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Case Report

Minimal invasive treatment of biliary leak after laparoscopic cholecystectomy

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A B S T R A C T

The laparoscopic cholecystectomy has become one of the most common operations for treatment of symptomatic gallbladder disease. However significant postoperative biliary duct injuries can occur, leading to biliary leaks. Here we present a case where multiple abdominal collections are detected in a 64-year-old male patient who underwent laparoscopic cholecystectomy due to gallbladder stones two weeks prior. Percutaneous drainage under computed tomography guidance is implemented to treat the collections which result to be bilomas. After controlling the leak, an endoscopic retrograde cholangiopancreatography with papillotomy and stent placement is performed believing that the problem was settled in the cystic duct. But after observing that the leak increased with this treatment, an anatomical variation is suspected. A percutaneous transhepatic cholangiography is performed which confirm the diagnosis. In case of any deviation of a normal surgical post operatory, a biliary leak must be suspected. Surgeons nowadays must be trained in different diagnosis and treatment methods.

Keywords: Bile ducts; Biliary fistula; Cholangiography; Cystic duct; Radiology, interventional

Introduction

Since the appearance of laparoscopic cholecystectomy, it has become one of the most common minimally invasive operations for treatment of symptomatic gallbladder disease.[1] However, significant postoperative biliary duct injuries can occur up to ten times more frequently with laparoscopic surgery than with open surgery.[2] Biliary leaks may occur within one-week postoperatively, but delayed clinical presentation may occur up to one month postoperatively.[3,4] An important factor that one must have into account and that can increase the risk of biliary leakage, are the variations in biliary anatomy which are very common. It is estimated that around 19% to 39% of the population have a variation of the "normal" biliary anatomy.[5,6] Modern surgeons must be prepared to face this complication and be able to treat it in a minimal invasive way, combining different approaches like laparoscopic, endoscopic and percutaneous. Here we present a case where different treatment modalities are implemented.

Case Report

This is the case of a 64-year-old male patient who underwent laparoscopic cholecystectomy due to gallbladder stones two weeks prior admission to our institution, with no other relevant clinical background. The patient presented diffuse abdominal pain, nausea and vomiting, not associated with other gastrointestinal symptoms, nor with fever or jaundice. Laboratory work-up revealed total bilirubin 3 mg/dL (predominant direct) and alkaline phosphatase of 900 U/L with no other abnormalities.

Abdominal ultrasound (US) is performed as first approach, showing intrahepatic and extrahepatic ducts with normal size and without any sign of biliary stones. A fluid collection of 160 mL is detected in the anterior subphrenic space, and free fluid on the right flank and right lower quadrant (Fig. 1, 2).

Due to the relative well clinical status of the patient, it is decided to perform a computed tomography (CT)-scan with percutaneous drainage of the collection. In the CT-scan more collections are detected in the subhepatic space and de Douglas pouch (Fig. 3).

Vigorous drainage is performed, placing pig-tail catheters with CT-guidance in the right anterior subphrenic, under the liver

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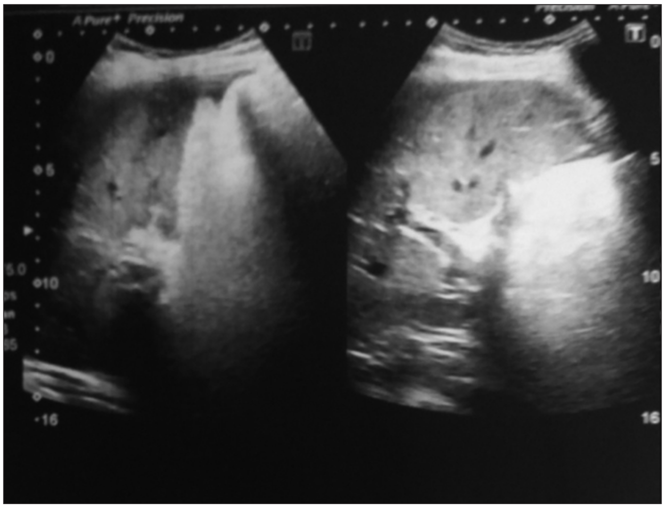

Fig. 1. Intrahepatic ducts with normal size.

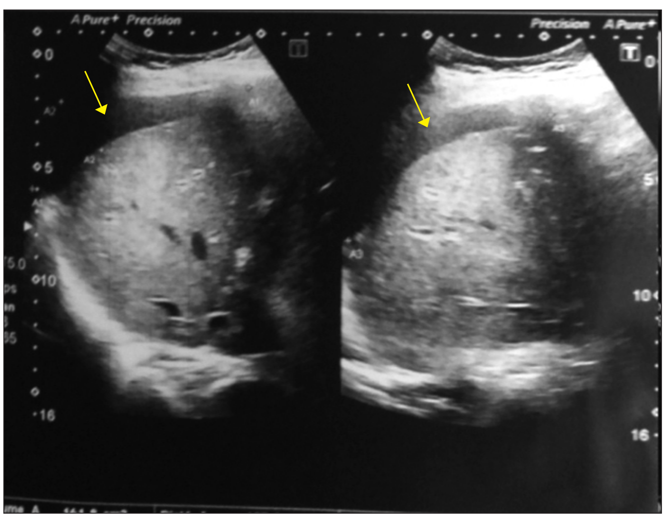

Fig. 2. Fluid collection in the anterior subphrenic space (arrows).

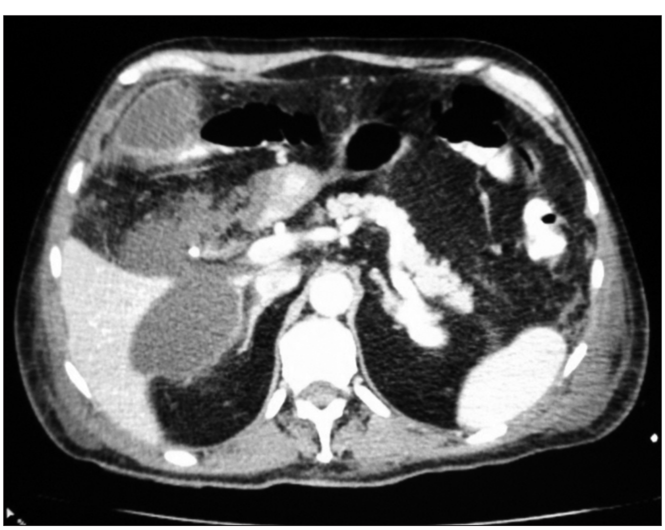

Fig. 3. Fluid collection under the liver.

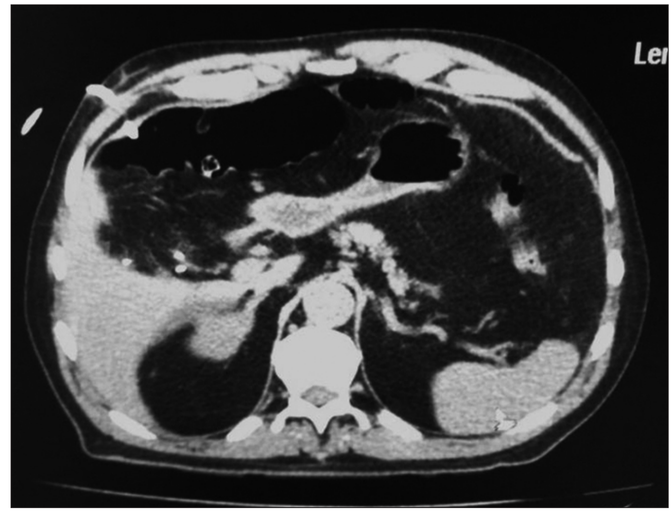

Fig. 4. Percutaneous drainage under going under the liver.

Fig. 5. Drainage in the Douglas pouch.

and in the Doulgas pouch (Fig. 4, 5). A total of 2,000 mL of bile is evacuated through the drainages.

One week after the drainage the patient clinical status is going well and all the catheters dry off except for the subhepatic drainage which presents an output of 60 to 80 mL per day of bile. A magnetic resonance cholangiography is performed in order to detect the site of the leakage (Fig. 6) but no evidence of leakage is detected in this study.

The patient continues with a daily output of 60 to 80 mL of bile and no sign of decrease is detected. Fistulography is performed but no connection with the bile ducts is evidenced, thus the patient underwent to an endoscopic retrograde cholangiopancreatography (ERCP). During the procedure an early leakage of the cystic duct is detected (Fig. 7) so a papillotomy and plastic stent placement is performed (Fig. 8), in order to reduce the pressure in the bile ducts and to stop the bile flow through the remnant cystic duct.

Forty-eight hours later the drainage output not only was not reduced as one would expect, but increased, presenting a daily output of 100 to 120 mL. Giving this scenario and suspecting an incomplete biliary tree in the ERCP (the right posterior branch

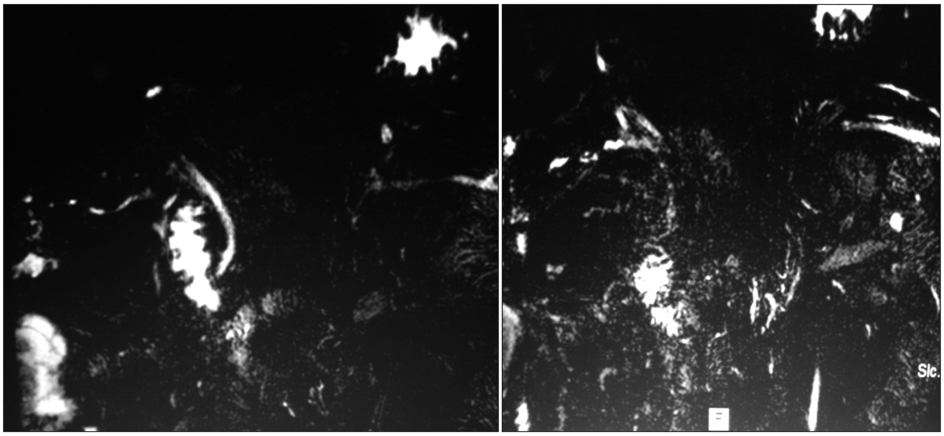

Fig. 6. Magnetic resonance cholangiography showing no evidence of bile injury or leakage.

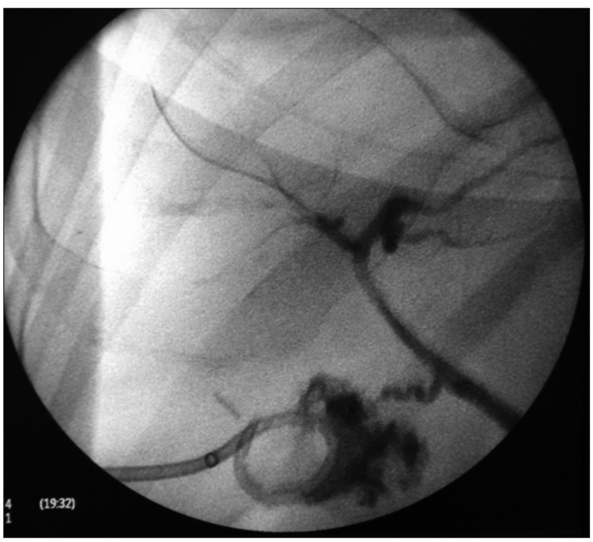

Fig. 7. Early leakage of the cystic duct flowing to the percutaneous drainage.

Fig. 8. Plastic stent placement.

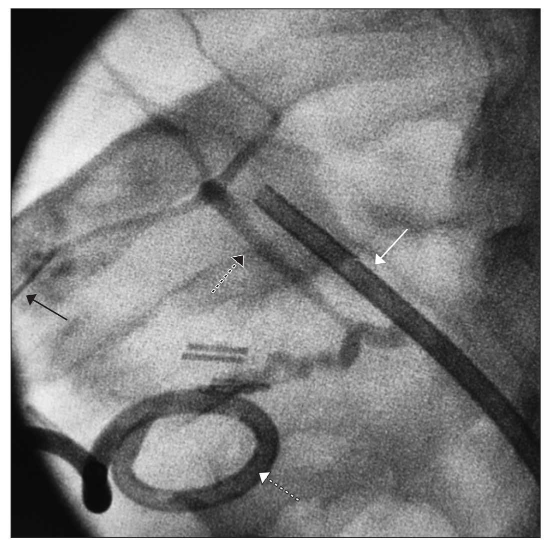

Fig. 9. Cholangiography showing the communication of the right posterior branch with the cystic duct. Solid black arrow, Chiba needle; solid white arrow, plastic stent; dotted black arrow, right posterior branch; dotted white arrow, percutaneous drainage.

is not visible) it is decided to perform percutaneous transhepatic cholangiography (PTHC). With a 22 G Chiba needle, the right posterior biliary branch is punctured and an anatomical variation is detected, where the right posterior biliary branch is draining in the cystic duct, thus causing hypertension in the cystic duct and blowing the surgical clips of the cholecystectomy. In the other hand, the plastic biliary stent is blocking the drainage to the common bile duct (CBD), thereby increasing the leakage (Fig. 9).

After detecting this situation it is decided to remove the endoscopic plastic stent. And now, with only the papillotomy, the pressure in the bile ducts decrease facilitating the flow to the CBD instead of flowing to the percutaneous drainage. Four days after the stent removal, the output of the percutaneous catheter dry off and it is removed. The patient is discharged with no further complications.

Discussion

In case of any deviation of a normal surgical post operatory, a biliary leakage must be suspected. Due to the significant postoperative biliary duct injuries that can occur in the laparoscopic cholecystectomy, surgeons nowadays must be trained in different diagnosis and treatment methods. Once the leak is confirmed with the imaging methods, every tool must be applied in order to control the leak. And finally, with the site of leakage detected and controlled, and with the patient in a stable clinical status, the next step must be the definitive surgery when needed.

Regarding to the diagnosis methods, one must prioritize the non-invasive methods: US, CT-scan, magnetic resonance imaging (MRI) and fistulography through abdominal drainages. And the invasive methods like ERCP and PTHC must be relegated to the therapeutic stage or when the previous methods couldn't arrive to the diagnosis. In the therapeutic stage, the ERCP and PTHC allow us to place an endoscopic plastic stent or percutaneous biliary drainage to treat the leak.

The US is often the initial imaging modality due to the lack of invasion, the cheap cost, and being accessible. It can show from anechoic, well-circumscribed collections to complex fluid with multiple fine internal septa.[7] Although the US is useful, further imaging is often necessary to confirm the diagnosis.

The CT-scan can be the next step, where we could find free fluid or bilomas which are typically demonstrate like sharply demarcated masses with clear margins. Additionally, CT-scan can detect vascular lesions which are many times associated with the biliary lesion. However, usually CT-scan cannot be used to diagnose the site of the leaking and here is where the MRI becomes relevant.

The MRI, besides of diagnose the possible free fluid and the collections, can detect the site of the leak and show us the biliary anatomy with the magnetic resonance cholangiopancreatography (MRCP). Specifically, thin-slab MRCP sequences may show the point of communication between the fluid collection and bile ducts. Thin-slab MRCP sequences are also helpful in depicting the detailed anatomy of the biliary tree and in detecting accessory biliary ducts, which could potentially be the source of the bile leak.[8,9]

Finally a simple and cheap study that one could perform to localize the leak, is the fistulography. By instilling contrast through the drainage with radioscopy it is possible to visualize the site from where the bile is coming and it's relation with the biliary tree.

Once the diagnosis is done, the surgeon has three main minimal invasive tools to treat the leak: image guided drainage of fluid and collections, PTHC with percutaneous biliary drainage and ERCP with papillotomy or stent placement.

The image guided drainage is usually performed utilizing a 16- to 22-gauge needle with Seldinger technique, under CT or US guidance. Given the lack of radiation exposure, portability, flexibility to angle the probe and real time imaging capability, US is considered the preferred modality to guide diagnostic aspiration and drain placement. Although some collections due to localization or bone or air interposition may require CT guidance. Even though the precise position of the catheter in an isolated biloma is crucial, in an active bile leak, the catheter should be placed in close proximity to the site of the leak.[10,11]

Many leaks solve just with the percutaneous drainage, but many others require further treatment. When the problem resides in the cystic duct or is just a small leak of the CBD or an intrahepatic biliary branch due to an incomplete section, an ERCP with papillotomy and stent placement can reduce the pressure in the CBD to favor the drainage to the duodenum instead of draining through the leak, and finally seal the leak.

On the other hand, when a complete section of the CBD or a biliary branch is present, a percutaneous transhepatic biliary drainage is needed in order to control the leak since the endoscopy cannot reach that level. Subsequently, a surgery will be needed in order to repair the site of the leak, like a hepaticjejunostomy.

Conflicts of Interest

No potential conflict of interest relevant to this article was reported.

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