Since the introduction of laparoscopic cholecystectomy much attention has been drawn to the occurrence of iatrogenic injuries to the major bile ducts during this procedure. Less well described are iatrogenic injuries to the hepatic or cystic arteries, which can occur in isolation or in association with bile-duct injuries. In this report we describe an unusual vascular injury that was associated with trauma to the common hepatic duct. The arterial injury caused massive gastrointestinal bleeding several weeks after the patient’s initial hospital discharge.

**CASE REPORT**

A 49-year-old woman underwent elective laparoscopic cholecystectomy for symptomatic cholelithiasis. Review of the operative report indicated that dissection of the hepatocystic triangle had been carried out bluntly without electocautery. The dissection had been difficult because of fibrosis in the triangle, and a small transverse tear in the common hepatic duct had been created and recognized. The cystic artery was described as crossing the triangle in the usual position, and it had been clipped and divided. No mention was made of intraoperative hemorrhage. The cystic duct had been identified and divided, and after re-
moval of the gallbladder, the tear in the common hepatic duct was managed by enlarging the hepatocochotom y and inserting a 10-French T tube. The tube was sutured into the duct, and the procedure was considered satisfactory on a postinsertion T-tube cholangiogram. The tube was removed 2 weeks postoperatively after another satisfactory cholangiogram had been obtained.

One week later she was admitted to a second hospital with acute, severe upper abdominal pain followed by massive hematemesis and melena. She was hemodynamically unstable and required 4 units of packed red blood cells and urgent operation. At surgery, copious bleeding from the area of the porta hepatitis was seen. This was controlled by a Pringle manoeuvre and a single absorbable pin-stitch placed in what was believed to be a small lateral defect in the proper hepatic artery. Arterial pulsation in the hepatoduodenal ligament was preserved, and a drain was inserted. Postoperatively an external biliary fistula developed through this drain, with loss of 500 mL/d of bile. Three weeks after her second operation she again experienced severe upper abdominal pain, and this was followed by external hemorrhage through the opening of the biliary fistula (which had been extubated by then). She was then transferred to our hospital for further management.

On arrival she was hemodynamically stable and had an obvious external biliary fistula. Small amounts of blood were episodically discharged into the fistula. There was no evidence of systemic infection. A contrast study of the fistula showed filling only of the right and left hepatic ducts, and an endoscopic retrograde cholangiogram demonstrated a very tight stricture of the common hepatic duct extending for 2.5 cm. in length. A selective hepatic arteriogram showed a pseudoaneurysm of the major anterior branch of the right hepatic artery, and there was a surgical clip in close proximity to this abnormality (Fig. 1). No cystic artery was identified on this arteriogram. At operation, after obtaining proximal control of the hepatic artery, the hematoma was evacuated and bleeding points were carefully oversewn with nonabsorbable material. A Roux-en-Y jejunal loop was anastomosed to the hepatic ducts at the level of the bifurcation. Six months after the third operation, biochemical indicators of liver function were normal and biliary drainage was normal, as demonstrated by HIDA scintigraphy.

**DISCUSSION**

Injury to the bile ducts has long been known to be a potential complication of removal of the gallbladder. This has become a particular concern during the laparoscopic era. Much less attention has been paid to vascular damage occurring at cholecystectomy, but in a large referred series of bile-duct injuries, simultaneous vascular injuries had occurred in about 25% of cases, and it was concluded that ductal damage often followed attempts to control bleeding. Most vascular injuries involve the right hepatic artery or cystic artery branches, and injuries to the portal circulation are much less common. Reports of bile-duct injury after laparoscopic cholecystectomy continue to indicate a high frequency of associated vascular damage, particularly to the right hepatic artery. In fact, the combined injury of

**FIG. 1.** Selective hepatic arteriogram demonstrating origin of pseudoaneurysm from injury to major anterior branch of right hepatic artery (upper arrow) and pseudoaneurysm itself (lower arrow) in close proximity to surgical clip.
bile-duct transection with partial excision of the extrahepatic ducts and injury to the right hepatic artery has been considered to be the “classic injury” seen with laparoscopic cholecystectomy.

Probably the most common manifestation of arterial injury during cholecystectomy is intraoperative hemorrhage. In the hepatocystic triangle the right hepatic artery can be misidentified as the cystic artery and damaged; this is most likely to occur with a “looping” vessel travelling nearly parallel to the cystic duct. This anatomic situation is often associated with a very short cystic artery.6,7 Other potential sources of difficulty leading to cystic artery hemorrhage include the presence of a low-lying or “inferior” vessel outside the triangle or the presence of a double artery.6,7 A single cystic artery that bifurcates early can have the same potential for hemorrhage as a double vessel, because ligation of the first branch can be followed by injury to the more posterior one.

Less commonly, arterial injury involves occlusion of the right hepatic artery without intraoperative hemorrhage. Because such an injury may be clinically insignificant, the true incidence is difficult to determine,6 but at least some cases result in hepatic ischemia.7

We believe that the third and least common manifestation of arterial injury is delayed bleeding originating from a pseudoaneurysm. Reports in the literature are in the form of single cases and have described origin from the cystic and hepatic arteries.

Most cases of hemobilia result from parenchymal disorders of the liver, but about 10% are from vascular lesions. These are usually hepatic artery aneurysms,11 and a minority of these are pseudoaneurysms. About half of these aneurysms ultimately decompress into the bile ducts.12 In the case reported here, the rupture occurred through the original common hepatic-duct injury, but decompression into the cystic-duct stump has also been described.1 The precise mechanism of injury in our case remains obscure, because there was no trace of the cystic artery on the arteriogram, but because of the proximity of a surgical clip to the abnormality, we assume that the major anterior branch of the right hepatic artery was either misidentified as the cystic artery or injured in the process of occluding this artery.

Conversion to open cholecystectomy can be required for control of intraoperative hemorrhage, but such an injury does not generally cause diagnostic difficulty. Arterial interruption without hemorrhage is often clinically insignificant, and it is unlikely to come to attention unless there has been a simultaneous bile-duct injury. A pseudoaneurysm of the hepatic or cystic arteries is clearly rare after laparoscopic cholecystectomy, but this diagnosis should be considered in patients who present after an interval with pain and either anemia or gastrointestinal hemorrhage. Ultrasonography, particularly with colour-flow Doppler scanning, can help to identify a pseudoaneurysm in this area,13,14 but generally selective arteriography will be necessary. Transcatheter embolization has been described as definitive treatment, but in our case since repair of the associated duct injury was also required, we decided to obliterate the pseudoaneurysm during an open surgical procedure.

References


