12
Management of Common Bile Duct Stones

12.1 The Evolution of Common Bile Duct (CBD) Stone Removal 172
12.2 The Evolving Role of ERCP in the Era of Laparoscopic Cholecystectomy 175
12.3 Intraoperative Endoscopic Retrograde Cholangiopancreatography (ERCP) 185
12.4 Laparoscopic Management of Common Bile Duct Calculi 191
12.5 Laparoscopic Choledochotomy for Management of Common Bile Duct Stones and Other Common Bile Duct Diseases 197
12.6 Fluoroscopic Transcystic Common Bile Duct Exploration in Laparoscopic Cholecystectomy 205
12.7 Electrohydraulic Lithotripsy of Common Bile Duct Stones 211
12.8 Biliary Laser Lithotripsy 217
12.9 Extracorporeal Shock Wave Lithotripsy in the Management of Common Bile Duct Stones 222
12.10 Radiologic Management of Biliary Stone Disease 227
The Evolution of Common Bile Duct (CBD) Stone Removal

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Courvoisier reported the first successful choledocholithotomy (CL) before the turn of the century.1 A few years later, in 1912, the father of biliary surgery, Hans Kehr, published his landmark textbook based on 2,000 cases including patients with CBD stones. He invented T-tube drainage after surgical exploration of the CBD.2 It is ironic that the great American surgeon, William Halstead, a few years after a cholecystectomy, died of complications from a choledocholithotomy for retained stones. There are four major developments that contributed to improved results in common bile duct surgery:

1. The introduction of operative cholangiography;
2. The use of choledochoscopy;
3. Retrograde endoscopic sphincterotomy (RES);
4. Laparoscopic choledocholithotomy.

The discovery of antibiotics was also a milestone in the successful treatment of infected bile cases, but keeping the scope of this book in mind, I will elaborate only on the above-listed developments.

The Introduction of Operative Cholangiography

Operative cholangiography has a rich history. In 1918, Reich injected a petroleum paste mixed with bismuth in a fistula of a woman who underwent pelvic surgery. To his great surprise, the extrahepatic biliary system became opacified. The patient developed a stormy course (spiking temperature, etc.) after this venture, but the infection subsided and the patient survived the first “cholangiography.”3 In 1922, Tenney and Patterson injected bismuth paste into a fistula that developed after cholecystectomy. They found a stricture of the common hepatic duct. Here, also, the patient developed fever and jaundice after this fistulography. They did exploratory surgery, and a bilioenteric bypass was performed. Unfortunately, the anastomosis leaked and the patient died of biliary peritonitis.4 In 1930, Ginzburg and Benjamin injected Lipiodol into a biliary fistula after cholecystectomy, and the first reported, retained stone in the ampulla was discovered.5 Then in 1932, Mirizzi introduced operative cholangiography:

The bile in the peritoneum observed by surgeons who believe its presence is due to slipping of a ligature, in most cases, is a testimony that there is an anatomical functional lesion of the hepatic or common bile ducts that has not been noticed because of the inaccuracy, deceptiveness, and lack of precision in the methods of exploration used . . . (Mirizzi).6

In the United States, Hicken introduced cholangiography in 1936.7 For the next two to three decades, operative cholangiography remained in the hands of a few enthusiasts. The eternal debate started whether we should do it routinely, selectively, or not at all. In 1958, Mallet-Guy, noticing the shortcomings of portable machines, introduced fluoroscopy. At this stage, it was difficult to switch quickly from fluoroscopy to radiography.8 In 1963, Stefanini built a special operating room where the patient was moved from one tabletop during surgery to an x-ray table in order to perform cine fluoroscopy.9

With better understanding of the surgical environment, we introduced modern radiology (fluorocholangiography) into the operating room in 1978, and collected experience before the laparoscopic cholecystectomy (LC) era in approximately 4,000 cases, with an average of eight films per case.10 The total time required for injection and aimed exposure using a fixed-ceiling C-arm arrangement with image amplification, closed circuit television, and a 100- × 100-mm camera was in the vicinity of three to five minutes. The TV image was also shown in the X-ray Department where a radiologist, at hand through an intercom, could advise the surgeon about his or her opinion of the findings.

The introduction of LC put the use and aim of fluo-