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Hem-o-lok clip migration to the common bile duct after laparoscopic common bile duct exploration: A case report

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Abstract

BACKGROUND

Laparoscopic cholecystectomy (LC) and laparoscopic common bile duct exploration (LCBDE) has been widely used for management of gallbladder stone and common bile duct (CBD) stones. Post-operative clip migration is a rare complication of laparoscopic biliary surgery, which can serve as a nidus for stone formation and cause recurrent cholangitis.

CASE SUMMARY

A 59-year-old female was admitted to hospital because of fever and acute right upper abdominal pain. She has a history of LC and LCBDE as previous surgery 2 mo ago. Physical examination revealed tenderness in the upper quadrant of right abdomen. Computed tomography scan demonstrated a high-density shadow at the distal CBD, which was considered as migrated clips. The speculation was confirmed by endoscopic retrograde cholangiopancreatography examination, and two displaced Hem-o-lok clips were removed by stone basket. No fever or abdominal pain was presented after the operation. In addition, literatures regarding surgical clip migration after laparoscopic biliary surgery were also reviewed and discussed.

CONCLUSION

Incidence of postoperative clip migration may be reduced by using clips properly and correctly and explore new methods to occluded cystic duct and vessels. If patient with a past history of LC or LCBDE, present with features of sepsis and recurrent upper quadrant pain, clip migration must be considered as one of the differential diagnosis.

Key Words: Laparoscopic cholecystectomy; Laparoscopic common bile duct exploration; Surgical clip; Postoperative migration; Case report

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Core Tip: Surgical clip migration is a rare complication of laparoscopic biliary surgery. Herein, we report a case of Hem-o-lok clips migration into common bile duct after laparoscopic cholecystectomy and laparoscopic common bile duct exploration operation, which were removed by basket in endoscopic retrograde cholangiopancreatography. Furthermore, literatures regarding clip migration post-laparoscopic biliary surgery were reviewed. We suggest that the incidence of postoperative clip migration may be reduced by using clips properly and correctly and explore new methods to occluded cystic duct and vessels.

INTRODUCTION

Gallbladder stone combined with common bile duct (CBD) stone is a common disease in developed countries, with a prevalence ranging from 8% to 18%[1]. Laparoscopic cholecystectomy (LC) and laparoscopic common bile duct exploration (LCBDE) are widely used procedures for the treatment of cholelithiasis combined with choledocholithiasis. Clearly dissecting the Carlo's triangle and properly closing the

cystic artery and cystic duct are the key steps of this surgery. Hem-o-lok clips are commonly used to ligate gallbladder blood vessels and cystic ducts. Complications of LCBDE include bile leakage, stone recurrence, infection, bleeding and postoperative clip migration.

Postoperative clip migration is a rare but well-established complication of laparoscopic biliary surgery. The clip may migrate to CBD[2-12], T-tube sinus wall[11,13], duodenum[8,14], and even pulmonary artery[15]. Herein, we report a case of clip migration after LC and LCBDE and review cases of clip migration reported in literatures after LC or LCBDE, hoping to draw some lessons from these cases.

CASE PRESENTATION

Chief complaints

A 59-year-old woman presented to the Emergency Department of our hospital complaining of fever and right upper abdominal pain for 3 d.

History of present illness

The patient's symptoms started 3 d ago with fever and acute right upper abdominal pain, which had been worsened the last 24 h.

History of past illness

The patient had a history of LC and LCBDE as previous surgery 2 mo ago.

Personal and family history

The patient has no personal and family history.

Physical examination

The patient's temperature was 38.9 °C, heart rate was 93 bpm, respiratory rate was 18 breaths per minute, blood pressure was 105/60 mmHg and oxygen saturation in room

air was 99%. Physical examination revealed that the abdomen was soft, tenderness was present in the right upper quadrant of abdomen without rebound tenderness.

Laboratory examinations

Laboratory examination showed aspartate aminotransferase 639 U/L, alanine aminotransferase 681 U/L, total bilirubin 74 μmol/L. Blood routine examination showed a white cell count of 16.1 × 10^9/L, a neutrophil percentage of 89% and a hemoglobin of 135 g/L.

Imaging examinations

Computed tomography scan demonstrated a slightly dilated common bile duct with a high-density shadow at the distal CBD, which was considered as migrated clips (Figure 1). Therefore, endoscopic retrograde cholangiopancreatography (ERCP) was performed, which confirmed that Hem-o-lok clips migrated into the CBD (Figure 2A).

FINAL DIAGNOSIS

Acute cholangitis caused by migrated Hem-o-lok clips applied in the LC and LCBDE surgery.

TREATMENT

Two displaced Hem-o-lok clips were removed by stone basket after sphincterotomy through ERCP (Figure 2B and C).

OUTCOME AND FOLLOW-UP

No fever or abdominal pain was presented after the operation, and the patient was discharged 3 d later in a stable condition. There was no abdominal pain, jaundice, abdominal pain or other discomfort during the follow-up period.

DISCUSSION

Choledocholithiasis is a common disease, with an incidence increasing year by year. Comparing to open surgery, the LCBDE is safe, effective, cosmetic minimally invasion and enhanced fast recovery[16]. Advances in laparoscopy have made LC and LCBDE a widely accepted strategy for patients with gallstones and choledocholithiasis. In our practice, the Carlo's triangle was initially dissected to expose cystic duct and cystic artery, and they were separated and clipped with three and one Hem-o-lok clips, respectively. Secondly, the CBD was exposed, and the anterior aspect wall of CBD was cut with electroacupuncture 1 cm away below the confluence of cystic duct and CBD, and the cholesterol crystals were removed by basket under the direct view. Thirdly, a 24# Silicone T-tube was placed into the CBD and was sutured with a 4-0 Vicryl. Finally, the gallbladder was resected using electroacupuncture, and T-tube was set on the right abdominal through the incision of rectus abdominis. Postoperative clip migration is a rare complication of laparoscopic cystic and biliary operation, which has been occasionally presented as case report. Migrated clips in bile duct may function as a nidus for gallstone formation, leading to biliary obstruction, acute pancreatitis, duodenal ulcer, biliary-colonic fistula and subdiaphragmatic abscess. Any type of surgical clips has a risk of migration. If a patient with a history of receiving LC or LCBDE, presents with features of recurrent upper quadrant pain with or without sepsis or liver function test derangement, clip displacement must be considered as one of the differential diagnosis.

We searched through MEDLINE, PubMed, Scopus, Web of Science, Google Scholar, CNKI database using the keywords 'clip migration and laparoscopic cholecystectomy (LC) or clip migration and laparoscopic common bile duct exploration (LCBDE)' from 1990 to 2021. A total of 14 articles including 36 cases about clip migration after LC or LCBDE have been reported[2-15] (Table 1). Twenty-five cases received LC and LCBDE (69.4%), 11 cases received LC (30.6%) as previous laparoscopic surgery. The age of patients ranged from 31 to 83 years old. Symptoms occurred from 1 mo to 7 years after laparoscopic surgery. Nineteen patients remained asymptomatic that were mainly diagnosed by choledochoscopy through T-tube sinus tract. The most common

manifestations due to clip migration were abdominal pain, fever and jaundice, which were similar to those of non-iatrogenic choledocholithiasis. In 27 cases the clips wedged into CBD (75%), the clips became a part of T-tube sinus in 6 cases (16.7%) and the clips migrated into duodenum in 2 cases (5.6%). The types of clips include Hem-o-lok clip (61.1%), metallic clip (16.7%) and absorbable clip (8.3%). Initial treatment included removing clips by basket in ERCP, endoscopic removal, conservative with observation strategy, while surgical treatment was required in 6 cases.

Mechanism of postoperative clip migration still remains controversial; some possible hypotheses of pathogenesis were suggested. Firstly, inappropriate application of surgical clips including improperly placement of clips and incomplete closure of cyst duct may lead to the formation of biloma, which would be reabsorbed later into the bile duct and left the clips behind[2]. Secondly, the compression of clips to bile duct wall caused by the surrounding structures or pulled cystic duct rudely during operation, may result in clip corroding into the lumen of CBD[17]. Besides, the number of clips used in surgery is also an important factor[5,18]. Thirdly, bile leakage caused by intraoperative bile tract injury and the subsequent inflammation make surrounding tissues brittle, inducing clips invade into the biliary tract through the incision of CBD mechanically[17]. In addition, the pressure exerted from abdominal organ movements accelerates the process of clip migration[10,18]. Finally, the rejection response to clips as a foreign body may also contribute to the displacement of surgical clips[4].

In order to reduce the incidence of postoperative clip migration, all technical factors in surgery should be considered. During the operation, the relationship of Calot's triangle should be carefully confirmed, and the placement of surgical clips should not be too close to the CBD; the number of clips should be minimized, and unnecessary surgical procedures should be avoided, such as the blind application of clips to control bleeding[19]. It has also been suggested that the risk of postoperative clip migration can be lowered by using absorbable clips when compared with non-absorbable clips. However, report about absorbable clip migration still exists[4,8], and Cetta *et al*[20] suggested that absorbable clips could also cause postoperative clip migration and be a

nidus of stone formation. Furthermore, new vessel and duct sealing technologies such as Harmonic scalpel can be applied as an alternative to clips in laparoscopic operation. The Harmonic scalpel is well accepted as a reasonable alternative for closure of cystic duct, which occupies the advantages of shorter operation time, fewer complications and avoiding the clip migration[21].

CONCLUSION

In summary, although the postoperative clip migration is rare, it is a well-recognized phenomenon and cannot be ignored. Any type of surgical clips has a risk of displacement. Using clips properly and correctly and explore new methods to occluded cystic duct may help to reduce the incidence of postoperative clip migration. If patients with a past history of LC with or without CBD exploration, present with features of sepsis and recurrent upper quadrant pain with or without derangement of liver function test, clip migration may be considered as one of the differential diagnosis.

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