

Metallic Clip Migration and Primary Common Duct Stone Formation After Subtotal Cholecystectomy

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Background	An 82-year-old male presented with choledocholithiasis ten years following laparoscopic conversion to open subtotal cholecystectomy.
Summary	A primary common duct stone formation with the nidus of a surgical clip, termed “cat’s eye calculi,” is reported ten years after subtotal cholecystectomy for severe cholecystitis. Stone and surgical clip retrieval was accomplished by percutaneous transhepatic technique because of a prior Roux-en-Y gastric bypass. A review of possible mechanisms of clip migration, percutaneous transhepatic cholangiogram technique, and treatment of stone/clips within the biliary system is discussed.
Conclusion	Postcholecystectomy clip migration is a rare cause of common duct stone formation. It should be considered in the differential diagnosis of post-cholecystectomy biliary obstruction.
Key Words	postcholecystectomy clip migration; percutaneous transhepatic cholangiogram; cat’s eye calculi

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Case Description

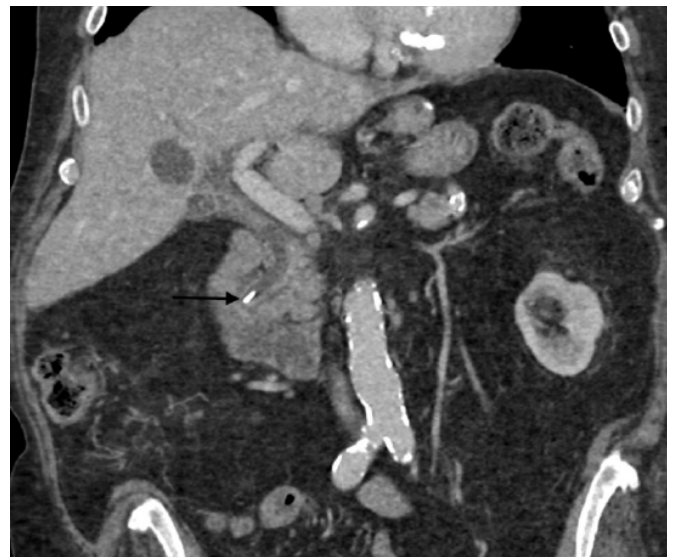
Migration of surgical clips into the biliary tree is rare but has been reported. They can be a focus for stone formation and often present with signs and symptoms of cholangitis. Previous reports have followed both open and laparoscopic cholecystectomy.¹⁻⁶ This case illustrates the possibility of clip migration into the bile duct after subtotal cholecystectomy. The wayward stone/clip is most often removed by endoscopic retrograde cholangiopancreatography (ERCP). Very rarely, the stone/clip has been removed by percutaneous transhepatic technique.^{7,8}

An 82-year-old male presented with diffuse abdominal pain via the emergency room, reportedly more severe in the right abdomen. He denied jaundice, fever, or chills but admitted to an episode of “sweating” when the pain was intense.

Past medical history was significant for Roux-en-Y gastric bypass for morbid obesity 15 years prior. Ten years ago, he underwent laparoscopic conversion to open subtotal cholecystectomy with reconstitution for severe acute cholecystitis. Three years ago, he was hospitalized for an episode of acute pancreatitis with bile duct dilation, which self-resolved. In addition to these noted events, he is treated for atherosclerotic heart disease, atrial fibrillation, hypertension, hyperlipidemia, and diabetes mellitus. Recently, he was started on treatment for irritable bowel symptoms.

Vital signs were stable, with an obese and nontender abdomen on examination. Initial white blood count and liver function tests were normal. The computed tomography (CT) image suggested a surgical clip in the distal common bile duct (Figure 1). Magnetic retrograde cholangiopancreatography (MRCP) confirmed a surgical clip in the common bile duct surrounded by a lucent 1 cm area, suggestive of a stone. The following morning, his white count remained normal while his liver function tests became diffusely elevated (bilirubin 4.3, alkaline phosphatase 411 IU/L, aspartate aminotransferase (AST) 780 IU/L and alanine aminotransferase (ALT) 560 IU/L).

Figure 1. Coronal CT Image of Abdomen Shows Surgical Clip Migration to Distal Common Bile Duct. Published with Permission



Under fluoroscopic guidance, interventional radiology performed a percutaneous transhepatic cholangiogram (PTC). Antegrade cholangiogram showed intrahepatic and extrahepatic bile duct dilatation. A linear density embedded in a filling defect, compatible with metal clip/stone complex, was seen in the distal common bile duct. There was no antegrade flow of contrast into the duodenum consistent with biliary obstruction (Figure 2). A peripheral right biliary duct was accessed under fluoroscopic guidance. With the placement of an AccuStick coaxial introducer system (Boston Scientific, Marlborough, MA), a 4-French angled Glidecath was advanced over a Glidewire (Terumo Medical, Somerset, NJ), and the distal common bile ductal obstruction was successfully crossed into the duodenum. The introducer system and catheter were exchanged for a 10-French Ansel sheath (Cook Medical, Bloomington, IN) and advanced into the distal common bile duct. A 6-French EN Snare® Endovascular Snare System (Merit Medical, Jordan, UT) was then advanced and used to successfully capture and externalize the metal clip/stone complex. The sheath was exchanged for a 10-French internal/external biliary drainage catheter (Cook Medical, Bloomington, IN). The patient promptly improved, his liver test normalized, and he was discharged four days later. The drainage catheter was removed six weeks following this procedure. Interestingly, his irritable bowel symptoms had completely resolved by this time.

Figure 2. Antegrade Cholangiogram Shows Intrahepatic and Bile Ductal Dilatation with No Contrast Flowing into Duodenum. Published with Permission



Linear density embedded in filling defect compatible with metal clip/stone complex seen in distal common bile duct, commonly termed “cat’s eye calculi” (arrow).

Discussion

Retained common duct stones (secondary stones) commonly cause biliary tract pathology following cholecystectomy.⁹ Less commonly, primary common duct stones form within the bile ducts. Stasis related to strictures, tumors, anatomical variants such as choledochocysts, secondary stones, and foreign bodies related to direct migration or enteric ingestion is a few of the etiologies causing primary bile duct stones to form.¹⁰⁻¹⁴ Postcholecystectomy clip migration (PCCM) has also been postulated as a nidus for primary common duct stone formation and was first reported in 1979 after an open cholecystectomy.² The eti-

ology of PCCM has been speculated but not proven. In a 2010 review of 69 cases, Chong and associates suggested that encroachment of the clip on the bile duct wall led to eventual direct erosion into the duct. He suggested another possible etiology: dehiscence of the cystic duct closure with biloma formation preceding migration. Additionally, he felt that using multiple clips was associated with clip migration.² Our patient underwent a laparoscopic, convert to open subtotal reconstituted cholecystectomy for intense inflammation. Metal clips were used on the retained gallbladder mucosa to control bleeding, and the remnant of the gall bladder was then closed with an absorbable suture. This may suggest an additional hypothesis for surgical clip migration via intraluminal movement through the patent cystic duct within the gallbladder remnant.

Typically, PCCM becomes symptomatic two or more years after the index procedure.⁴ While most cases have been described after using metallic clips, plastic and absorbable clips have also been implicated occasionally.¹⁵⁻²³ The stone/metal clip complex has a distinctive appearance of a linear density embedded in a filling defect in imaging studies. In 1993, the term “cat’s eye calculi” was coined by Dr. William Wu for its radiographic appearance (Figure 2).²⁴ ERCP and surgery are the most common methods to remove common duct clips and associated stones. In our case, the PTC technique was successfully utilized because of distorted anatomy from his previous gastric bypass. Chong and associates found only one of three total PTC extraction attempts successful.²

Conclusion

While PCCM is a rare cause of common duct stone formation and/or biliary obstruction, it should be considered in the differential diagnosis, particularly if there was a historically complicated cholecystectomy. In imaging studies, the distinctive cat’s eye calculi appearance of the stone/clip complex can aid in revealing the diagnosis.²⁴ Retrieval of the stone/clip complex is most often accomplished by ERCP. In cases such as our patient with aberrant anatomy, percutaneous transhepatic cholangiogram, and surgery can be useful adjuncts when ERCP cannot be accomplished.

Lessons Learned

In an effort to reduce clip migration, it has been recommended to limit the number of clips on the cystic duct and keep the clips well away from the common bile duct.² Additionally, if subtotal cholecystectomy is chosen, avoid-

ing placement of clips within the reconstituted gall bladder remnant or performing a fenestrated cholecystectomy is prudent. However, it should be noted that more studies focused on PCCM in the subtotal cholecystectomy population are necessary to draw this conclusion definitively.

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