Figure 1:** Abdominal computed tomography showed the dilatation of the common bile duct and some metallic density inside the duct (Arrow).



**Figure 2:** Endoscopic retrograde cholangiography revealed a defect 10 mm in diameter in the common bile duct. An endo-clip was found at the center of the defect (Arrow).



**Figure 3:** Removed calculus. Calcium bilirubinate stone with a clip-like appearance on the cut surface. (scale bar, 10 mm).

## Discussion

Laparoscopic cholecystectomy has been established as the standard procedure for the treatment of the cholecystolithiasis. With the widespread adoption of this procedure, there have been many reports describing its associated complications. One of these complications is the development of choledocholithiasis, with the metal clips used to control the cystic duct stump as a nucleus [2-32]. In the present case, choledocholithiasis developed 13 years after laparoscopic cholecystectomy with choledochotomy and T-tube insertion into the common bile duct. It is thought that, 13 years after the surgery, the metal clip used for the laparoscopic cholecystectomy migrated into the common bile duct and formed a nucleus in the course of the development of choledocholithiasis.

The mechanism underlying the migration of the metal clip into the common bile duct is thought to be as follows: First, the insertion site of the T-tube caused inflammation around the cystic duct, which induced a foreign-body reaction to the clip, inflammation of cystic duct stump, and necrosis, and then the clip migrated into the duct from the cystic duct stump [33].

Most cases of choledocholithiasis that develop due to endo-clips are calcium bilirubinate stone; a migrated clip in the cystic duct stump is exposed to the lumen of the bile duct, at which point calcium bilirubinate is believed to be deposited in the presence of biliary stasis, inducing infection when the clip stays in the same position for long time, forming a calculus [1]. The calculus found in this case was also calcium bilirubinate; we may

therefore conclude that it developed via a similar mechanism. It has been reported that the onset of such a complication ranges from 2 months to 16 years. In patients with this complication, a wide range of nonspecific symptoms may be noted [2-32]. In some cases of open cholecystectomy, although rarely, it has been reported that the artificial silk used to suture the stump of the bile duct migrated to the common bile duct and led to the formation of choledocholithiasis after surgery [34-36]. Thus, it is recommended that absorbable sutures be used to control the cystic duct when performing open choledochotomy [1,7]. In laparoscopic cholecystectomy, in addition to the metal clips used to control the cystic duct stump, there have been articles reporting the development of calculi around the metal clips used to treat the stump of the cystic artery or falling into the abdominal cavity after migrating into the common bile duct [3,24].

However, in laparoscopic cholecystectomy, closure of the cystic duct using clips is common due to the difficulty of suturing in such conditions. The use of absorbable clips, absorbable suture, laparoscopic coagulating shears, and a vessel sealing system are thought to be useful as alternatives to metal clips for controlling the cystic duct stump [37,38]. However, some studies using absorbable clips have reported the development of calculi due to the migration of the clip at an early stage after surgery [39]. Furthermore, absorbable clips have negative aspects, such as their cost and inferiority in operativity due to their larger width compared to metal clips. These issues keep absorbable clips from being widely employed in surgery. To treat choledocholithiasis with metal clips as the nuclei, ERC with a balloon catheter or basket catheter is first used to remove the stone if there are no co-existing lesions in the common bile duct and no duodenal papillitis [40]. However, these procedures should be examined in greater detail, as one report described the basket catheter becoming hooked to the metal clip inside the stone, resulting in stopping the catheter procedure and switching to emergency operation [13]. Clips can migrate into the common bile duct and become the nucleus of a calculus even after long time passes after laparoscopic cholecystectomy. It is important for physicians to bear in mind the possibility of the occurrence of this type of late complication.

## Conflict of Interest

None of the authors have any conflicts of interest associated with this study.

## Financial disclosure

We have no disclosures or any financial support.

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