The subvesical duct of Luschka — a source of bile leakage following gallbladder removal

Ian C Duncan
FFRad(D)SA
Basil J Sher
FCRad(D)SA

Sunninghill Medical Institute
Sandton

Abstract

We describe a case of bile leakage following laparoscopic cholecystectomy further complicated by iatrogenic central bile duct obstruction. The site of leakage was identified not from the site of the inadvertent proper hepatic duct ligation but from a damaged aberrant subvesical duct communicating with the gallbladder fossa. The anatomy of these subvesical ducts is explained as is their surgical importance with relation to the aetiology of bile leaks after cholecystectomy.

Introduction

Bile leaks are recognised complications following cholecystectomy or other hepatobiliary surgery. They can result from direct trauma to a duct or from an anastomotic or cystic duct remnant leakage. The presence of an aberrant bile duct leak may make the radiological detection of the presence and site of the leakage more difficult.[1] One such example involves the subvesical duct of Luschka.

Case report

A 30-year-old woman presented 1 week after laparoscopic cholecystectomy with jaundice, upper abdominal pain and abdominal distension. A provisional diagnosis of bile duct injury was made. Abdominal ultrasonography showed fluid in the gallbladder fossa and subhepatic space (Fig. 1) and a large volume of free intraperitoneal fluid. The intrahepatic bile ducts were not dilated.

An abdominal MR scan was performed which again showed the fluid in the gallbladder fossa and peritoneal cavity (Fig. 2). A MR cholangiogram was attempted to try and show continuity between the right and left main hepatic bile ducts and although the proper hepatic duct was shown to be occluded, no definite answer could be given concerning the existence of free communication between the right and left hepatic ducts or about the site of the bile leakage (Fig. 3).

Fig. 1. Axial upper abdominal ultrasound scan showing fluid in the gallbladder fossa and no dilation of the intrahepatic bile ducts.

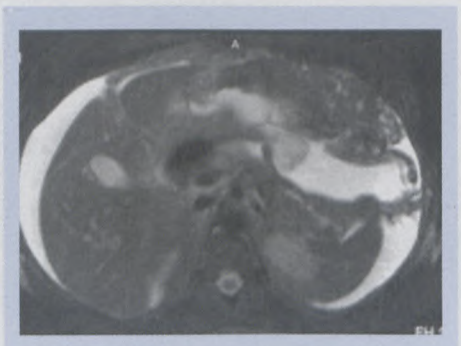

Fig. 2. Axial T2 MR scan through the lower liver again shows fluid in the gallbladder fossa as well as the large volume of free intraperitoneal fluid particularly around the right hepatic lobe.

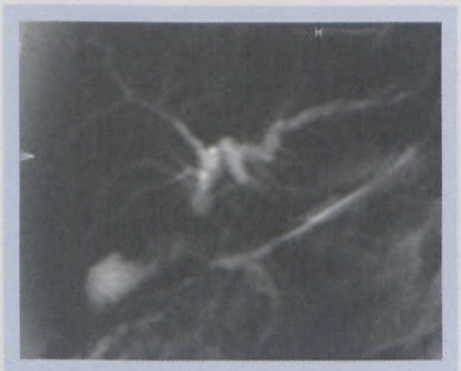

Fig. 3. MR cholangiogram showing the gallbladder fossa and free fluid in the subhepatic space. Although the intrahepatic ducts are seen, continuity between the hepatic ducts across the confluence cannot be confirmed. The proper hepatic duct is not visualised.

These studies were followed by percutaneous transhepatic cholangiography (PTC). This was performed from a left sided approach due to the large volume of perihepatic free fluid around the right lobe, also preempting possible conversion of the

procedure into a percutaneous drain insertion. During the contrast injection leakage of contrast from a duct-like structure communicating with the anterio-inferior segmental duct (segment 5) and running inferiorly towards the gallbladder fossa was noted (Fig. 4). The contrast accumulated progressively in the gallbladder fossa and subhepatic space (Fig. 5). This aberrant duct was identified as the subvesical duct of Luschka. Also identified was total occlusion of the proper hepatic duct at the confluence of the right and left hepatic ducts but with free communication between the two ducts. A surgical clip was seen at the level of the obstruction confirming an iatrogenic injury. No contrast leak was seen from the site of this obstruction.

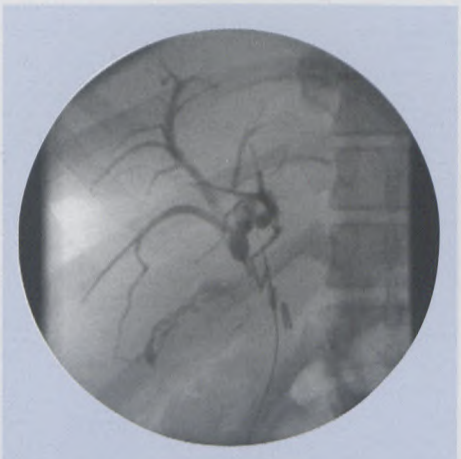

Fig. 4. Percutaneous transhepatic cholangiogram showing leakage of contrast via the damaged subvesical duct of Luschka communicating between the anterioinferior segmental duct and the gallbladder fossa.

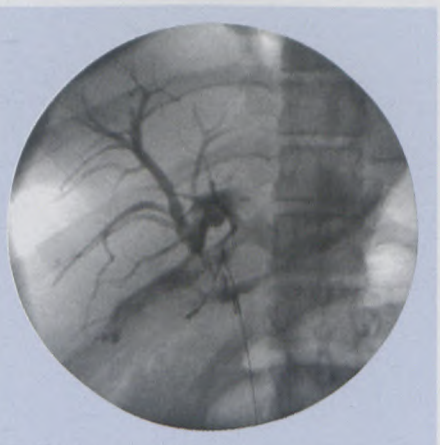

Fig. 5. Further contrast injection confirms communication between the right and left hepatic ducts with obstruction at the duct confluence. The presence of a clip at this point indicates inadvertent surgical ligation. There is further accumulation of contrast in the subhepatic space.

An external drain was placed into the hepatic duct system via a second more peripheral left-sided access. Two days later a choledochojejunostomy was performed by anastomosing a Roux loop to the bile duct confluence. The opening at the subvesical duct was also oversewn at the same time so as to avoid further bile leakage.

Discussion

There are a large number of congenital variants of the intrahepatic and extrahepatic bile ducts[2-4] all of which are related to the complex embryological development of the biliary tree. They are seen in up to 42 - 47% of cases.

Anomalous or aberrant bile ducts are seen in around 28% of cases.[2] These ducts are often erroneously referred to as 'accessory' ducts. However they provide the sole path of bile drainage from normal areas of the liver with which they are associated and are more correctly termed 'anomalous' or 'aberrant' ducts.

The cholecystohepatic or subvesical duct is a small aberrant intrahepatic duct that runs close to the wall of the gallbladder just below the surface of the liver in the gallbladder fossa. The original description of this duct was by Luschka and it is thus often referred to as 'Luschka's duct'. Occasionally the subvesical duct may extend into the wall of the gallbladder, but almost never communicates with the gallbladder lumen (although it probably did during embryological development). It is present in between 15% and 35% of cases.[2,3] These ducts drain an area of the inferior right lobe in the vicinity of the gallbladder fossa usually into a segmental tributary of the right hepatic duct, less commonly into the right hepatic duct itself or more rarely into the cystic or common hepatic ducts. These ducts are small, being 1 - 2 mm in diameter and are typically not accompanied by a portal venous branch. They are usually not seen at cholangiography, particularly MR cholangiography. The greatest clinical significance attached to the presence of these ducts is that they may be damaged during cholecystectomy, whether open or laparoscopic, as the gallbladder is dissected away from its bed.[1,4] This can then result in a bile leak into the gallbladder bed and subhepatic space. This leak is often limited in extent but many result in the leakage of a considerable volume of bile, as in our case.

Postoperative bile leaks can occur due to direct duct trauma at a number of sites other than the subvesical duct often related to the presence of other aberrant bile duct variations.[1] Leaks can also occur from a hepaticojejunal anastomosis, common bile duct-to-common bile duct anastomosis, hepatic resection site or leakage from a ligated cystic duct remnant.

Postoperative bile leaks, regardless of their site, usually respond well to bile drainage. This can be done internally by placement of a bile duct stent or externally by percutaneous transhepatic biliary drainage.[5]

Radiologists involved in the investigation of bile leakage following cholecystectomy should therefore be aware of the presence of the subvesical

duct as potential source of bile leakage into the gallbladder fossa. The preferred method of investigation is percutaneous transhepatic cholangiography, particularly as this can then be followed immediately by percutaneous biliary drain insertion to allow external bile diversion thereby facilitating closure of the leak.

References

1. Suhocki PV, Meyers WC. Injury to aberrant bile ducts during cholecystectomy: A common cause of diagnostic error and treatment delay. *AJR* 1999; **172:** 955-959.
2. Healey JE, Schroy PC. Anatomy of the biliary ducts within the human liver: Analysis of the prevailing patterns of branchings and the major variations of the biliary ducts. *Arch Surg* 1953; **66:** 599-616.
3. Hayes MA, Goldenberg IS, Bishop CC. The development basis for bile duct anomalies. *Surg Gynaecol Obstet* 1958; **107:** 447-456.
4. Goor DA, Ebert PA. Anomalies of the biliary tree. *Arch Surg* 1972; **104:** 302-309.
5. Ernest O, Sergent G, Mizrahi D, Delemazure O, L'Hermine C. Biliary leaks: Treatment by means of percutaneous transhepatic biliary drainage. *Radiology* 1999; **211:** 345-348.