Biliary peritonitis due to fistulous tract rupture following a T-tube removal

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Abstract

We present a patient with biliary peritonitis following a T-tube removal. The patient underwent laparotomy; a rupture of the fistulous tract around the T-tube was found. A Nelaton catheter was inserted through this opening and advanced toward the biliary tree and secured in place by a suture ligature. Postoperative course was uneventful.

In the pre-endoscopic retrograde cholangiopancreatography (ERCP)/laparoscopic cholecystectomy (LC) era, open common-bile-duct exploration (CBDE) was a relatively common operation, performed mainly for the management of choledocholithiasis. At that time, approximately one in five operations for gallstone disease involved open CBDE.1 Nowadays, open CBDE is rarely performed. The new generation of surgeons may become unfamiliar with some technical details of the management of T-tubes and related complications. We report a case of biliary peritonitis due to a T-tube fistulous tract fracture occurred at the time of T-tube removal. Relevant diagnostic and therapeutic problems are discussed and the literature is briefly reviewed.

Case report

A 62-year-old woman was presented with the diagnosis of gallstone disease. She had a history of acute cholecystitis 1½ months prior to surgery. The patient underwent LC. During LC, the common bile duct (CBD) was accidentally opened. LC was converted to open cholecystectomy and a T-tube was inserted into the CBD through its opening. Postoperative course was uneventful.

At postoperative day 11, a T-tube cholangiography was performed and was normal. On postoperative day 12, the T-tube was removed. Immediately after the T-tube removal, the patient complained of severe abdominal pain. The abdomen was tender on palpation. Abdominal ultrasonography (US) showed the presence of free fluid within the abdomen. The patient was reoperated with the presumed diagnosis of biliary peritonitis.

At surgery, a fractured, curved fistulous tract was found, which caused the bile leak. A Nelaton catheter was inserted into the fistulous tract and advanced toward the CBD. A suture-ligature secured the Nelaton catheter around the mature fistulous tract to prevent further leakage of bile around the Nelaton catheter. A Penrose drain was placed adjacent to the fractured fistulous tract. Postoperative course was uneventful. The Nelaton catheter and the Penrose drain were removed on postoperative days 7 and 9, respectively. The patient is currently well, 7 years after surgery.
Discussion

Bile leakage after T-tube withdrawal is generally regarded as an exceedingly rare complication. The potential problems associated with the use of T-tubes are not well known to junior surgeons, mainly due to the rarity of CBDE in the era of LC/ERCP. Therefore, some technical details should be emphasised to avoid this complication, which may be associated with a significant morbidity and even mortality:

- The T-tube should have a direct course from the point of entry into the CBD to the abdominal wall. A curved course may result in a fracture of the fistulous tract at the time of T-tube removal, due to the stress on a part of its wall. This could be an aetiologic factor in our patient.

- The T-tube should remain for a time sufficient for the formation of a mature fistulous tract around it. Early (i.e. accidental) removal of the T-tube will be associated with a high incidence of biliary leakage. Generally, maturation of the fistulous tract occurs 7–10 days after the insertion of the T-tube. Ellis recommended that the T-tube should be removed on postoperative day 10, provided that cholangiographic findings are normal. In our clinical practice, we remove the T-tube on postoperative day 12. The maturation of the fistulous tract is impaired and delayed in some clinical situations, such as in patients receiving corticosteroids or immunosuppression, etc. Due to immunosuppression, the liver transplant patient with a choledochocholedochostomy has a 4–20% incidence of symptomatic bile leak after T-tube removal. In these cases, the T-tube should remain for a longer period to allow the maturation of the fistulous tract to occur.

- The material of the T-tube may influence the formation of reactive tissue around it. In the past, PVC (polyvinyl chloride) T-tubes had been associated with a higher incidence of bile peritonitis following their removal (up to 4%). The same group reported more than 2000 CBDE without this complication by using latex-rubber T-tubes; they postulated that PVC T-tubes were less irritant than latex-rubber (which are currently preferred), resulting in failure to form a walled-off track. Furthermore, the PVC T-tube hardens on contact with bile, and so its removal is more likely to damage the CBD.

- The T-tube cross-arm should fit loosely in the CBD, but the stem should be of a good calibre. This combination can best be achieved by cutting a gutter out of the cross-arm. Also, the trauma of T-tube removal can be reduced by cutting V-shaped sections out of the cross-arm, opposite to its attachment to the stem (Figures 1 [A and B] and Figure 2 [A and B]).

- Before T-tube removal, an obstructing lesion in the CBD (such as a retained stone) should be excluded by cholangiography to avoid increased pressures within the biliary tree, predisposing to the development of biliary leak. The T-tube cholangiography should be reviewed by the surgical team and—if there is no evidence for distal obstruction or retained gallstones—then the T-tube should be removed by a member of the team.
Figure 1 (A and B). The T-tube cross-arm should fit loosely in the CBD, but the stem should be of a good calibre. This can be achieved by cutting a gutter out of the cross-arm.
Figure 2 (A and B). The trauma of the CBD during the T-tube removal can be reduced by cutting V-shaped sections out of the cross-arm, opposite to its attachment to the stem.
This complication may have different clinical presentations. Bile ascites or peritonitis, necessitating laparotomy (approximately 75% of patients), or localised biloma, which can be managed conservatively with or without ultrasonography (US)/computed tomography (CT)-guided drainage (25% of patients), are the most common presentations. Diagnosis is usually easy. The main symptom is pain almost immediately after T-tube withdrawal. Modern imaging methods (US/CT) confirm the diagnosis (presence of free or localised fluid collection/s). ERCP may be used to precisely identify the location of the leak.

Effective drainage of leaked bile and appropriate control of the leak are the aims of treatment. Open laparotomy may be required for the drainage of leaked bile (in patients with biliary peritonitis or ascites) or—in localised biliary collection/s—by percutaneous US/CT-guided drainage. Small collections of bile may be well tolerated and may remain asymptomatic. During laparotomy, the safest surgical approach is the introduction of a Nelaton catheter into the ruptured fistulous tract through its opening and the advancement of the catheter toward the biliary tree; to achieve tightness, the catheter should be secured in place with a suture-ligature tied around it and the fistulous tract. If a catheter cannot be advanced safely along the fistula tract, then a large tube drain should be positioned adjacent to the site of tract rupture.

If laparotomy may be avoided (see above), bile leak may be controlled by using minimally invasive procedures (including laparoscopy). Obviously, this approach should be confined to surgical centres having the appropriate expertise and the necessary technical facilities. During ERCP, a nasobiliary stent, internal stent, or an endoscopic sphincterotomy may be used therapeutically. Another minimally invasive approach is the introduction—under fluoroscopic control—of a guidewire into the fistulous tract, followed by the advancement of another drain into the fistulous tract.

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