

Clip-induced biliary stone

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ABSTRACT

Surgical clip migration is a well-known phenomenon ever since their first use in surgery. The mechanism of clip migration is poorly understood, and can occur from days to years after laparoscopic cholecystectomy. Migration of the surgical clips may be a complex process involving necrosis, pressure exerted from intra-abdominal movement, formation of stones over the exposed clip within the bile duct, and eventual migration into the common bile duct. We report two cases, a 58-year-old man and a 54-year-old woman, of clip-induced biliary stones resulting from surgical clip migration a few years after laparoscopic cholecystectomy.

Keywords: clip migration, stones, surgical clips, surgical complication

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INTRODUCTION

Surgical clip migration is a well-known phenomenon ever since their use in surgery. Migration into the common bile duct has been recognised since 1979, and after laparoscopic procedure was first reported since 1992^(1,2). Despite the increasing number of cases of laparoscopic cholecystectomy (LC) performed, there have been less than 30 case reports of choledocholithiasis induced by surgical clips. The mechanism of clip migration is poorly understood. This can occur from days to years after LC. Migration of the surgical clips may be a complex process involving necrosis, pressure exerted from intra-abdominal movement, formation of stones over the exposed clip within the bile duct and eventual migration into the common bile duct. Bile duct injury, local sepsis and improper placement of the surgical clips are possible factors involved. We present two cases of clip-induced biliary stone resulting from surgical clip migration, and highlight this interesting but rare phenomenon.

CASE ONE

A 58-year-old Chinese man was admitted with cholangitis leading to septic shock. His past medical

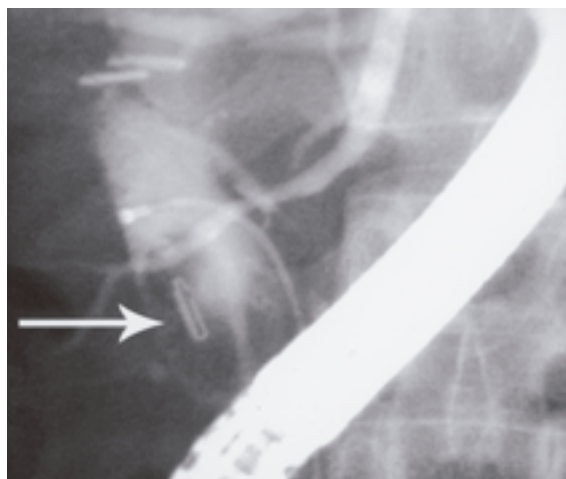


Fig. 1 Radiograph shows clip within filling defect (arrow). Two remaining clips are present at the cystic duct site.

history included multisystem atrophy, nasopharyngeal carcinoma treated with radiotherapy, and LC four years ago. The surgery was uncomplicated, and the cystic artery and cystic duct stump was ligated with three hemoclips. He was admitted six months earlier with cholangitis for which an endoscopic retrograde cholangiopancreatography (ERCP) was performed. This showed mildly dilated common and intrahepatic ducts. At ERCP, three clips were noted at the cystic stump area. Endoscopic sphincterotomy was performed and the duct cleared with a dormia basket and balloon. He was well at discharge then.

In the current admission, ultrasonography showed dilated intra- and extra-hepatic ducts, with stone and sludge seen in the distal common bile duct. His blood culture was positive for *Escherichia coli*. At ERCP, pus was draining out from the site of previous endoscopic sphincterotomy. Cholangiogram showed a large filling defect with a metal clip inside (Fig. 1). There were now two surgical clips seen in the cystic duct site. There was a mild stricture in the mid common bile duct. A biliary mechanical lithotripter was used to crush and extract the stone. His stay was complicated by a nosocomial infection which resolved with a course of intravenous antibiotics. He recovered and was discharged to our rehabilitation unit.

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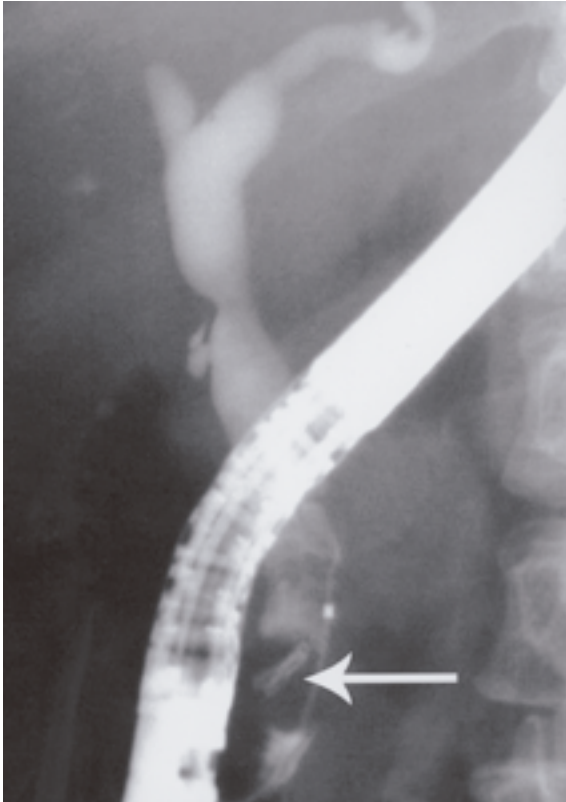


Fig. 2 Radiograph shows two clips within filling defect (arrow). Stricture is seen proximally.

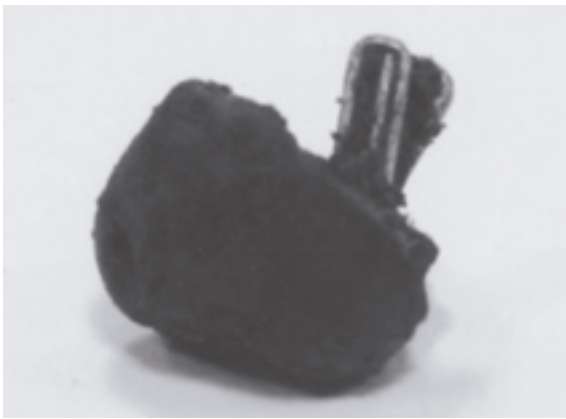


Fig. 3 Photograph shows two clips embedded within the stone.

CASE TWO

A 54-year-old Chinese woman was admitted with one-week history of jaundice without fever. She also reported one-month history of loss of appetite and some loss of weight. She had a LC done three years ago for gallstone disease. This was done in another hospital, therefore details of the operation or post-operative events were not available. Ultrasonography showed dilated intra- and extra-hepatic ducts, with a stone seen in the common bile duct. Laboratory results showed an obstructive picture. Her total white cell count was normal. ERCP showed a filling defect with two metal clips at the centre (Fig. 2). There was

a mild stricture at the proximal common bile duct where the cystic duct had been. There were no clips seen at the cystic duct or artery area, showing that they had completely migrated. The stone was removed after a sphincterotomy and eventually retrieved per orally using a dormia basket. Dissection of the stone revealed two surgical clips at the centre (Fig. 3).

DISCUSSION

Stone induced by foreign material^(1,3) and causing ascending cholangitis is well recognised. It has been reported that up to one-third of recurrent post-cholecystectomy stones may be due to unabsorbed suture material⁽⁴⁾. Despite the increasing use of haemostatic clips and the number of LCs done, the number of reported cases have been less than thirty. These events may possibly have gone unnoticed, with spontaneous passage of either the metal clip or the stone. In fact, the spontaneous passage of biliary stones has been reported to occur in up to 21%⁽⁵⁾ of cases.

Spontaneous passage of surgical clips without causing complication has also been reported⁽⁶⁾. Lombardo et al reported an incidence of clip migration of 24% (11/46) post- LC⁽⁷⁾. Forty-six patients were serially followed-up with abdominal radiographs at 2-3 days, and 1, 6, 12 and 24 months post-LC. Most migrations (7/11) occurred within the first month. In their review, they only documented one case of clip-induced stone occurring at 26 months post-operation.

It remains unclear how applied haemostatic clips end up in the bile duct. The clip may have been introduced into the bile duct during surgery or may be due to gradual erosions leading to eventual migration post-operatively. One author reported the migration of a shrapnel splinter from the right thoracic cavity through the diaphragm into the liver and then the common bile duct, causing cholangitis⁽⁸⁾. This was documented by serial radiographs to occur over 36 years after initial injury. There have also been reports of clip migration causing duodenal ulcer and into blood vessels causing clip emboli^(9,10). The mechanism of clip migration is unknown. In our first case, manipulation of the bile duct with the dormia basket and balloon during the first admission may have contributed to the migration. Short cystic stump, inappropriate clip placement and local infection/suppurative complications have been reported to be predisposing factors⁽⁷⁾.

The likely chain of events, as postulated by us, that leads to the migration of the clip is shown in Fig. 4. Pressure exerted by the clip and on the clip by movement within the intra-abdominal cavity lead to erosions and migration along a path of low pressure or resistance (usually a hollow viscus). As the clip protrudes into the common bile duct, it acts as a

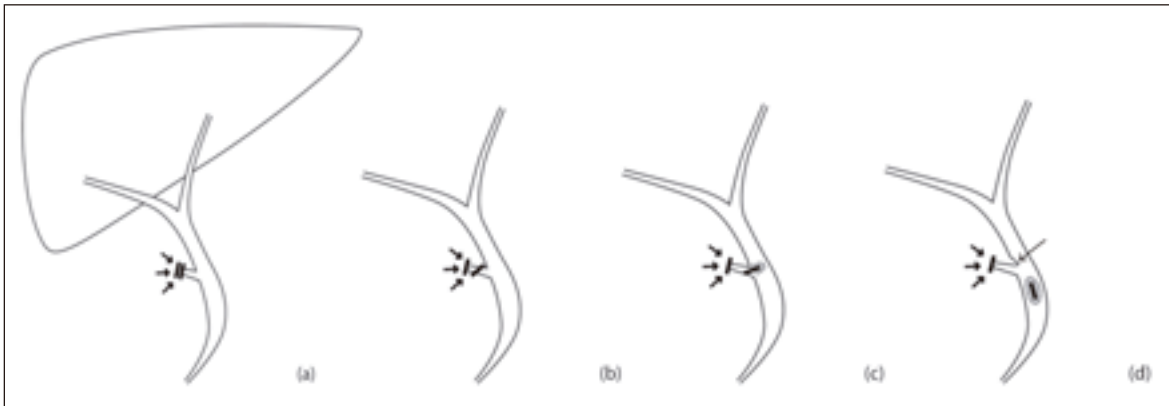


Fig. 4 Mechanism of migration of surgical clip leading to stone formation. Pressure activities from within the intra-abdominal cavity (bold arrows) lead to clip migration (a & b). The exposed clip acts as a nidus for stone formation (c). Eventually, the clip completely migrates into the common bile duct (d), becomes imbedded within the stone, causing biliary obstruction. The point where the clip had migrated through probably leads to the formation of a stricture (long arrow).

nidus for stone formation. With time, the stone gets bigger and with biliary duct activity, more of the clip migrates inward. Eventually the clip dislodges from the wall into the common bile duct. We believe the area of stricture seen is where the clip had migrated through, with possible bile duct injury from the clip. Instances when a clip had migrated through without stone formation may have been due to the nature of the bile or the speed of the migration. Proper placement, use of minimal numbers of clips and use of absorbable clips may reduce the incidence of migration and complications.

Both of our cases show that clip migration is a slow gradual process, occurring months after the initial operations. Patients who had LC should be followed-up clinically and clip migration should be considered if there is recurrence of symptoms. They should also be advised that clip migration causing symptoms can occur, albeit rarely. We hope that these two case reports of clip migration with subsequent stone formation will increase the awareness of such interesting phenomena to all doctors, especially endoscopists.

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REFERENCES

1. Walker WE, Avant GR, Reynolds VH. Cholangitis with a silver lining. *Arch Surg* 1979; 114:214-5.
2. Onghena T, Vereecken L, Dwey K, Loon C. Common bile duct foreign body: an unusual case. *Surg Laparosc Endosc* 1992; 2:8-10.
3. Martinez J, Combs W, Brady PG. Surgical clips as a nidus for biliary stone formation: diagnosis and therapy. *Am J Gastroenterol* 1995; 90:1521-4.
4. Wosiewicz V, Schenk J, Sabinski F. Investigations on common duct stones. *Digestion* 1983; 26:43-52.
5. Frossard JF, Hadengue A, Amouyal G, Choury A, Marty O, Giostra E, et al. Choledocholithiasis: a prospective study of spontaneous common bile duct stone migration. *Gastrointest Endosc* 2002; 51:175-9.
6. Matsuura T, Kanisawa Y, Sato T, Saito T, Hirata K. Migration of endo-clip into common bile duct after laparoscopic cholecystectomy. *Lancet* 1992; 340:306.
7. Lombardo F, Cetta F, Cappelli A. The long-term fate of metallic clips used for cystic duct and artery ligation during laparoscopic cholecystectomy. *Gastroenterology* 1994; 17:542-4.
8. Eguchi S, Matsuo S, Hidaka M, Azuma T, Yamaguchi S, Kanematsu T. Impaction of a shrapnel splinter in the common bile duct after migrating from the right thoracic cavity: report of a case. *Surg Today* 2002; 32:383-5.
9. Reis LD. Surgical clips incorporated into a duodenal ulcer: a rare complication after elective laparoscopic cholecystectomy. *Endoscopy* 2000; 32:S3.
10. Ammann K, Kiesenebner J, Gadenstatter M, Mathis G, Stoss F. Embolism of a metallic clip: an unusual complication following laparoscopic cholecystectomy. *Dig Surg* 2000; 17:522-4.