

# Combined percutaneous and endoscopic approach in management of dropped gallstones following laparoscopic cholecystectomy

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## ABSTRACT

Dropped gallstones due to accidental perforation of gallbladder wall during laparoscopic cholecystectomy are often encountered. However, dropped gallstones as nidus of infection with subsequent abscess formation is a rare complication of laparoscopic cholecystectomy (0.3%). Most of the reported cases of complicated dropped stones required open surgical drainage. Minimally invasive measures were less frequently employed. We report a case of dropped gallstones that were removed endoscopically through a percutaneous drainage tract.

## CASE REPORT

### CASE REPORT

A 53-year-old man presented to the emergency department of our institution with fever and right upper quadrant pain. Urgent ultrasonogram (USG) of the upper abdomen demonstrated the presence of multiple stones in gallbladder and thickened gallbladder wall. Common bile duct (CBD) stones were also seen. Overall features were compatible with acute calculous cholecystitis and cholangitis. Endoscopic retrograde cholangiopancreatography (ERCP) placement of common bile duct stent was performed. The patient was discharged with appointment for elective laparoscopic cholecystectomy 3 weeks later in 1998. The CBD stones were eventually removed by ERCP.

Two years later in 2000, this patient was admitted for jaundice, tea color urine, epigastric pain and vomiting. Contrast computed tomography (CT) scan of the abdomen

demonstrated a large irregular rim-enhancing subhepatic collection. In the presence of leukocytosis, an abscess was diagnosed in the subhepatic region. The patient was referred to the interventional radiology unit for percutaneous ultrasonographic guided drainage of the abscess. He had prompt resolution of his symptoms following abscess drainage.

Thereafter, this patient had multiple hospital admissions due to recurrent infection with subhepatic abscess requiring repeated percutaneous drainage by interventional radiologists in 2001, 2002 and 2007. The drained pus grew pseudomonas. Contrast fistulogram in 2001 showed no definite communication of the abscess cavity with bowel or biliary tract.

He was last admitted in 2007 again for right sided abdominal pain and pus oozing from previous drainage tract skin wound. CT scan confirmed a cutaneous fistula connected

to the subhepatic collection (Figure 1a). Multiple tiny hyperdense presumptive dropped gallstones were seen within the inferior part of the collection. Majority of the dropped gallstones were less than 5mm in size (Figure 1a, b). A 6.7Fr Grollman catheter was inserted for percutaneous abscess drainage (Figure 2).

After discussion with surgical colleagues, percutaneous stone removal was offered to the patient as a less invasive alternative to tackle the recurrent subhepatic abscess formation. The old Grollman catheter was removed over Amplatz guidewire. The percutaneous tract was progressively dilated to 24F by interventional radiologists using Amplatz renal dilatation set over Amplatz guidewire. A 24F Amplatz sheath was inserted to reach the abscess cavity. This served as a percutaneous access for surgeons to perform endoscopic irrigation of the abscess cavity, debridement and removal of dropped stones in the operation theater using choledoscope and basket (Figure 3, 4, 5). Follow up CT scan 2 months later showed reduction in number of dropped gallstones within the moderately resolved subhepatic collection. However, persistence of subhepatic collection and residual stones were noted in the follow up CT and a second endoscopic stone removal was required. The two procedures were uneventful with no immediate complications. On clinical follow up this patient remained asymptomatic up to 16 months after last stone removal.

## DISCUSSION

With the development of minimal access surgery, the number of laparoscopic cholecystectomies is growing (2). Dropped stones were seldom encountered with open cholecystectomies because the entire operative field is well visualized during the procedure, any spillage of gallstone can be immediately retrieved. In laparoscopic cholecystectomies, gallbladder perforation may occur during dissection of the gallbladder from the liver bed or more commonly during extraction of the gallbladder through a relatively narrow umbilical incision. This has resulted in an increased incidence of dropped gallstones. Most patients with dropped gallstones remained asymptomatic. Although spilled stones were once considered harmless, there is increasing evidence that they can result in septic complications such as abscess formation (4). The estimated incidence of abscess formation as a result of dropped gallstones after the laparoscopic approach is approximately 0.3% (1, 3). This condition can present months after the procedure (5) as in our case.

Most of the reported cases of dropped gallbladder stone with abscess formation in the literature required open surgical drainage. Some dropped stones were removed percutaneously under fluoroscopic guidance using a basket when the stones were larger than 5mm (6). Endoscopic removal of stones through the percutaneous drainage tract was offered to our patient because of the small size and multiplicity of the dropped stones. We used a basket to trap the stone and remove them together with pulling out the scope through the 24Fr

Amplatz Sheath. It is large enough for 8mm stone to pass without fragmentation. If we use a 30Fr sheath, stones of up to 1cm in size can be removed. Lithotripsy using various means (electrohydraulic or ultrasound) can be applied to large stones but the drawback is that more stone fragments are created. Pathogens trapped in stones can be exposed. Direct visualization of the dropped stones, debridement drainage and irrigation of the abscess cavity using an open system to avoid septicaemia is made possible using the mentioned percutaneous endoscopic approach (Fig. 4a, b). This is particularly advantageous when the stones are numerous and sand-like sludge as in our patient (Fig 4c). Endoscopic debridement allows trapped stones to be released and retrieved using a basket under direct vision. All the debris and dropped stones can be retrieved using a choledochoscope and basket via a single small percutaneous opening, in particular, the potential contamination of a relatively large surgical field can be avoided. However, all the stones may not be removed in a single operation. Percutaneous endoscopic stone removal can allow repeat of the procedure via the same tract. On the other hand, if open surgery is attempted, residual stones may require another more difficult re-operation.

The radiological diagnosis of dropped gallstones with abscess formation following prior laparoscopic cholecystectomy can be very challenging. Most radiologists would just report the CT finding of the rim-enhancing intra-abdominal collection without accounting for the presence of hyperdense gallstones at the dependent portion of the collection. The surgical absence of gallbladder and history of prior laparoscopic cholecystectomy should prompt one to conduct a detailed search for dropped gallstones as a cause of intra-abdominal abscess formation.

This case is unique because of the long time course. Presumably, many of the stones got loculated and incorporated into the abscess wall resulting in incomplete removal. The result might have been better if the abscess developed earlier and the stones removed early in the post-operative period using this technique.

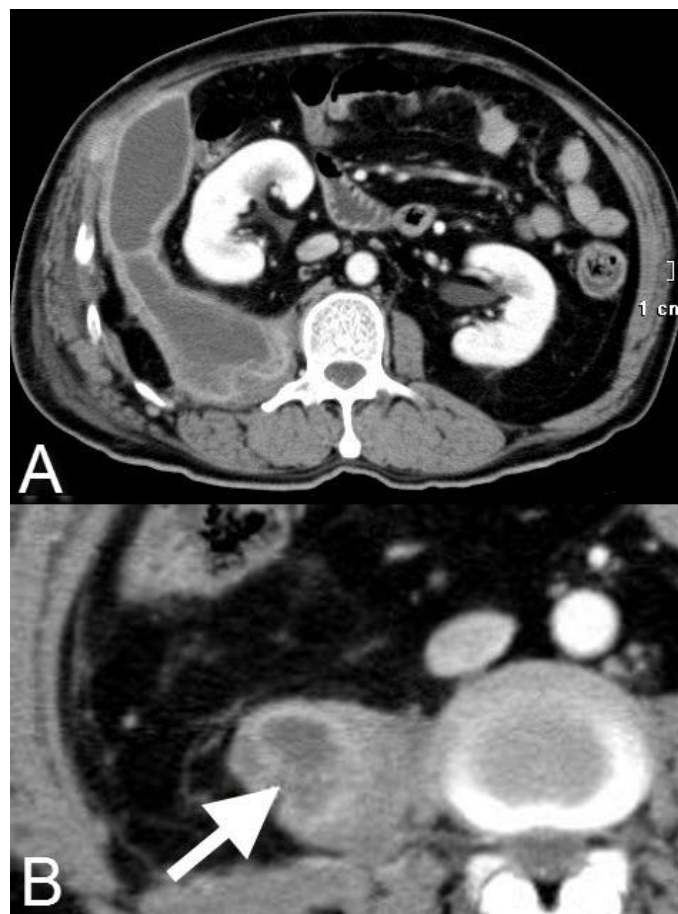
## TEACHING POINT

Knowledge of the radiographic appearance and awareness of dropped gallstone are crucial to the diagnosis of this rare condition. Combined percutaneous and endoscopic removal of dropped gallstones can be a less invasive alternative to open surgical drainage.

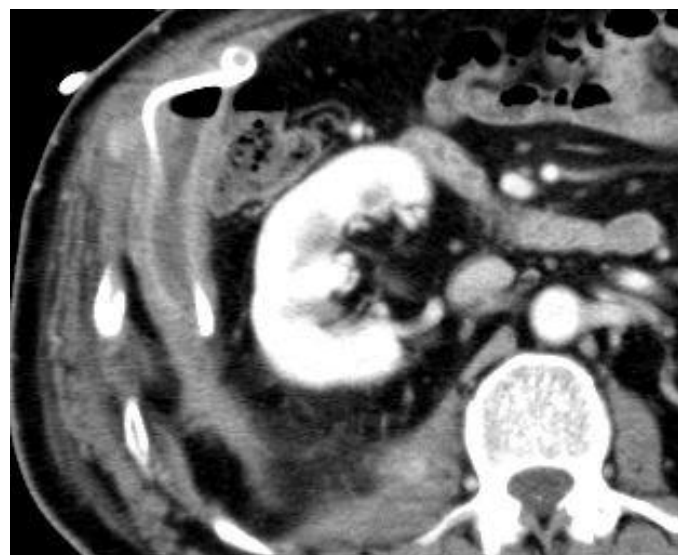
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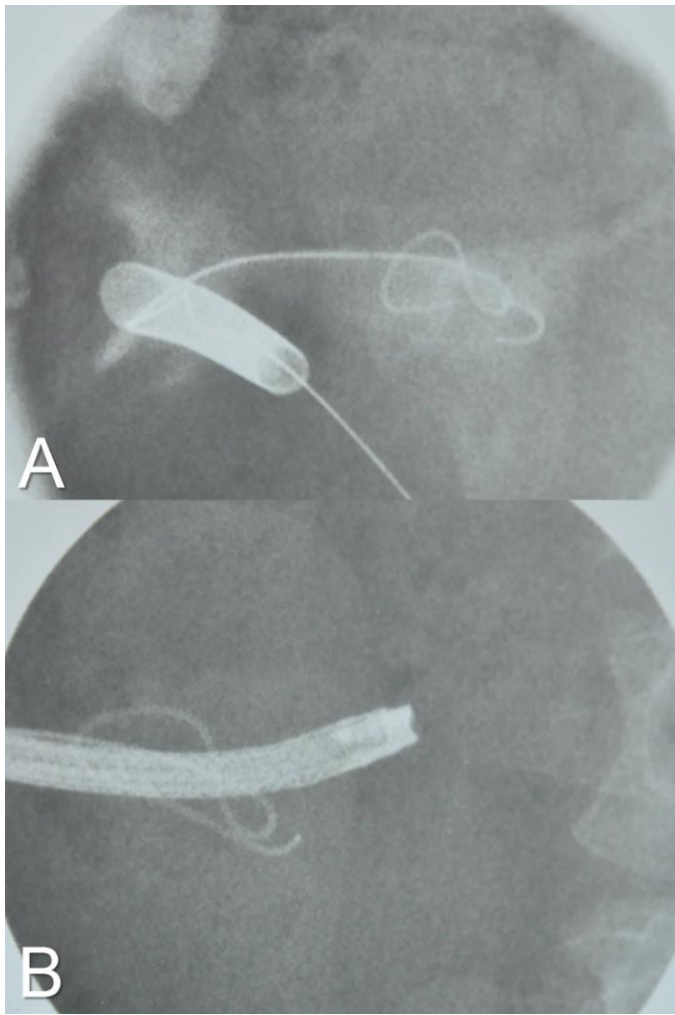
FIGURES



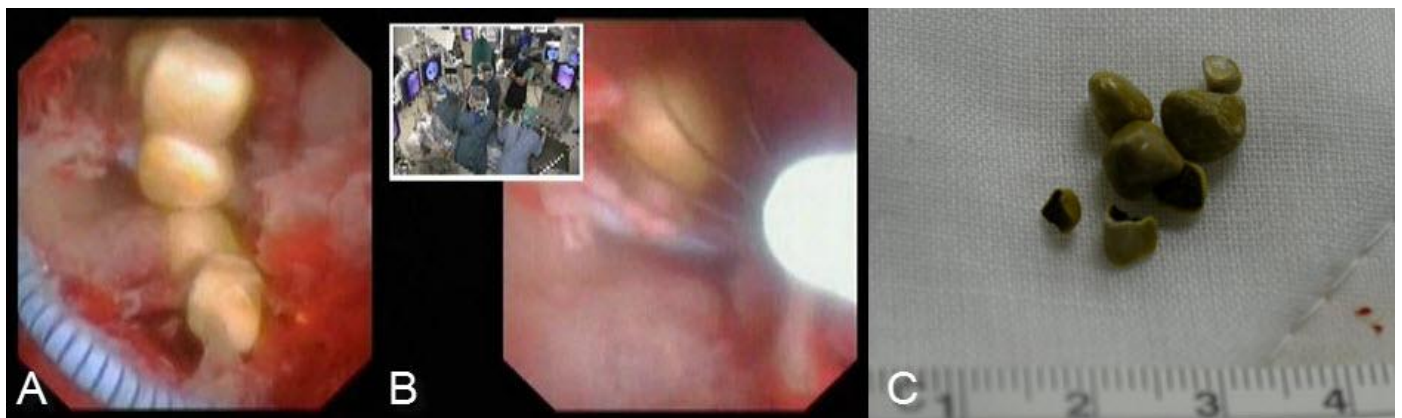
**Figure 1 (top):** 52-year-old male patient with dropped gallstones. A, B: Axial contrast enhanced (IV) CT image of the upper abdomen showed subhepatic rim-enhancing collection extending to right anterior abdominal wall. The right kidney was anteriorly displaced. Tiny hyperdense foci (arrow) were noted within the inferior portion of the collection suggestive of dropped gallstones related to prior laparoscopic cholecystectomy. (Technique: KVp=120; mA=240; Slice Thickness=5.00 mm; Dose of intravenous contrast: Iopamiro 370, 70ml)



**Figure 2 (right):** 52-year-old male patient with dropped gallstones. Axial contrast enhanced (IV) CT image of the upper abdomen showed a Grollman catheter within the subhepatic abscess collection. (Technique: KVp=120; mA=340; Slice Thickness=5.00 mm; Dose of intravenous contrast: Iopamiro 370, 70ml)



**Figure 3 (left):** 52-year-old male patient with dropped gallstones. (A, B) Fluoroscopic images over the right upper abdomen. A 24Fr Amplatz sheath was inserted over the Amplatz guidewire after adequate tract dilatation using Amplatz renal dilatation set. Choledochoscope was inserted along the guidewire via the 24Fr Amplatz sheath to facilitate stone removal, irrigation of the abscess cavity and debridement.



**Figure 4 (top):** 52-year-old male patient with dropped gallstones. (A, B) Endoscopic appearance of the dropped gallstones. Continuous flushing was connected. The inset showed a photo of the operating theater (B). A dropped stone was retrieved by basket. (C) Retrieved stones.

#### ABBREVIATIONS

CT = Computed tomography

USG = Ultrasound

ERCP = Endoscopic Retrograde Cholangiopancreatography

#### KEYWORDS

Dropped gallstone, laparoscopic cholecystectomy, percutaneous endoscopic stone extraction

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