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**Choledochoduodenal fistula caused by migration of endo-clip after laparoscopic cholecystectomy**

Hong T *et al.* Choledochoduodenal fistula

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**Abstract**

The wide use of surgical endo-clips in laparoscopic surgery has led to a variety of complications. Post- cholecystectomy endo-clips migrating into the common bile duct after laparoscopic cholecystectomy is rare. Migrated endo-clip can cause obstruction, serve as a nidus for stone formation and cause cholangitis. While the exact pathogenesis is still unknown, it is probably related to improper clip application, subclinical bile leak, inflammation, and subsequent necrosis, allowing the clips to erode directly into the common bile duct. We present a case of endo-clip migrating into the common bile duct and duodenum resulting in choledochoduodenal fistula after laparoscopic cholecystectomy and a successful reconstruction of the biliary tract by a hepaticojejunostomy with a Roux-en-Y procedure. This case shows that the surgical endo-clips can penetrate into the intact bile duct wall through serial maceration, and it is believed that careful application of clips may be the only way to prevent their migration after laparoscopic cholecystectomy.

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**Key words**: Biliary obstruction; Laparoscopic cholecystectomy; Choledochoduodenal fistula

**Core tip:** Choledochoduodenal fistula caused by endo-clip migration, which is an extremely rare complication after the introduction of laparoscopic cholecystectomy, and it can occur from days to years after laparoscopic cholecystectomy.

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**INTRODUCTION**

Since the introduction of laparoscopic technique, laparoscopic cholecystectomy is considered as the gold standard for the management of symptomatic disease with a less than 3% overall complcation rate[1]. Most of the abnormal biliary- enteric communications are the result of perforation caused by gallstones from the gallbladder or common bile duct into the duodenum, the rest are the results of peptic ulcer, tumor, trauma or other local abnormalities[2], which often occur before laparoscopic cholecystectomy. Choledochoduodenal fistula caused by endo-clip migration is an extremely rare complication after the introduction of laparoscopic cholecystectomy, and it can occur from days to years after laparoscopic cholecystectomy. We present a rare case of endo-clip migrating into the common bile duct and duodenum resulting in choledochoduodenal fistula after the laparoscopic cholecystectomy 10 years ago.

**CASE REPORT**

A 48-year-old woman was referred to our hospital with a chief complaint of intermittent epigastric pain, fever and jaundice for about 3 mo. The patient underwent a laparoscopic cholecystectomy (LC) 10 years ago without any intraoperative or postoperative complications. In this 3 mo, she had intermittent fever, epigastric pain and jaundice. She was diagnosed as acute cholangitis at a rural community hospital and all the symptoms were relieved after one week of anti-infection treatment. Physical examination at admission revealed no fever, no icteric sclera or jaundice. There was no tenderness at the epigastric area. Laboratory tests revealed white blood cells of 5470/mm3, elevated level of alanine aminotransferase (59 U/L, 5-40), gamma glutamyl aminotransferase (300 U/L, 0-50), total/direct bilirubin level (15.1/9.0 µmol/L, 1.7-22.5/0.0-6.0 µmol/L). Tumor markers showed high CA19-9 level (326 U/mL), but the levels of carcinoembryonic antigen and alpha-fetoprotein were in normal ranges. Plain abdominal radiograph showed metal endo-clips in the right upper quadrant area (Figure 1). Magnetic resonance imaging showed marked dilatation of biliary duct and stenosis of the common bile duct at the hepatic duct confluence which was close to the duodenum (Figure 2). Endoscopic image of the duodenum (Figure 3) showed yellowish bile acid leaking from a papillary orifice at the first part of duodenum wall. Computed tomography (CT) showed a mass on the duodenal wall, and linear, highly dense lesions both in the mass (Figure 4A) and in the hepatic duct confluence (Figure 4B) with dilated hepatic ducts. The patient’s clinical manifestation and imaging studies revealed a choledochoduodenal fistula caused by the injury to the common bile duct by migrated metal endo-clip. Partial resection of the common bile duct and the fistula and repair of the duodenum were performed, followed by reconstruction of the biliary tract by a hepaticojejunostomy with a Roux-en-Y procedure. Ann endo-clip was found in duodenal portion of the choledochoduodenal fistula.

**DISCUSSION**

Surgical endo-clips are widely used during LC as substitute ligation materials. Raoul *et al*[1] first reported the migration of surgical endo-clips into the biliary tract acting as a nidus for stone formation after laparoscopic cholecystectomy. A variety of endo-clip related complications, such as biliary leaks, endo-clip migration into the common bile duct with stone formation, acute pancreatitis, cholangitis, benign stricture, obstructive jaundice, and endo-clip embolism have been reported[3]. Choledochoduodenal fistula is even much rarer. Biliary-enteric fistula is a known complication of chronic gallbladder disease which has the reported incidence of 0.06%-0.14%[4]. However, they usually happen before the cholecystectomies, and there are no accurate data for the biliary-enteric fistula, especially for the choledochoduodenal fistula. To the best of our knowledge, this is the first report on the choledochoduodenal fistula caused by endo-clip migrating into the common bile duct and duodenum after LC.

With regard to the pathogenesis of endo-clips migration after laparoscopic cholecystectomy, the first possibility is an incomplete closure of cyst duct caused by ineffective clip, which brought on biloma with bile leakage. The second possibility is erosion of the bile duct wall or adjacent adhered duodenal or colonic wall because of localized inflammation around the endo-clips. The eroded and inflamed common bile duct and duodenal or colonic wall would develop perforation or scar constriction, resulting in choledochoduodenal fistula or bile duct stenosis[5].

For the evaluation of choledochoduodenal fistula after LC, magnetic resonance cholangiography, endoscopic retrograde cholangiography, or CT with three-dimensional reconstruction of biliary tract could be helpful. For the complicated structure around the fistula caused by the tissue inflammation and adherence, open surgery is a safe option to reconstruct the biliary tract and to repair the defect in the duodenum due to defects both in common bile duct and duodenum. Endo-clip migration could be potentially avoided by the use of absorbable endo-clips or ultrasonic dissection without clipping[6].

In conclusion, we offered a rare case of endo-clip migrating into the common bile duct and duodenum resulting in choledochoduodenal fistula after LC. This situation could be managed by reconstruction of the biliary tract by a hepaticojejunostomy with a Roux-en-Y procedure and it could be potentially avoided by the use of absorbable endo-clips or ultrasonic dissection without clipping.

**COMMENTS**

***Case characteristics***

Choledochoduodenal fistula caused by migration of endo-clip after laparoscopic cholecystectomy

***Differential diagnosis***

It should be considered in the differential diagnosis of patients with obstructive jaundice or cholangitis after laparoscopic cholecystectomy.

***Diagnostic imaging***

Diagnostic imaging must include magnetic resonance cholangiography, endoscopic retrograde cholangiography or 3D-computed tomography with reconstruction of biliary tract.

***Treatment***

Surgical intervention is mostly required to reconstruct the biliary tract and to repair the defect in the duodenum due to defects both in common bile duct and duodenum.

***Peer review***

This is an interesting case report because of its own rarity.

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**Figure 1 Plain abdominal radiograph showed metal endo-clips (arrow) in the right upper quadrant area.**

**Figure 2 Magnetic resonance cholangiography showed marked dilatation of biliary duct and stenosis of the common bile duct at the hepatic duct confluence (arrow) which was close to the duodenum.**

**Figure 3 Endoscopic image of the duodenum showed yellowish bile acid (arrow) leaking from a papillary orifice at the first part of duodenum wall.**

**Figure 4 Computed tomography showed a mass on the duodenal wall (arrow), and linear, highly dense lesions both in the mass (A, arrow) and in the hepatic duct confluence (B, arrow) with dilated hepatic ducts.**