CIRA Case of the Week
December 2016

Case Courtesy of Drs. Chris Plewes and Rahim Samji

Initial presentation

- 61 year old female
- Presented to the emergency department
- Right flank pain and fever

HPI

- Had presented 1 year previously with recurrent right upper quadrant pain, fever, and jaundice
- Diagnosed with gallstone related cholecystitis and cholangitis
- Multiple ERCP procedures, including CBD stenting, complicated by pancreatitis
- Acute-on-chronic cholecystitis requiring long term percutaneous cholecystostomy
- Underwent laparoscopic cholecystectomy, with spillage of gallstones during dissection of surrounding adhesions
- Made a good recovery and was discharged home 7 months before current presentation

HPI

- On exam, the abdomen was soft but tender in the RUQ and RLQ
- Adequate bowel sounds were present
- WBC was elevated at 22, liver function was normal
- Initial ultrasound showed a predominantly hypoechoic lesion in or adjacent to the right lobe of the liver
- Subsequent CT showed a 20 cm multiloculated low density collection associated with gallstones in the right infrahepatic space

Initial imaging

Large, heterogeneous, predominantly fluid density collection bordering the right lobe of the liver.

Initial imaging

The collection extends into the subhepatic space and compresses the right lobe of the liver. Inflammatory changes extend to the right lateral abdominal wall. The collection is multiloculated and contains several gallstones. Several small collections were also seen in the anterior abdominal wall.

Initial imaging

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Initial management

- A 10 French pigtail drainage catheter was placed into the collection under ultrasound guidance
- The patient was started on antibiotics and discharged home
- Surgical washout and stone retrieval were scheduled

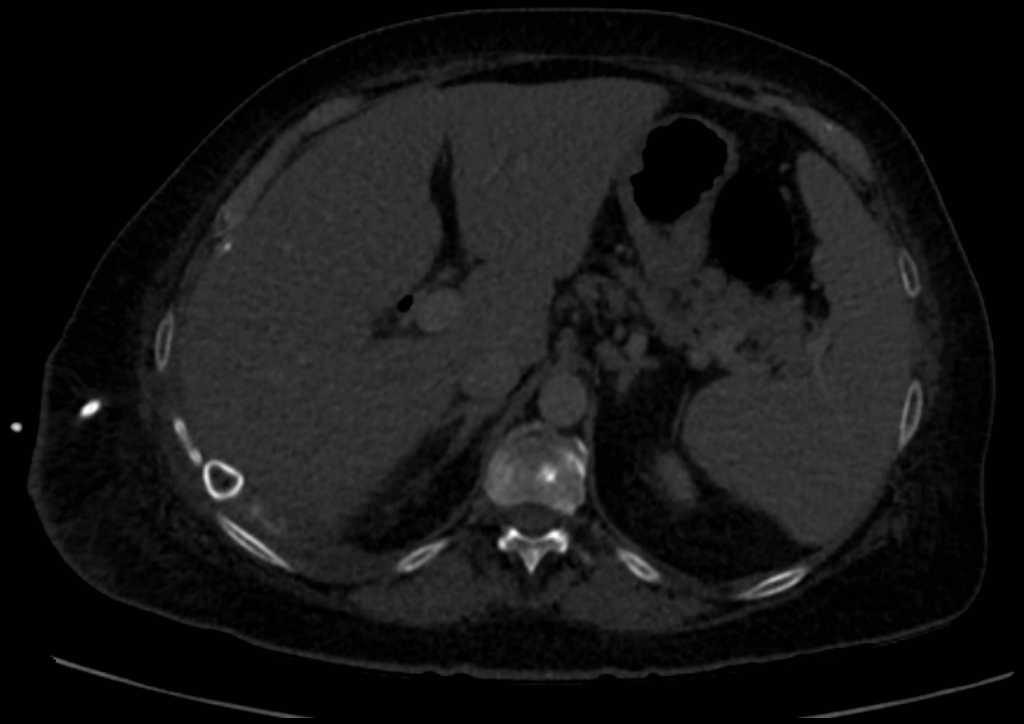
Initial management

- Laparoscopy was performed
- Two loculated abscess cavities were entered and washed out but no stones could be identified
- The anterior abdominal wall collections were drained
- At that time, it was not felt that converting to an open procedure would aid in stone extraction

Initial management

- Post-procedural CT demonstrated persistent right peri- and infrahepatic abscesses up to 9 cm in diameter containing multiple gallstones.

Initial imaging



Calcified gallstones are seen within small residual perihepatic collections.

Initial imaging

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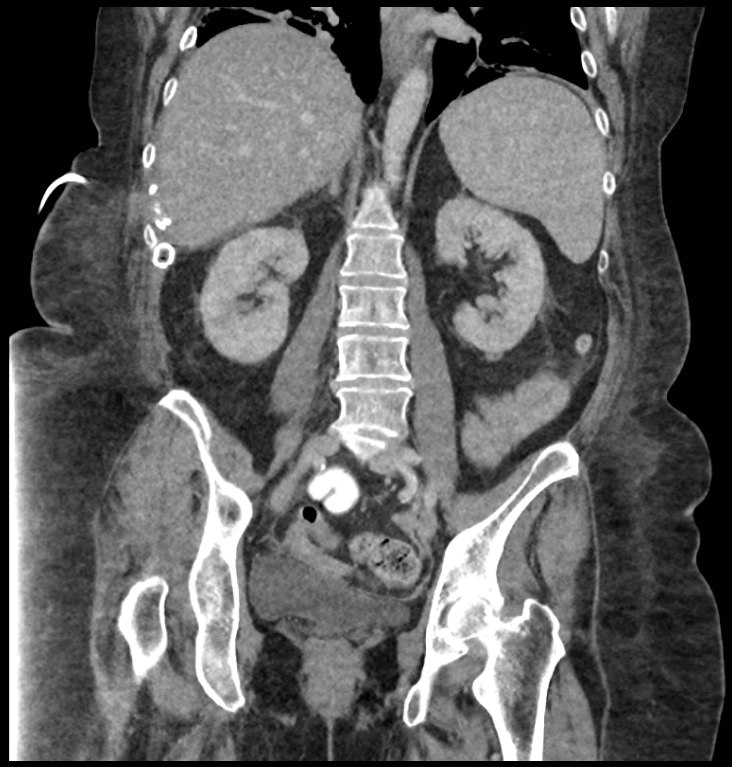
Initial imaging



Calcified gallstones are seen within small residual perihepatic collections.

Initial management

- The patient stabilized on antibiotics with two drains in situ and was discharged home.
- Given the difficulty surgically extracting the gallstones associated with these collections, Interventional Radiology was consulted and percutaneous stone extraction was arranged.

Dropped gallstones

- Laparoscopic cholecystectomy has become the standard of care for routine gallbladder removal and is now the most common major abdominal procedure in Western countries
- Although the laparoscopic approach has many advantages over open technique, it carries an increased risk of gallbladder perforation during extraction, which can lead to dropped gallstones in the peritoneal cavity (reported incidence from 13 to 32%)
- Many of these are removed intraoperatively but inaccessible stones remain in up to 6%

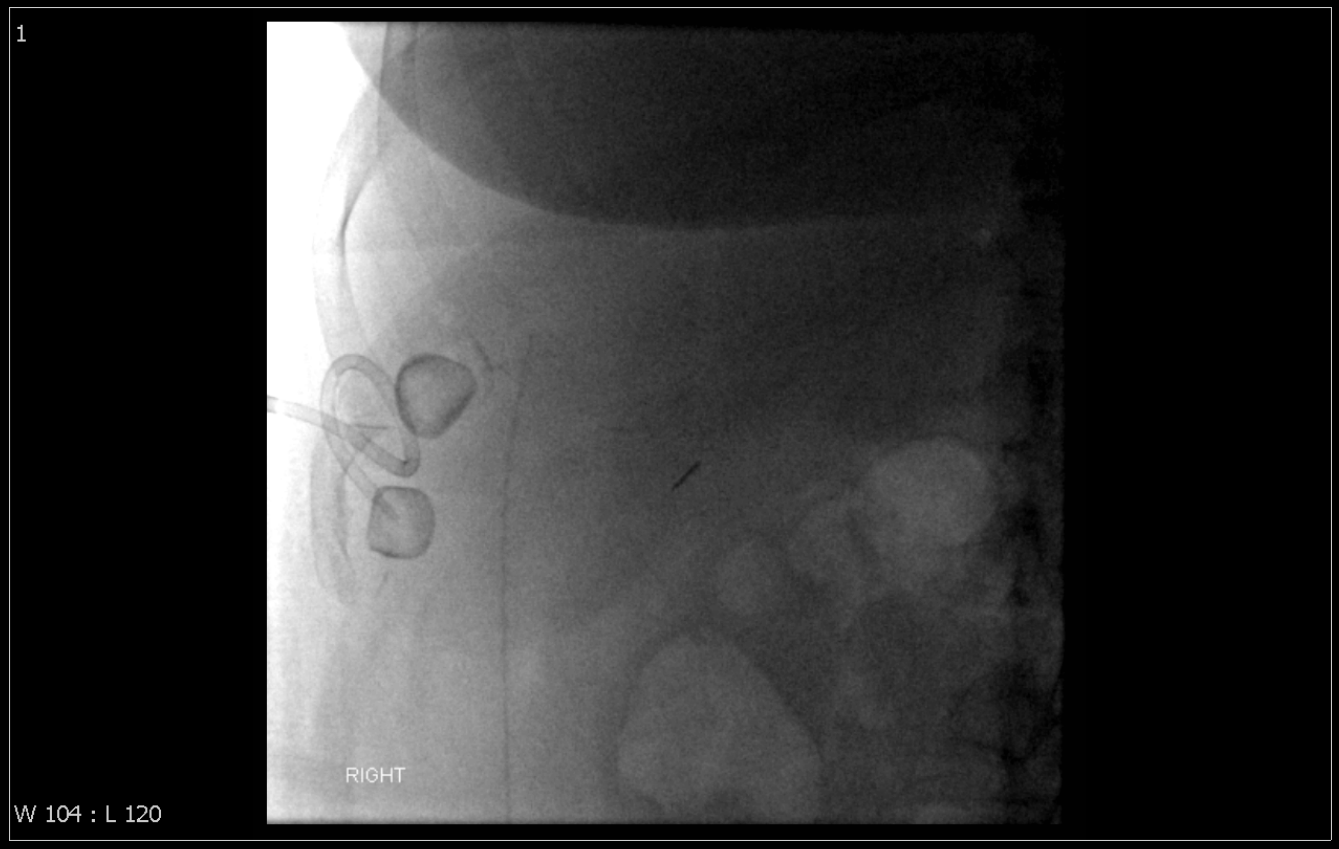
Dropped gallstones

- The majority of retained gallstones are asymptomatic, but in a small proportion (0.08 – 0.3%), the gallstones can lead to abscess and fistula formation, often laparoscopic port sites or perihepatic spaces.
- Management of these collections usually requires removal of the offending gallstone to prevent recurrent infection.
- Often this can be accomplished using minimally invasive surgical techniques, or, failing that, an open approach.
- In this case, given the difficulty locating and accessing the stones intraoperatively, a percutaneous image-guided approach was employed.

Percutaneous extraction

- The patient was electively admitted for the procedure
- Local anesthetic, conscious sedation, and pre-procedural antibiotic were administered
- Fluoroscopy showed multiple radiopaque gallstones in the posterolateral perihepatic space around the existing pigtail drainage catheter
- Contrast injection confirmed a collapsed cavity surrounding these stones

Percutaneous extraction



Percutaneous extraction

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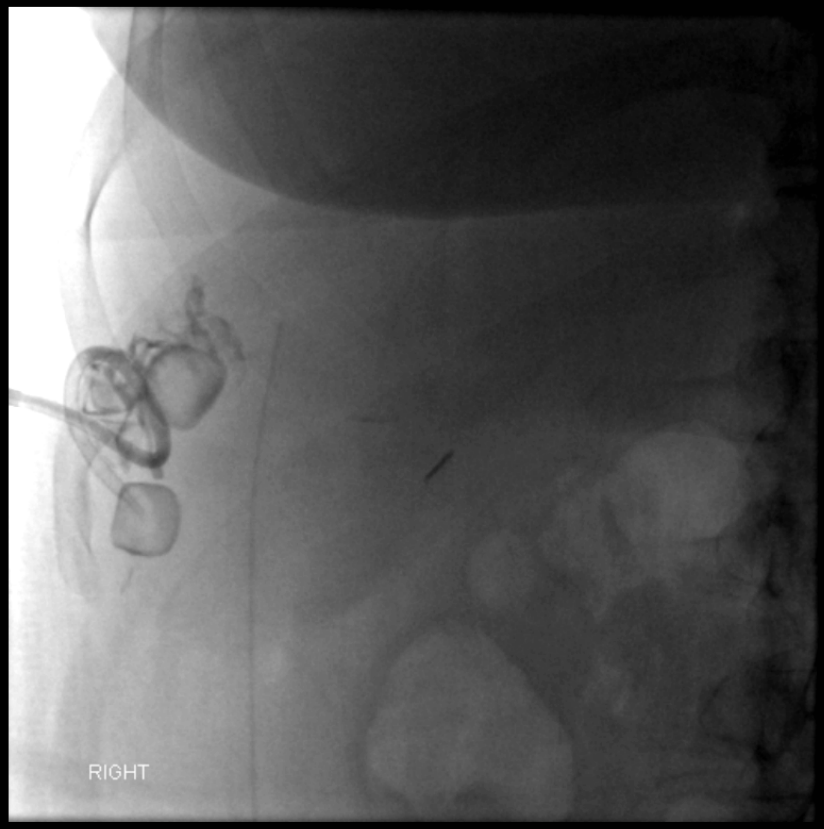
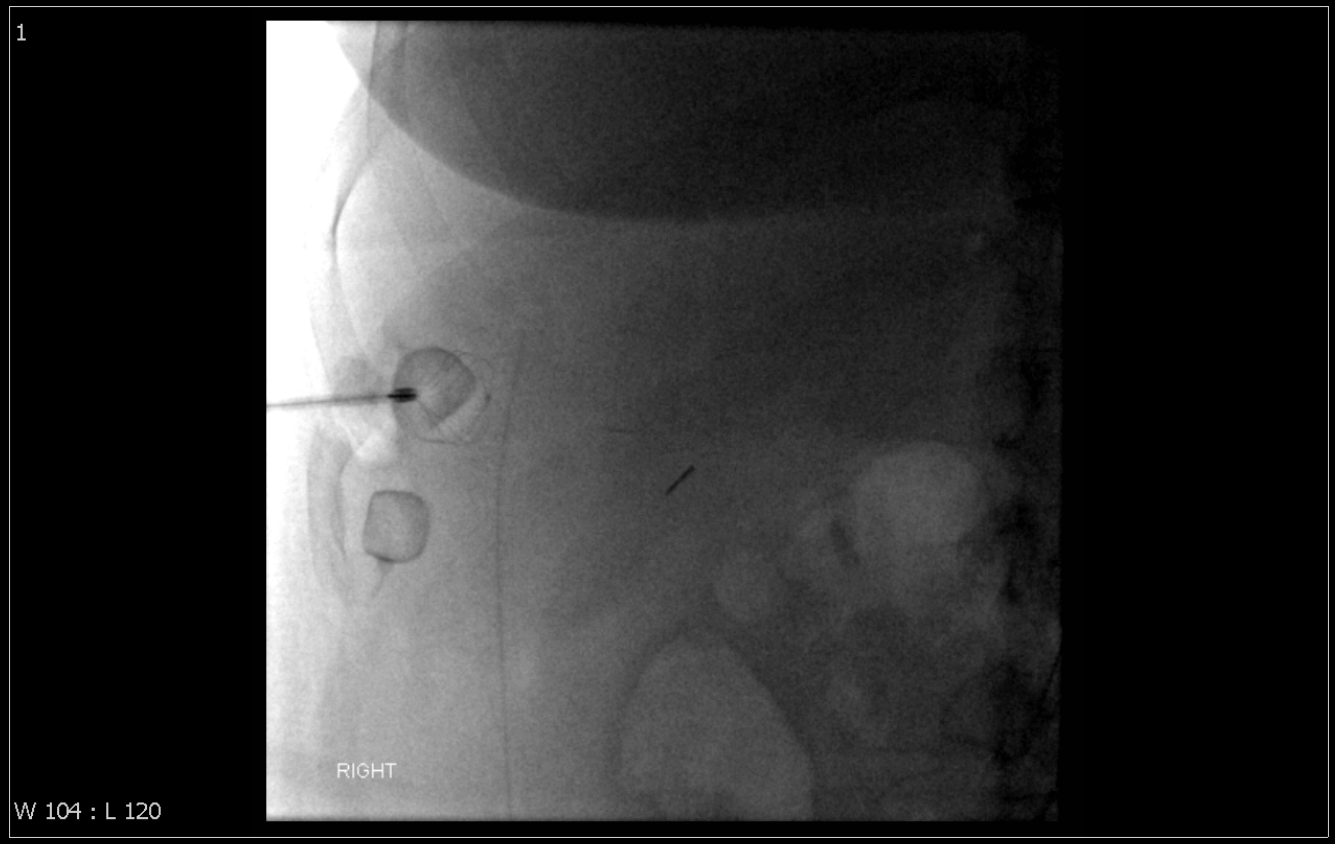


W 104 : L 120

Percutaneous extraction

- The percutaneous tract was angioplastied to 10 mm over a buddy wire
- Attempts to remove the largest stone using a 2.5 x 1.8 cm retrieval basket were unsuccessful

Percutaneous extraction



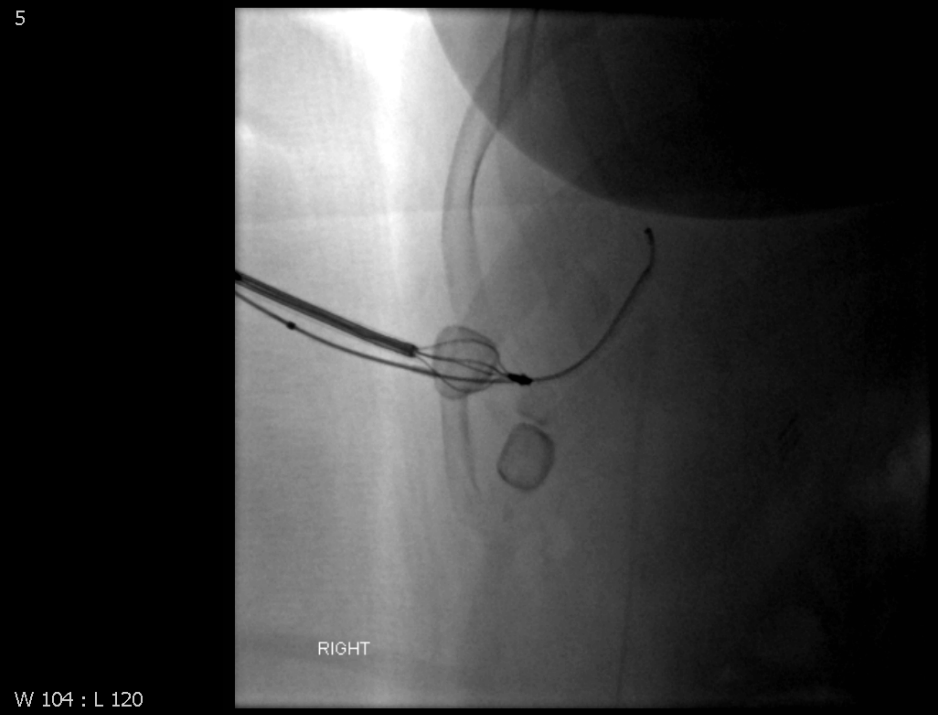
Percutaneous extraction

The tract was ballooned and the balloon deflated in an effort to encourage the stone to pass through the balloon tract.

Percutaneous extraction

- A 20 French sheath was placed and a 3 cm 8.5 French retrieval basket was used to capture the stone.

Percutaneous extraction

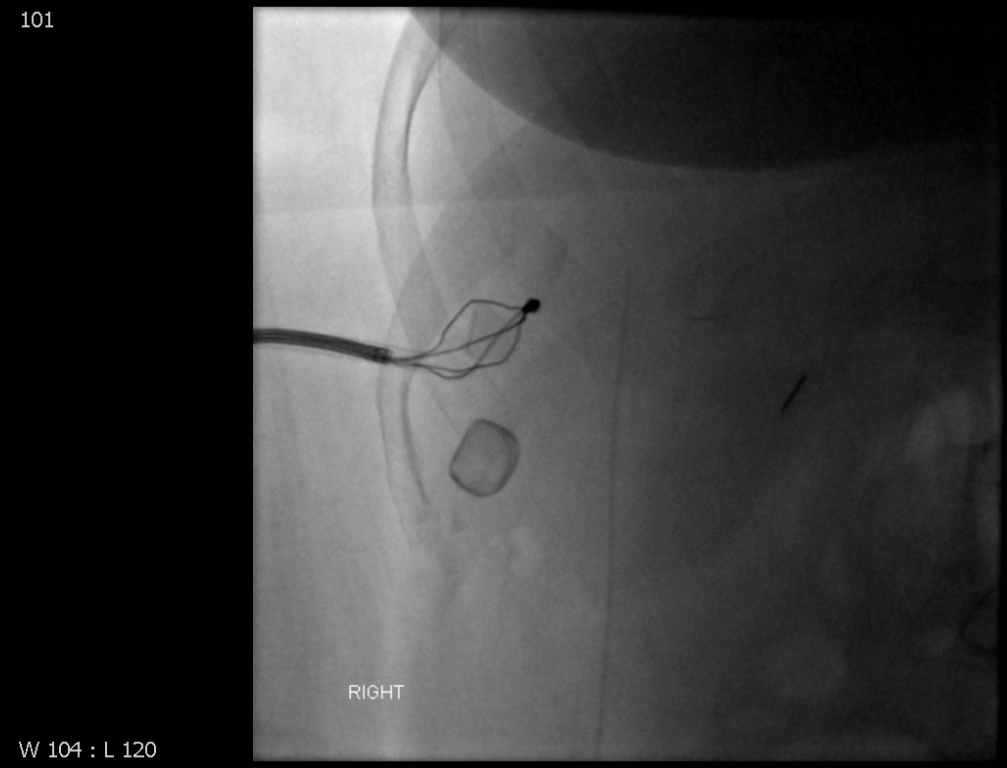


Stone successfully captured with an endoscopic basket retrieval device.

Percutaneous extraction

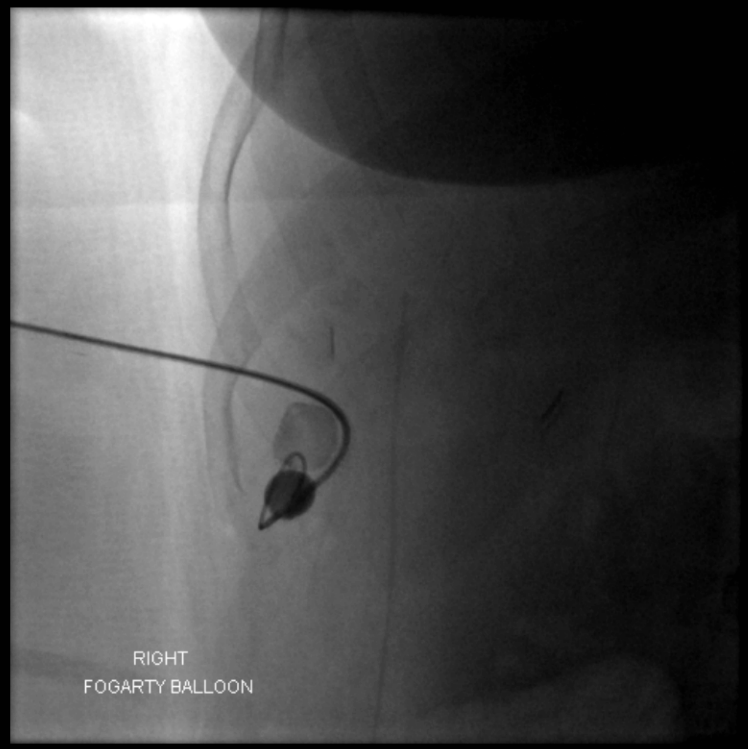
Extraction required balloon dilation of the tract to 16 mm.

Percutaneous extraction



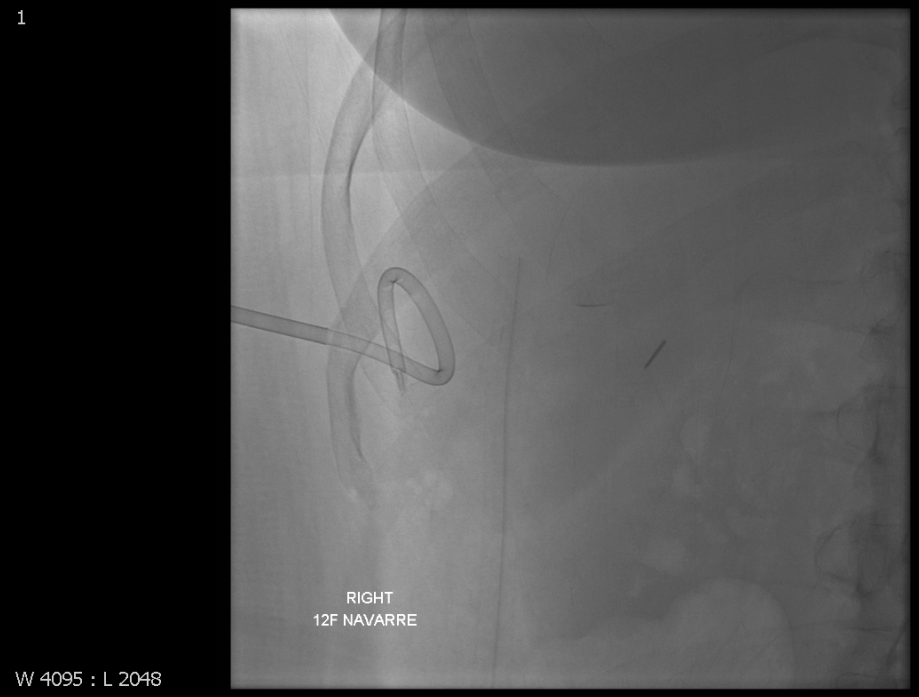
Smaller fragments were subsequently removed

Percutaneous extraction



A 5.5 French compliant balloon catheter was used to redirect gallstones superiorly to facilitate capture with the retrieval basket.

Percutaneous extraction



At the end of the initial procedure, a 12 French catheter was replaced in the subcutaneous tract.

Percutaneous extraction

- The patient recovered well on antibiotics and was discharged uneventfully

Percutaneous extraction

- The patient presented again to the emergency department on July 20, 2015 with periumbilical pain
- Ultrasound of the anterior abdominal wall showed a non-radiopaque gallstone within the anterior periumbilical collection
- Repeat CT showed at least one residual partially calcified stone remaining within the perihepatic collection, as well as one stone within the subcutaneous tract

Follow-up CT

A gallstone is seen in the superficial portion of the subcutaneous tract, along the drainage catheter.

Follow-up CT

A partially calcified residual gallstone is seen in the largely collapsed perihepatic collection.

Percutaneous extraction

- Repeat extraction was scheduled
- The patient was placed under general anesthesia
- A sinogram was performed through the existing pigtail catheter, showing a thin channel connecting to the region of the partially-calcified gallstone

Percutaneous extraction

The partially calcified gallstone is visible as a faint linear opacity immediately above the cholecystectomy clip. The cavity surrounding it has been selected with a hydrophillic guidewire.

Percutaneous extraction

A 5.5 French compliant balloon was used in an attempt to redirect the stone into the more proximal cavity.

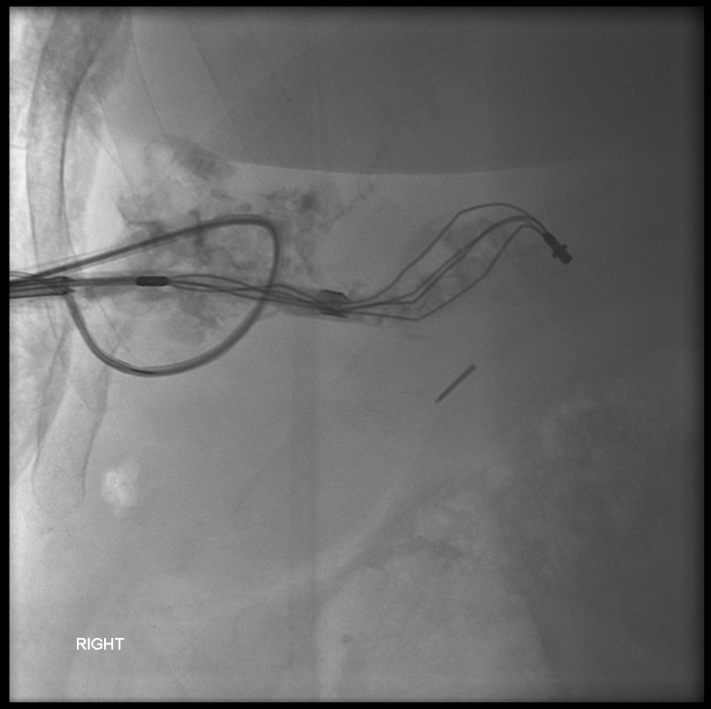
Percutaneous extraction

Multiple attempts were made with a endoscopic basket retrieval device to grasp the stone.

Percutaneous extraction

Contrast was instilled to highlight the surrounding cavity.

Percutaneous extraction



The stone was successfully grasped and removed. The stone in the subcutaneous tract was removed under fluoroscopic guidance using forceps.

Percutaneous extraction

A 12 French pigtail drainage catheter was replaced at the end of the procedure.

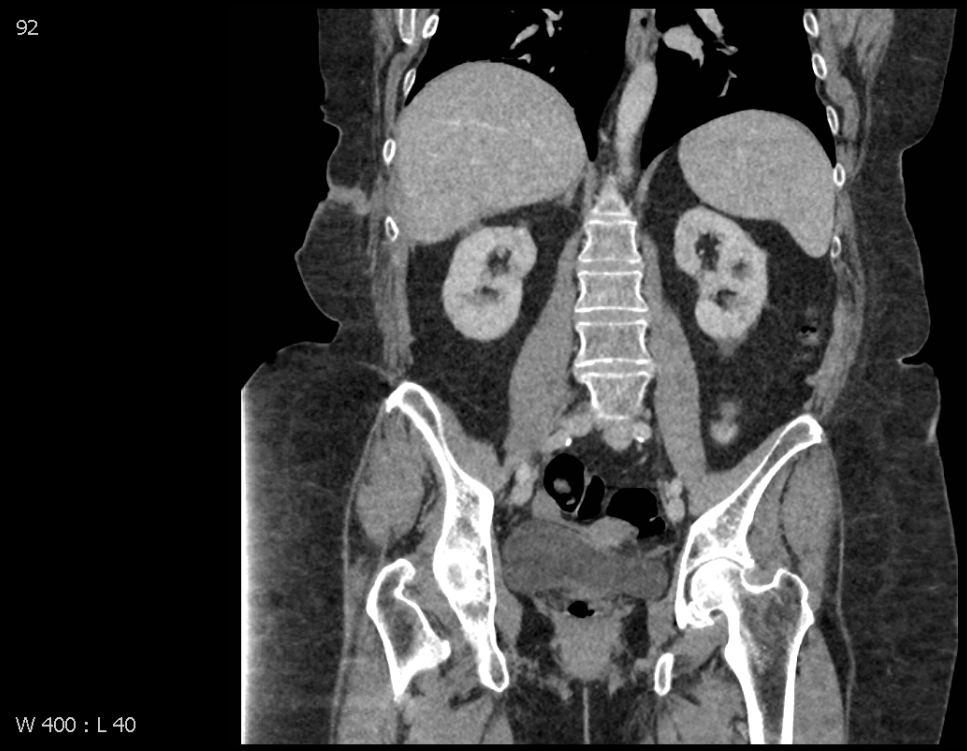
Post-procedural follow-up

- The patient recovered uneventfully. The catheter was removed and the patient discharged home.
- A subsequent CT performed for purulent drainage from the subcutaneous tract showed near-complete resolution of the perihepatic collection with no residual gallstones identified.

Post-procedural follow-up

Near-complete resolution of the perihepatic collection. No residual stones.

Post-procedural follow-up

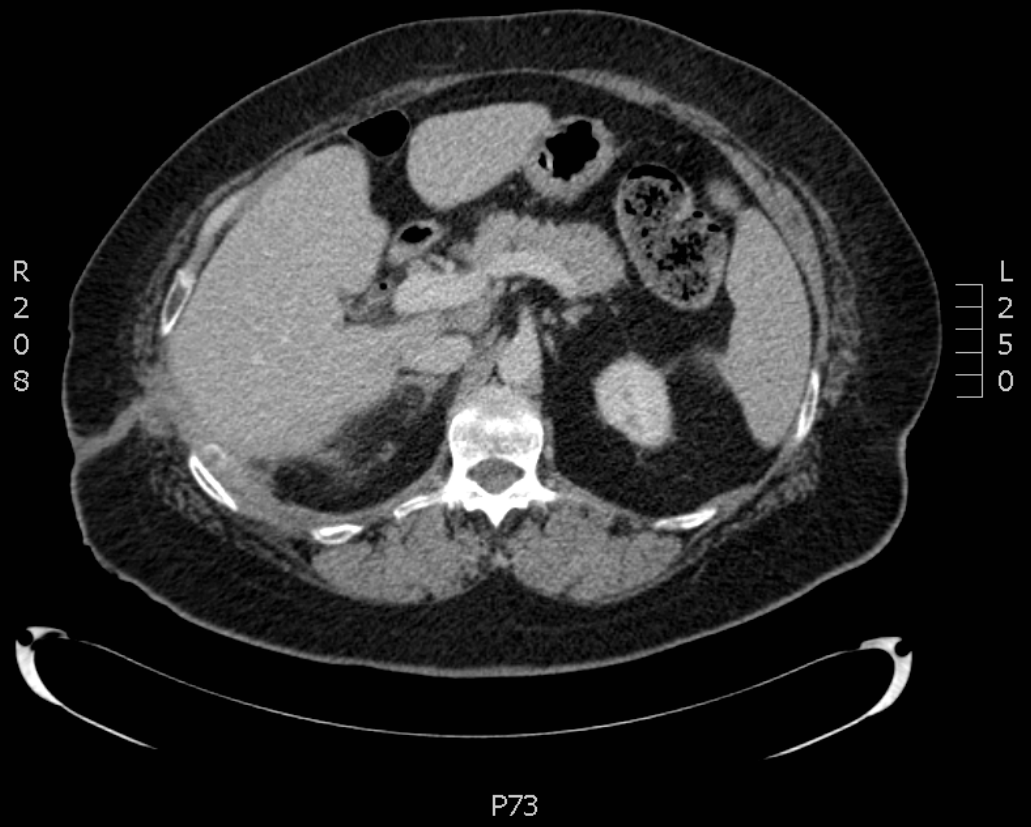


Near-complete resolution of the perihepatic collection. No residual stones.

Persistent drainage from tract

- Patient returned for CT to ensure resolution of the perihepatic abscess

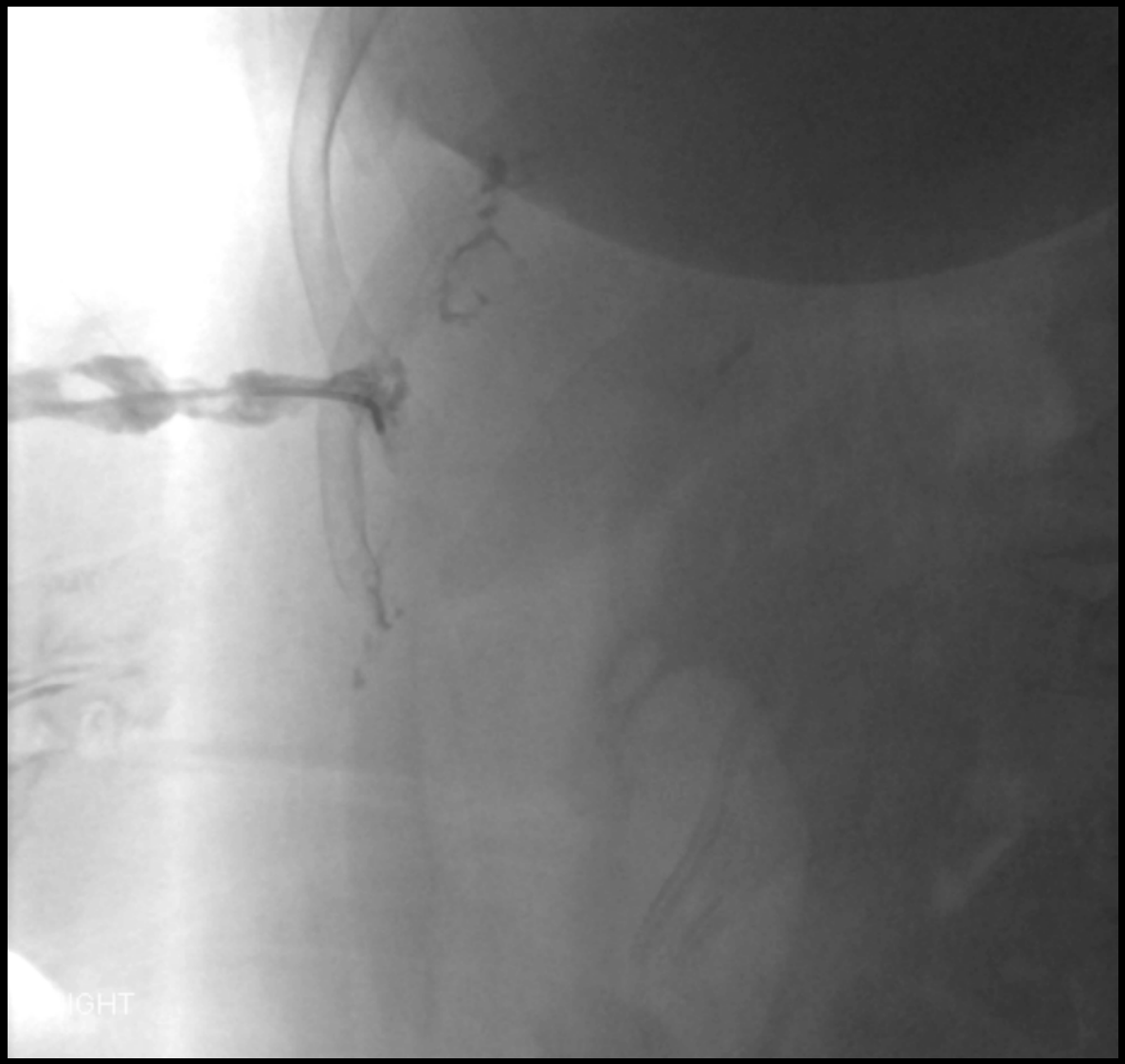
Persistent drainage from tract



Dropped gallstone seen posterior to segment 7 in residual perihepatic collection.

Persistent drainage from tract

- Patient returned for third and final attempt at stone retrieval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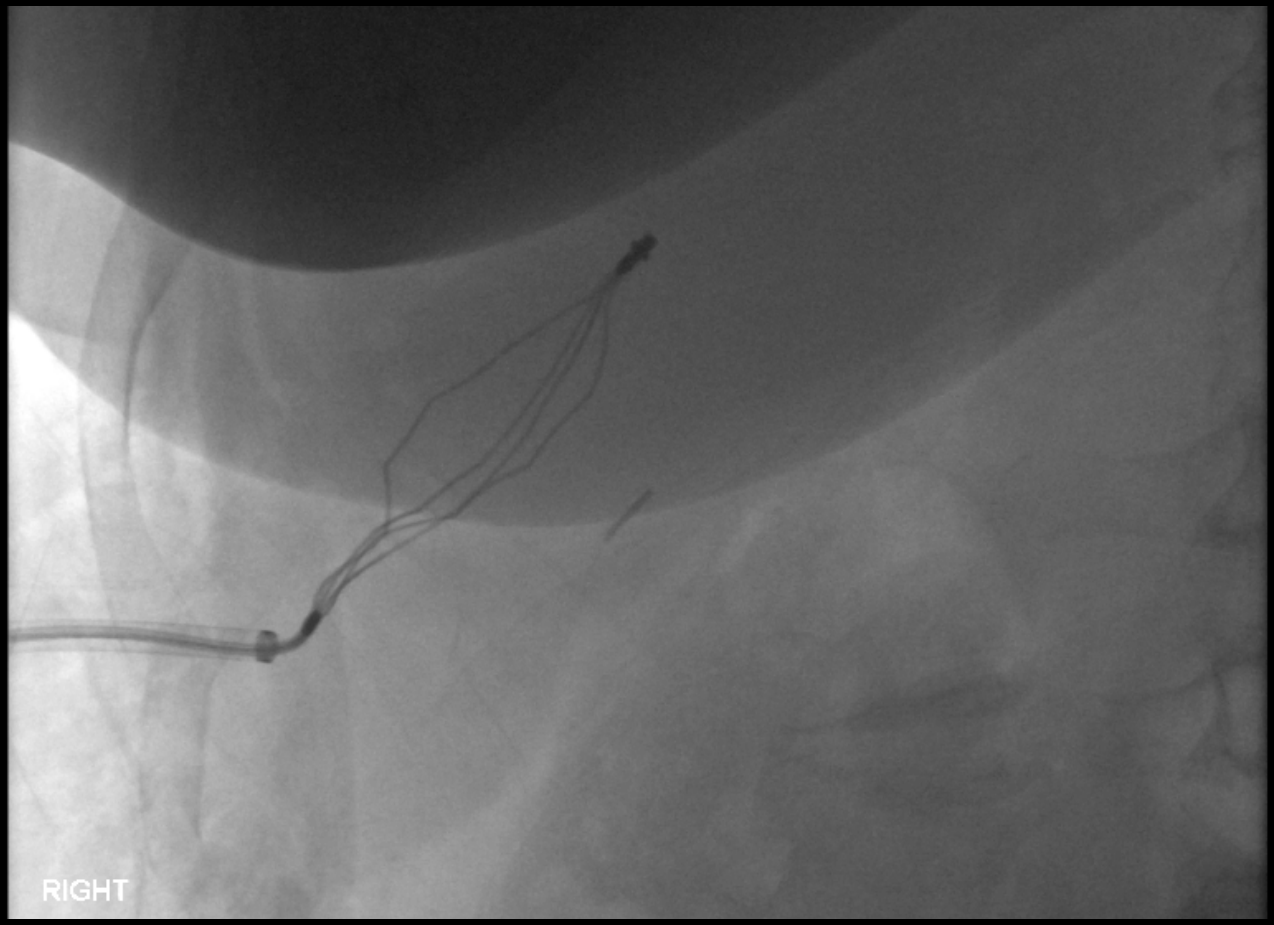
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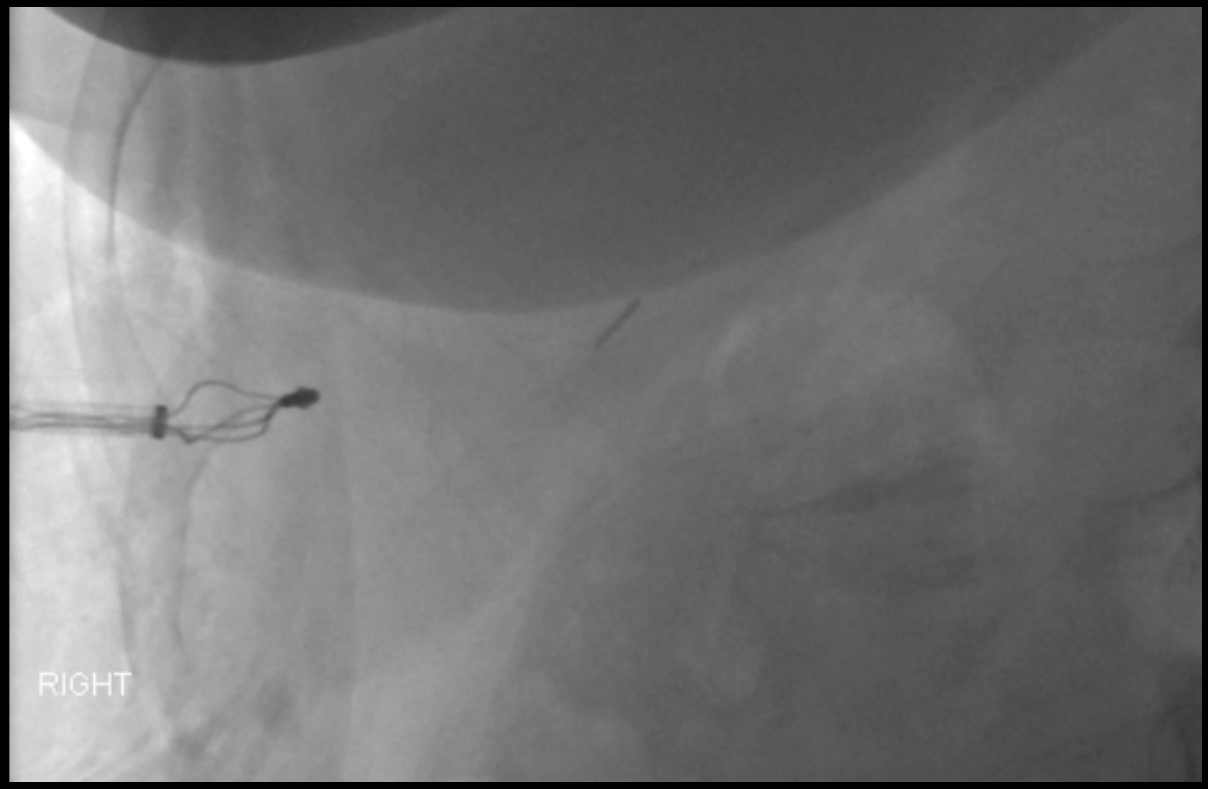
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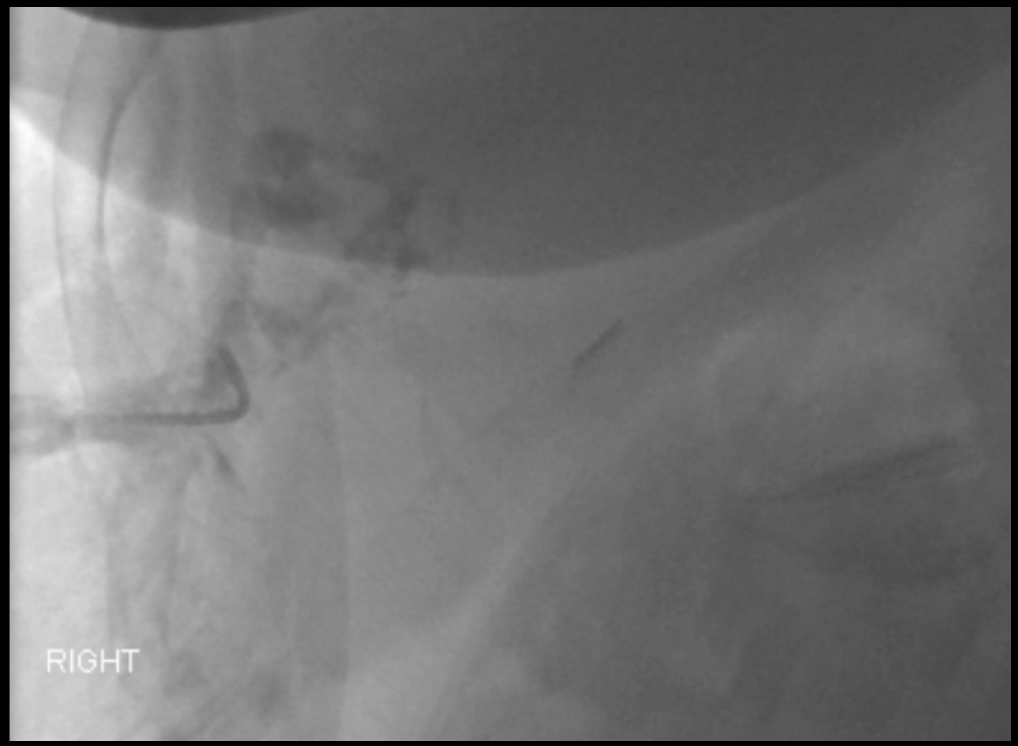
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Discussion

- Potential benefits of image-guided percutaneous stone extraction include:
  - Established access directly into the abscess collection via existing percutaneous drains
  - The ability to evacuate stones within a collection without opening it to the peritoneal space
  - Relatively small size of percutaneous access
- Difficulties associated with the technique include:
  - Lack of direct visualization of the dropped stones (barring the use of endoscopic devices percutaneously) could lead to difficulty in completely removing the stone burden
  - Working in the perihepatic spaces under fluoroscopic guidance could lead to unrecognized hepatic injury, although the instruments used would be unlikely to cause significant regional trauma
  - The stones may be difficult to remove in a single procedure (as in this case)

Discussion

- Gallbladder perforation and stone spillage during laparoscopic cholecystectomy is a relatively common occurrence, with a small but documented risk of developing an infection, with the dropped stones as a nidus
- Image-guided percutaneous gallstone extraction offers a viable and less invasive alternative to open surgical extraction in cases where the dropped gallstones are difficult to locate laparoscopically, either due to adhesions or being walled off from the peritoneal space, or the patient is a poor surgical candidate

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