Case 10384

Spectrum of complications following biliary stent positioning
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Section: Abdominal imaging
Area of Interest: Biliary Tract / Gallbladder Arteries / Aorta Liver
Procedure: Cholangiography
Procedure: Instrumentation
Procedure: Drainage
Procedure: Complications
Imaging Technique: CT
Imaging Technique: MR
Special Focus: Obstruction / Occlusion Obstetrics Prostheses Abscess Haemorrhage Case Type: Clinical Cases
Authors: Tonolini Massimo
Patient: 37 years, male

Clinical History:

Man with previous Bismuth type-II iatrogenic bile duct injury (Fig. 1) following laparoscopic cholecystectomy 10 months earlier, needing immediate reintervention to remove surgical clips and position temporary plastic biliary stent (subsequently removed).
He suffered abdominal pain, vomiting, and hypotension 24 hours after endoscopic positioning of covered metallic biliary stent (Fig. 2).

Imaging Findings:

MDCT (Fig. 3a, b) showed extensive hyperattenuating subcapsular haematoma compressing the liver, plus abundant peritoneal effusion. The next day, progressive blood loss and increasing hepatic haematoma at repeated MDCT (Fig. 3c-e) dictated immediate surgical evacuation (Fig. 3f, g).
One month after hospital discharge, the patient was rushed to emergency department with worsening right-sided thoraco-abdominal pain and fever over a week. Urgent MDCT (Fig.4a-g) showed pleural effusion, lung atelectasis, and a huge, predominantly fluid-attenuating (15 Hounsfield Units) subphrenic collection with inflammatory enhancement of the surrounding, compressed liver parenchyma, thin rim-like enhancement, consistent with an abscess. Percutaneous drainage (Fig. 4h..j) yielded 3 liters of stinking pus.
Clinical, laboratory, and imaging (Fig. 5a..c) resolution was obtained. During endoscopic replacement, the biliary stent was not found anymore (Fig. 5d), displaced and probably lost with stools. Contrast (Fig. 5e) and MR cholangiography (Fig. 5f) confirmed persistent iatrogenic biliary stricture with reduced upstream dilatation. Further endoscopic treatment was deemed contraindicated, but the patient refuses proposed surgical revision.

Discussion:

Biliary endoprostheses (stents) are widely employed to manage obstructive jaundice from benign and neoplastic causes. Currently, most nonmalignant biliary strictures result from iatrogenic duct injury during surgical procedures (mostly laparoscopic cholecystectomy), alternatively from anastomotic fibrosis (in patients with biliary-enteric
anastomosis or liver transplantation), rarely from sclerosing cholangitis or chronic pancreatitis. Treatment relieves symptoms and signs of cholestasis, prevents superimposition of infectious cholangitis and of secondary biliary cirrhosis [1-3].

Endoscopic positioning of plastic or self-expandable metal stents is an appealing, minimally invasive treatment for biliary strictures. Alternatively, stenting may be performed through a percutaneous transhepatic or combined approach. Technical and clinical success rates reach 99% and 80% respectively. Clinical effectiveness is generally lower (55-82%) with percutaneous positioning. However, biliary stenting is associated with a significant (39.5%) risk of complications. By far, the commonest complication (25-35% of patients) is stent obstruction, with reported patency rates of 38% and 25% at 2 and 3 years respectively, without significant differences between underlying causes [1-4].

Less common complications include stent misplacement or dislodgement (4-6% of patients), infection (variably presenting as cholangitis, liver abscess and/or sepsis), haemobilia, perforation, stent fracture or collapse [4-6]. As this case with serial occurrences exemplifies, imaging (particularly with multidetector CT in an emergency setting) is necessary to recognize stent-related complications. Complemented with multiplanar reformations, CT provides high-resolution visualization of the stent, whether of plastic or metallic reticular “mesh” material, of the biliary segment where it is located, and of its anatomical relationships. Interpretation of post-procedural studies should review stent type, integrity, patency, and position including proximal and distal extremities. Furthermore, the presence of abnormal findings such as blood, gas, or fluid collections should be noted, as well as signs of inflammatory enhancement or active bleeding [5, 6].

Occurring after a variable time interval, displacement of a biliary stent may be proximal, particularly in patients with malignant obstruction, or alternatively distal to the intestine, that is not unusually asymptomatic. Suggested by clinical and laboratory findings, superinfection may cause septic cholangitis (with thickened enhancing ductal walls), or formation of liver abscess, appearing as a fluid-like collection with peripheral enhancement. Finally, the rare subcapsular or intraparenchymal liver haematoma is recognized by its characteristic unenhanced hyperattenuation [5, 6].

In conclusion, awareness of the wide spectrum of possible complications following bile stent positioning is necessary to correctly interpret early and delayed post-procedural imaging studies, to detect correctable complications, thus sparing patients additional morbidity and mortality [6].

**Differential Diagnosis List:** Multiple complications following biliary stenting including liver haematoma, abscess, displacement, Cholangitis, Acute cholecystitis, Acute pancreatitis, Haemobilia, Haemoperitoneum, Duodenal perforation

**Final Diagnosis:** Multiple complications following biliary stenting including liver haematoma, abscess, displacement

**References:**


**Description:** Coronal Minimum Intensity Projection image from multidetector CT (MDCT) shows moderate intrahepatic duct dilatation in both lobes, and a sizeable non-haemorrhagic collection in the gallbladder fossa. **Origin:** Tonolini M, Radiology Department, “Luigi Sacco” University Hospital – Milan (Italy)
**Description:** Coronal MPR reformation from contrast-enhanced MDCT shows abrupt termination of common hepatic duct (arrowhead), metallic clips (two of them surgically removed afterwards), and sizeable non-haemorrhagic gallbladder fossa collection. **Origin:** Tonolini M, Radiology Department, “Luigi Sacco” University Hospital – Milan (Italy)
Description: Coronal T2-weighted MR image confirms moderate dilatation of intrahepatic ducts and common bile duct, and sizeable non-haemorrhagic gallbladder fossa collection. Origin: Tonolini M, Radiology Department, “Luigi Sacco” University Hospital – Milan (Italy)
Description: MR cholangiopancreatography images confirm moderately dilated intrahepatic ducts; 1.5-cm long common hepatic duct stump with 7-mm calibre and abrupt termination consistent with Bismuth type II injury; normal-calibre choledochus caudally to the ductal discontinuity. Origin: Tonolini M, Radiology Department, "Luigi Sacco" University Hospital – Milan (Italy)
Description: MR cholangiopancreatography images confirm moderately dilated intrahepatic ducts; 1.5-cm long common hepatic duct stump with 7-mm calibre and abrupt termination consistent with Bismuth type II injury; normal-calibre choledochus caudally to the ductal discontinuity. Origin: Tonolini M, Radiology Department, "Luigi Sacco" University Hospital – Milan (Italy)
Description: After 5 months without biliary stenting, contrast injection during ERCP shows persistent short stricture (arrowhead) of the common bile duct, causing discrete upstream dilatation. Origin: Tonolini M, Radiology Department, “Luigi Sacco” University Hospital – Milan (Italy)
Description: A 8-cm long covered metallic endoprosthesis with characteristic radio-opaque reticular "mesh" appearance is positioned endoscopically, to obtain long-term stricture treatment. Origin: Tonolini M, Radiology Department, “Luigi Sacco” University Hospital – Milan (Italy)
Figure 3

Description: 24 hours after interventional ERCP, unenhanced (a) and post-contrast (b) MDCT acquisitions show appearance of a large hyperattenuating subcapsular haematoma (*) compressing the liver parenchyma, plus fluid-attenuation peritoneal effusion. Origin: Tonolini M, Radiology Department, “Luigi Sacco” University Hospital – Milan (Italy)
Description: 24 hours after interventional ERCP, unenhanced (a) and post-contrast (b) MDCT acquisitions show appearance of a large hyperattenuating subcapsular haematoma (*) compressing the liver parenchyma, plus fluid-attenuation peritoneal effusion. Origin: Tonolini M, Radiology Department, "Luigi Sacco" University Hospital – Milan (Italy)
Description: Follow-up unenhanced (c) and post-contrast (d-f) MDCT on the next day showed increasing size of subcapsular hepatic haematoma (*), causing severe compression of the liver. Note biliary stent in place (arrows). Origin: Tonolini M, Radiology Department, "Luigi Sacco" University Hospital – Milan (Italy)
Follow-up unenhanced (c) and post-contrast (d-f) MDCT on the next day showed increasing size of subcapsular hepatic haematoma (*), causing severe compression of the liver. Note biliary stent in place (arrows). **Origin:** Tonolini M, Radiology Department, “Luigi Sacco” University Hospital – Milan (Italy)
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Description: Further contrast-enhanced MDCT (f.g) document postoperative status (*) after surgical evacuation of subcapsular liver haematoma. Note disappearance of ascites. Drainage tube left in place (thin arrow). Origin: Tonolini M, Radiology Department, “Luigi Sacco" University Hospital – Milan (Italy)
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Figure 4

Description: One month after hospital discharge, unenhanced (a) and contrast-enhanced (c..g) images from emergency MDCT show appearance of a huge predominantly fluid-attenuating liver collection (*).

Origin: Tonolini M, Radiology Department, “Luigi Sacco” University Hospital – Milan (Italy)
Description: On arterial-phase images including coronal reformations (b..d) the entire size of the collection is shown. Note adjacent, compressed liver parenchyma showing inflammatory hyper-enhancement (+). Origin: Tonolini M, Radiology Department, “Luigi Sacco” University Hospital – Milan (Italy)
Description: On arterial-phase images including coronal reformations (b..d) the fluid-like liver collection (*) is shown in its entire size and mass effect. Note adjacent, compressed liver parenchyma showing inflammatory hyper-enhancement (+). **Origin:** Tonolini M, Radiology Department, "Luigi Sacco" University Hospital – Milan (Italy)
Description: On arterial-phase images including coronal reformations (b..d) the fluid-like liver collection (*) is shown in its entire size and mass effect. Note coexistent right lung basal atelectasis and pleural effusion. Origin: Tonolini M, Radiology Department, "Luigi Sacco" University Hospital – Milan (Italy)
**Description:** Note coexistent right lung basal atelectasis and pleural effusion. **Origin:** Tonolini M, Radiology Department, “Luigi Sacco” University Hospital – Milan (Italy)
Description: On venous phase images (f,g) the huge liver collection (*) does not enhance with the exception of a thin peripheral rim. **Origin:** Tonolini M, Radiology Department, "Luigi Sacco" University Hospital – Milan (Italy)
Description: On venous phase images (f, g) the huge liver collection (*) does not enhance with the exception of a thin peripheral rim. Note liver parenchyma compression, and metallic biliary stent in place (arrowhead). Origin: Tonolini M, Radiology Department, “Luigi Sacco” University Hospital – Milan (Italy)
Description: Unenhanced MDCT images (h.,j) show postprocedural status following percutaneous drainage of huge abscess cavity (3 litres of pus). Tube still in place (arrowhead). Origin: Tonolini M, Radiology Department, “Luigi Sacco” University Hospital – Milan (Italy)
Description: Unenhanced MDCT images (h..j) show postprocedural status following percutaneous drainage of huge abscess cavity (3 litres of pus). Tube still in place (arrowhead). Origin: Tonolini M, Radiology Department, “Luigi Sacco” University Hospital – Milan (Italy)
Description: Axial (a) and coronal reformatted (b,c) MDCT images show resolution of huge liver abscess (*) after drainage tube removal. Metallic biliary stent still in place (arrowhead). Origin: Tonolini M, Radiology Department, "Luigi Sacco" University Hospital – Milan (Italy)
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Description: During ERCP (planned for stent replacement) the metallic stent was not visible anymore in the abdomen, indicating its displacement and probable loss with stools. Origin: Tonolini M, Radiology Department, “Luigi Sacco” University Hospital – Milan (Italy)
Description: Contrast injection during ERCP after stent loss confirms persistent short stricture of the common bile duct (arrowhead). Origin: Tonolini M, Radiology Department, “Luigi Sacco” University Hospital – Milan (Italy)
Description: Finally, MR cholangiopancreatography shows T1 (f) and T2 (g,h) low signal intensity in the site of previously drained haematoma and liver abscess (*), indicating fibrosis. Origin: Tonolini M, Radiology Department, “Luigi Sacco” University Hospital – Milan (Italy)
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Description: Finally, MR cholangiopancreatography shows persistent short stricture of the common bile duct (arrowhead) with reduced upstream dilatation. Origin: Tonolini M, Radiology Department, “Luigi Sacco” University Hospital – Milan (Italy)