Cholecystectomy

77

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Indications

Symptomatic cholelithiasis, when laparoscopic cholecystectomy is not feasible
Acute cholecystitis, both calculous and acalculous
Chronic acalculous cholecystosis and cholesterosis, when accompanied by symptoms of gallbladder colic
Carcinoma of gallbladder
Trauma
Incidental removal during laparotomy for another indication, either for technical reasons or gallstones
Failed laparoscopic cholecystectomy ("conversion")

Preoperative Preparation

Diagnostic confirmation of gallbladder disease
Perioperative antibiotics
Nasogastric tube for patients with acute cholecystitis or choledocholithiasis

Pitfalls and Danger Points

Injury to bile ducts
Injury to hepatic artery or portal vein
Hemorrhage from cystic or hepatic artery or from liver bed
Injury to duodenum or colon

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Operative Strategy

Anomalies of the Extrahepatic Bile Ducts

Anomalies, major and minor, of the extrahepatic bile ducts are quite common. A surgeon who is not aware of the variational anatomy of these ducts is much more prone to injure them during biliary surgery. The most common anomaly is a right segmental hepatic duct that drains the dorsal caudal segment of the right lobe. This segmental duct may drain into the right hepatic duct, the common hepatic duct (Fig. 77.1a), the cystic duct (Fig. 77.1b), or the common bile duct (CBD) (Fig. 77.1c). Division of this segmental duct may result in a postoperative bile fistula that drains as much as 500 ml of bile per day. Ligation, rather than preservation, is the appropriate management if a small segmental duct is injured.

Important cystic duct anomalies (Fig. 77.2) include the entrance of the cystic duct into the right hepatic duct (Fig. 77.2e), a low entrance of the cystic duct that occasionally joins the CBD rather close to the ampulla (Fig. 77.2c), and a cystic duct that enters the left side of the CBD (Fig. 77.2f).

Another extremely important anomaly of which the surgeon should be aware is the apparent entrance of the right main hepatic duct into the cystic duct. The latter duct, in turn, joins the left hepatic duct to form the CBD, as illustrated in Fig. 77.3. In this case, dividing and ligating the cystic duct at its apparent point of origin early in the operation results in occluding the right hepatic duct. If the technique described in the next section is carefully followed, this accident can be avoided.

Avoiding Injury to the Bile Ducts

Most serious injuries of the bile ducts are not caused by congenital anomalies or unusually severe pathologic

†Deceased

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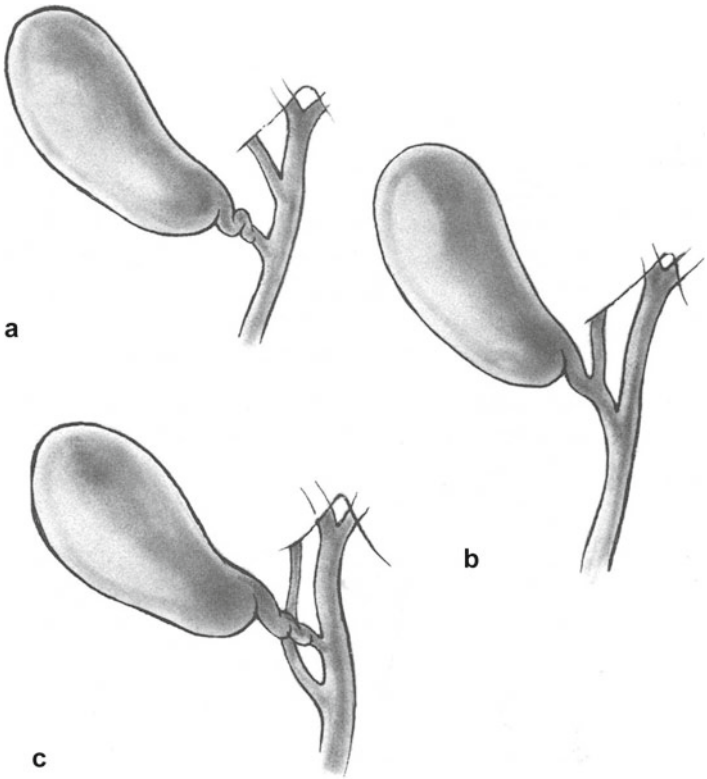

Fig. 77.1 Anomalous segmental right hepatic ducts

changes. In most cases, iatrogenic trauma results because the surgeon who mistakenly ligates and divides the CBD thinks it is the cystic duct. It is important to remember that the diameter of the normal CBD may vary from 2 to 15 mm. It is easy to clamp, divide, and ligate a small CBD as the first step in cholecystectomy under the erroneous impression that it is the cystic duct. The surgeon who makes this mistake must also divide the common hepatic duct before the gallbladder is freed from all its attachments. This leaves a 2- to 4-cm segment of common and hepatic duct attached to the specimen (Fig. 77.4). Because this is the most common cause of serious duct injury, *we never permit the cystic duct to be clamped or divided until the entire gallbladder has been dissected free down to its junction with the cystic duct*. Division of the cystic duct is always the last step in the cholecystectomy. When the back wall of the gallbladder is being dissected away from the liver, it is important carefully to dissect out each structure that may enter the gallbladder from the liver. Generally, there are only a few minor blood vessels that may be divided by sharp dissection and then occluded by electrocoagulation. Any structure that resembles a bile duct must be carefully delineated by sharp dissection. In no case should the surgeon apply a hemostat to a large wad of tissue running from the liver to the gallbladder, as it may contain the common hepatic duct.

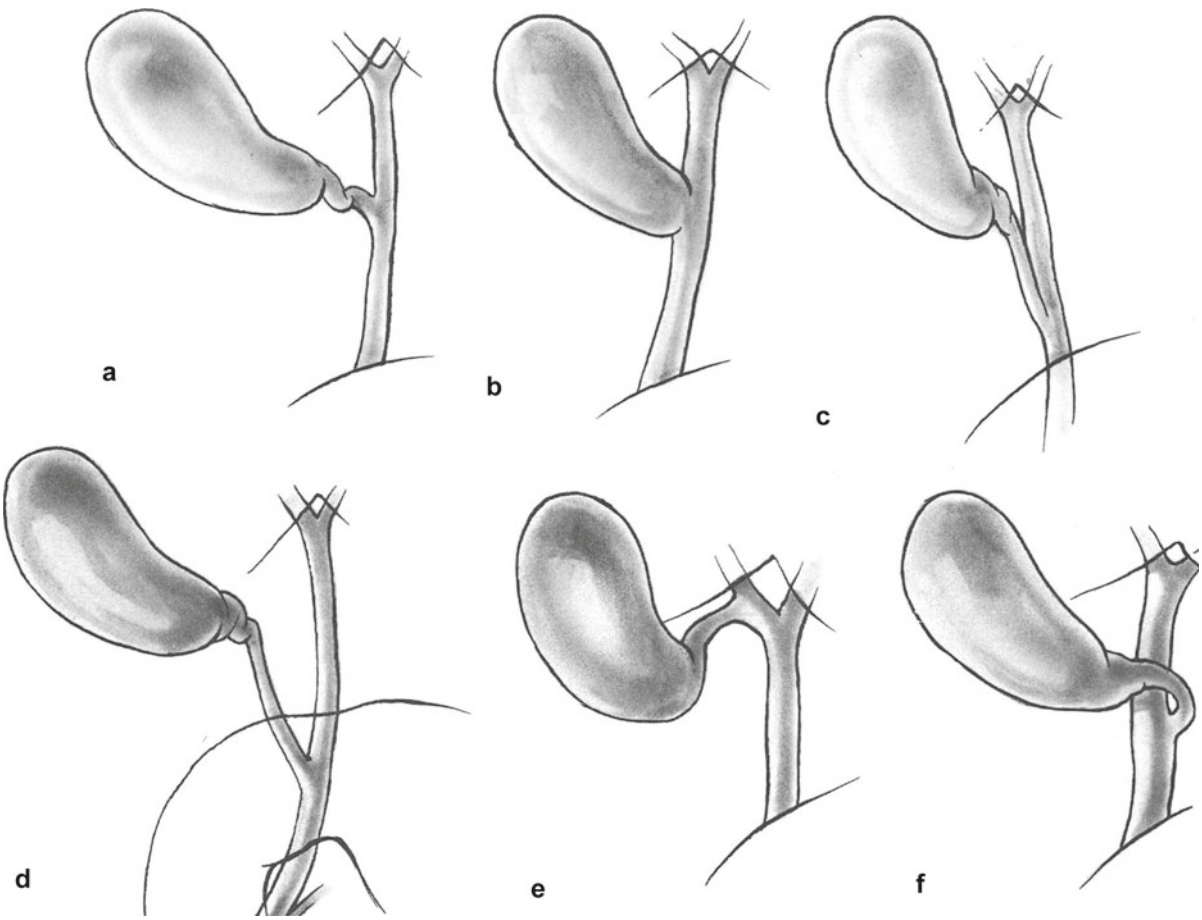

Fig. 77.2 Variations in entry of the cystic duct into the common bile duct

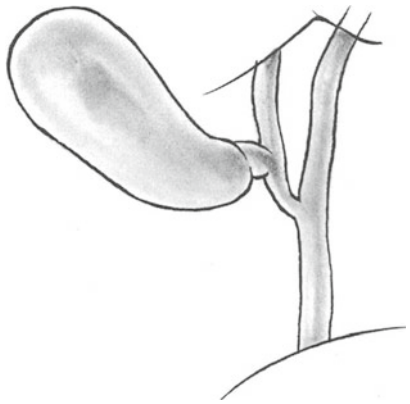

Fig. 77.3 Anomalous entry of the right hepatic duct into the cystic duct

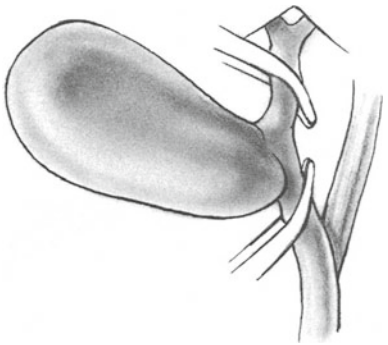

Fig. 77.4

Rarely, an anomalous bile duct enters the gallbladder directly from the liver bed. Such ducts should be suture ligated or clipped to avoid postoperative bile drainage.

Ligating the Hepatic Artery Inadvertently

Careful dissection prevents injury or inadvertent ligature of one of the hepatic arteries. However, if one of these vessels should be ligated accidentally, this complication is not ordinarily fatal because hepatic viability can usually be maintained by the remaining portal venous flow and by arterial collaterals, such as those from the undersurface of the diaphragm. This is true only if the patient has normal hepatic function and there has been no jaundice, hemorrhage, shock, trauma, or sepsis. Generally, based on findings from experimental work on animals, antibiotics are administered in cases of this type, although the need for antibiotic therapy has not been firmly established in humans.

Although hepatic artery ligation generally has a low mortality rate, it is not zero. Consequently, if a major lobar hepatic artery or the common hepatic artery has been inadvertently divided or ligated, end-to-end arterial reconstruction may be performed if local factors are favorable. For other branches of the hepatic artery, arterial reconstruction is not necessary. Variations in the anatomy of the hepatic arteries are shown in Fig. 77.5.

Avoiding Hemorrhage

In most cases, hemorrhage during the course of cholecystectomy is due to inadvertent laceration of the cystic artery. Often the stump of the bleeding vessel retracts into the fat in the vicinity of the hepatic duct, making accurate clamping difficult. If the bleeding artery is not distinctly visible, do not apply any hemostats. Rather, grasp the hepatoduodenal ligament between the index finger and thumb of the left hand and compress the common hepatic artery. This measure temporarily stops the bleeding. Now check whether the exposure is adequate and if the anesthesiologist has provided good muscle relaxation. If necessary, have the first assistant enlarge the incision appropriately. After adequate exposure has been achieved, it is generally possible to identify the bleeding vessel, which is then clamped and ligated. Occasionally the cystic artery is torn off flush with the right hepatic artery. If so, the defect in the right hepatic artery must be closed with a continuous vascular suture such as 6-0 Prolene. On rare occasions it is helpful to occlude the hepatoduodenal ligament by applying an atraumatic vascular clamp. It is safe to perform this maneuver for as long as 15–20 min.

The second major cause of bleeding during the course of a cholecystectomy is hemorrhage from the gallbladder bed in the liver. Bleeding occurs when the plane of dissection is too deep. This complication may be prevented if the plane is kept between the submucosa and the "serosa" of the gallbladder. If this layer of fibrous tissue is left behind on the liver, there is no problem controlling bleeding. With this plane intact, it is easy to see the individual bleeding points and to control them by electrocoagulation. Occasionally, a small artery requires a suture ligature or a hemoclip for hemostasis. With proper exposure, hemostasis should be perfect. On the other hand, when this fibrous plane has been removed with the gallbladder and liver parenchyma is exposed, the surface is irregular and the blood vessels retract into the liver substance, making electrocoagulation less effective. Blood may ooze from a large area. In this case, apply a layer of topical hemostatic agent to the bleeding surface and cover it with a dry gauze pad; use a retractor to apply pressure to the gauze pad. After 15 min, carefully remove the gauze pad. The topical hemostatic agent may then be carefully removed or left in place.

Cystic Duct Cholangiography

Cystic duct cholangiography is useful for detecting CBD stones and delineating biliary anatomy. The use of fluoroscopy considerably facilitates the procedure. When cholangiography is used routinely, it requires only 5–10 min of

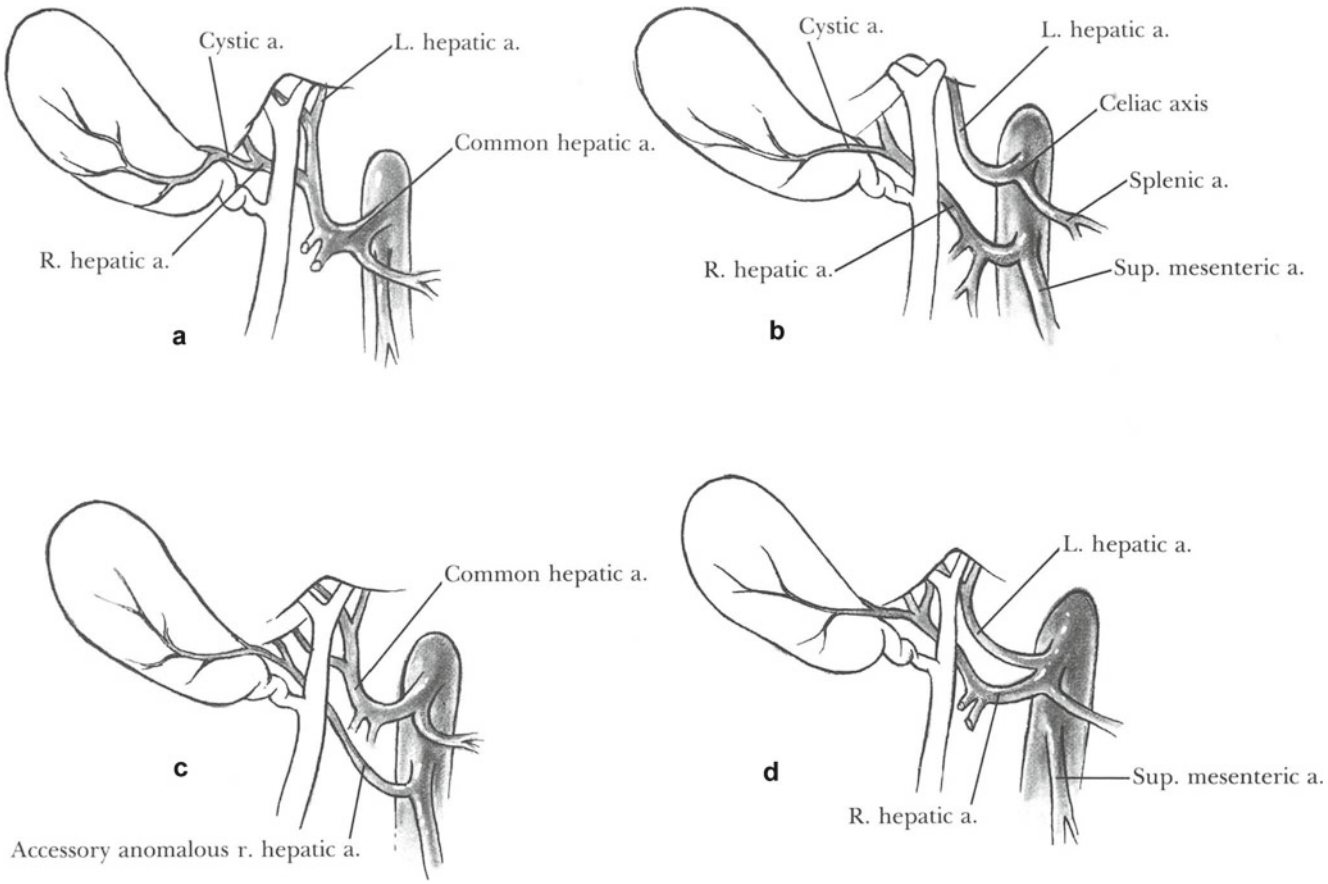

Fig. 77.5 Variations in the anatomy of the hepatic arteries

additional operating time; over time the surgical and radiology teams gain expertise with the technique, making the results more accurate.

Modifications in Operative Strategy Due to Acute Cholecystitis

Decompressing the Gallbladder

Tense enlargement of the gallbladder due to cystic duct obstruction interferes with exposure of adjacent vital structures. Insert a trocar or an 18-gauge needle attached to suction and aspirate bile or pus from the gallbladder, allowing the organ to collapse. After the trocar has been removed, close the puncture site with a purse-string suture or a large hemostat.

Sequence of Dissection

Although there is sometimes so much edema and fibrosis around the cystic and common ducts that the gallbladder must be dissected from the fundus down, in most patients an incision in the peritoneum overlying the cystic duct near its junction with the CBD reveals that these two structures are not intimately involved in the acute inflammatory process. When this is the case, identify and encircle (but do not ligate) the cystic duct with 4-0 silk sutures and dissect out the cystic artery.

If the cystic artery is not readily seen, make a window in the peritoneum overlying Calot's triangle just cephalad to the cystic duct. Next, insert the tip of a Mixter right-angle clamp into this window and elevate the tissue between the window and the liver on the tip of this clamp. This maneuver improves exposure of this area. By carefully dissecting out the contents of this tissue, one can generally identify the cystic artery. Ligate it with 2-0 silk and divide the artery. When this can be done early in the operation, there is less bleeding during liberation of the fundus of the gallbladder.

Dissecting the Gallbladder Away from the Liver

Use a scalpel incision on the back wall of the gallbladder and carry it down to the mucosal layer of the gallbladder. If part of the mucosa is necrotic, dissect around the necrotic area so as not to lose the proper plane. If it has not been possible to delineate the proper plane and the dissection inadvertently is between the outer layer of the gallbladder and

the hepatic parenchyma, complete the dissection quickly and apply a topical hemostatic agent to the oozing liver bed. Then apply a moist gauze pad and use a retractor over the gauze pad to maintain exposure while the dissection is being completed. If the cystic artery has not been ligated in the previous step, it is identifiable as it crosses from the region of the common hepatic duct toward the back wall of the gallbladder.

Management of the Cystic Duct

Cholangiography

Cholangiography is performed in patients with acute obstructive cholecystitis to exclude the presence of common duct stones and to delineate anatomy. If the cystic duct is not patent, perform cholangiography through a small scalp vein needle inserted directly into the CBD.

Occasionally, the cystic duct is so inflamed it is easily avulsed from its junction with the CBD. If this accident occurs, suture the resulting defect in the CBD with a 5-0 Vicryl suture. If the cystic duct has been avulsed and its orifice in the CBD cannot be located, simply insert a sump or closed suction catheter to a point deep to the CBD in the right renal fossa after obtaining a cholangiogram.

When to Abandon Cholecystectomy and Perform Cholecystostomy

If at any time during the course of dissecting the gallbladder such an advanced state of fibrosis or inflammation is encountered that continued dissection may endanger the bile ducts or other vital structures, all plans for completing the cholecystectomy should be abandoned. Convert the operation to a cholecystostomy (see Chap. 79). If a portion of the gallbladder has already been mobilized or removed, it is possible to perform a partial cholecystectomy and to insert a catheter into the gallbladder remnant. Then sew the remaining gallbladder wall around the catheter. Place additional drains in the renal fossa. Remove the gallbladder remnant at a later date, after the inflammation has subsided. Meanwhile, the pus has been drained out of the gallbladder.

The need to abandon cholecystectomy for a lesser procedure occurs in no more than 1 % of all cases of acute cholecystitis if the surgeon has experience with this type of surgery. Less experienced surgeons should not hesitate to perform a cholecystostomy when they believe that removing the gallbladder may damage a vital structure.

Documentation Basics

- Findings
- Cholangiogram or not? Findings?

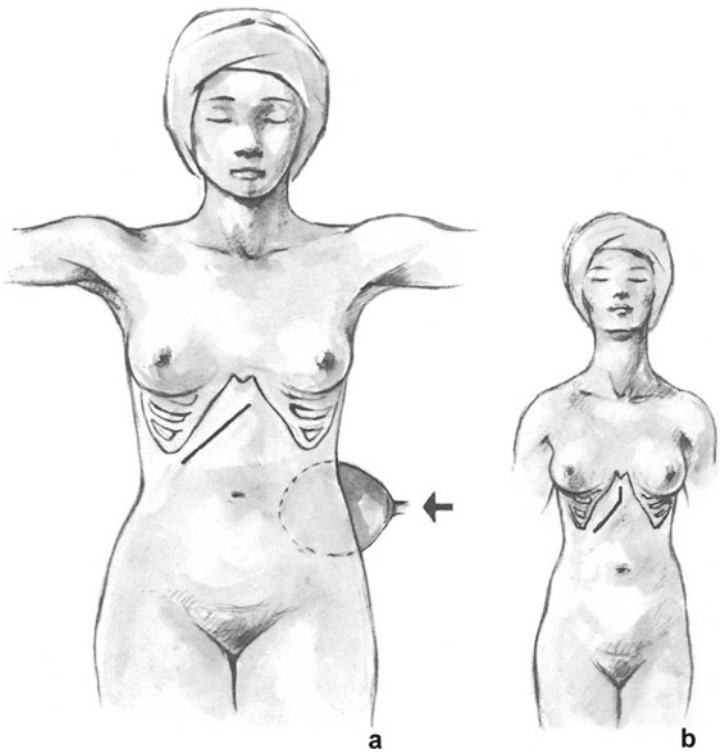

Fig. 77.6

Operative Technique

Incision

We prefer to make a subcostal incision for almost all cholecystectomies because of the excellent exposure afforded in the region of the gallbladder bed and cystic duct. It is important to start the incision at least 1 cm to the left of the linea alba. Then incise in a lateral direction roughly parallel to and 4 cm below the costal margin (Fig. 77.6a). Continue for a variable distance depending on the patient's body build. This incision divides the ninth intercostal nerve, which emerges just lateral to the border of the rectus muscle. Cutting one intercostal nerve produces a small area of hypoesthesia of the skin but no muscle weakness. If more than one intercostal nerve is divided, the abdominal musculature sometimes bulges.

In a thin patient with a narrow costal arch, a Kehr hockey-stick modification is useful (Fig. 77.6b). This incision starts at the tip of the xiphoid, proceeds down the midline for 3–4 cm, and then curves laterally in a direction parallel to the costal margin until the width of the right belly of the rectus muscle has been encompassed. If a midline incision is utilized, excellent exposure often requires that the incision be continued 3–6 cm below the umbilicus.

When the liver and gallbladder are high under the costal arch and this anatomic configuration interferes with

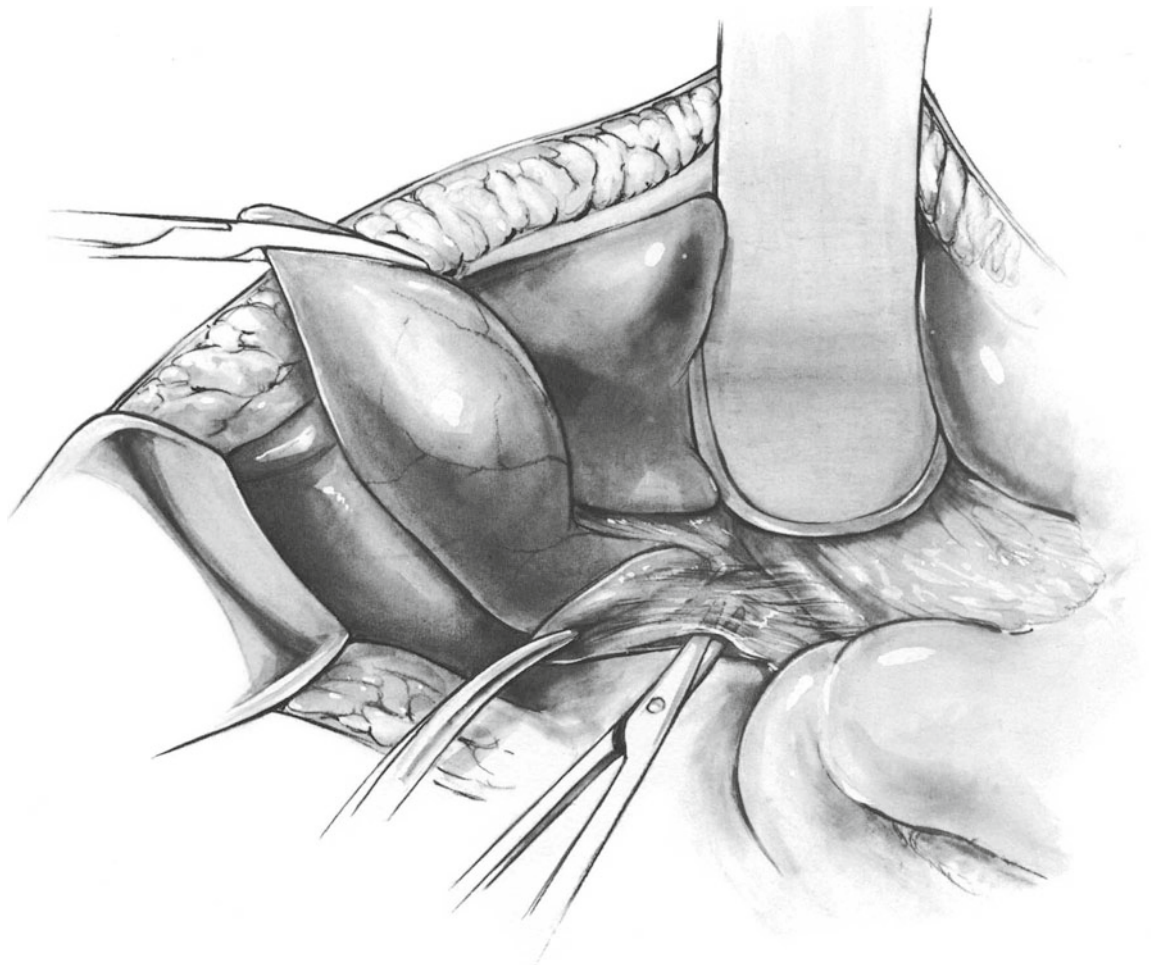

Fig. 77.7

exposure, or when necessary in obese patients, add a Kehr extension (up the midline to the xiphoid) to a long subcostal incision and divide the falciform ligament. This vertical extension of the incision often markedly improves exposure. Also, apply an upper hand or Thompson retractor to the costal arch and draw it upward.

After the incision has been made, the entire abdomen is thoroughly explored. Then direct attention to the gallbladder, confirming the presence of stones by palpation. Check the pancreas for pancreatitis or carcinoma and palpate the descending duodenum for a possible ampullary cancer.

Dissecting the Cystic Duct

Expose the gallbladder field by applying a Foss retractor to the inferior surface of the liver just medial to the gallbladder and a Richardson or a Balfour self-retaining retractor to the costal margin. Alternatively, affix a Thompson retractor to the operating table; then attach a blade to the Thompson retractor and use it to elevate and pull the right costal margin in a cephalad direction. Apply a gauze pad over the hepatic flexure and another over the duodenum. Occasionally, adhesions between omentum, colon, or duodenum and the gallbladder must be divided prior to placing the gauze pads. Have the first assistant retract the duodenum away from the gallbladder with the left hand. This move places the CBD on stretch.

Place a Kelly hemostat on the fundus of the gallbladder. With traction on the gallbladder, slide Metzenbaum scissors underneath the peritoneum that covers the area between the wall of the gallbladder and the CBD (Fig. 77.7). Expose the cystic duct by alternately sliding Metzenbaum scissors underneath the peritoneum to define the plane and then cutting along the gallbladder wall. If the inferior surface of the gallbladder is dissected free and elevated, this plane of dissection must lead to the cystic duct, provided the plane hugs the surface of the gallbladder. The cystic duct can be easily delineated by inserting a right-angle Mixter clamp behind the gallbladder. Apply a temporary ligature of 4-0 silk to the cystic duct with a single throw to avoid inadvertently milking calculi from the gallbladder into the CBD. Do not injure the cystic duct by strangulating it with this ligature because this structure, on occasion, proves to be a small CBD, not the cystic duct. If you do not elect to obtain a cholangiogram, proceed to ligating and dividing the cystic artery. Otherwise, at this point in the operation, perform cystic duct cholangiography.

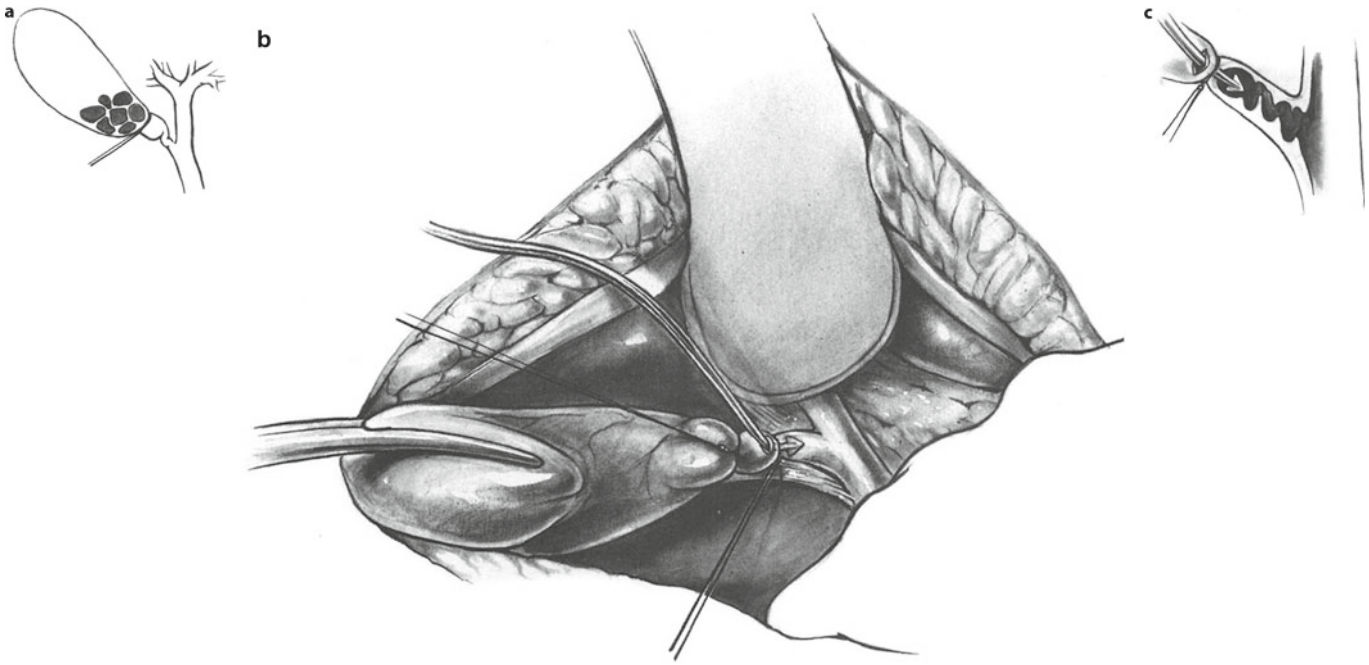

Fig. 77.8

Cystic Duct Cholangiography

We routinely perform cholangiography during cholecystectomy. There are two major impediments to catheterizing the cystic duct: (1) the internal diameter may be too small for the catheter and (2) the valves of Heister frequently prevent passage of the catheter or needle even for the 4–5 mm necessary to properly secure the catheter tip with a ligature. Although the valves may be disrupted by insertion of a malleable probe or a pointed hemostat, this maneuver sometimes results in shredding the cystic duct. A method that facilitates intubating the cystic duct is isolation of the proximal portion of the duct, including its junction with the gallbladder. Here the duct is large enough to permit introduction of the catheter at a point *proximal* to the valves of Heister, simplifying the entire task.

After the cystic duct has been isolated, continue the dissection proximally until the infundibulum of the gallbladder has been freed. The diameter at this point should be 4–5 mm. Then milk any stones up out of the cystic duct into the gallbladder and ligate the gallbladder with a 2-0 silk ligature (Fig. 77.8a). Pass another 2-0 ligature loosely around the cystic duct. Make a small transverse scalpel incision in the ampulla of the gallbladder near the entrance of the cystic duct.

At this point attach a 2-m length of plastic tubing to a 50-ml syringe that has been filled with a 1:1 solution of Conray/saline. Then check to see that the entire system—the syringe, 2 m of plastic tubing, and cholangiogram catheter—is *absolutely free of air bubbles*. Pass the catheter into the incision and then into the cystic duct for a distance of 5 mm (Fig. 77.8b). Tie the previously placed 2-0 ligature just above the bead at the termination of the cholangiogram catheter (Fig. 77.8c). Under no condition, attempt to aspirate bile into the system, as this maneuver often results in aspirating air bubbles into the tubing. Some surgeons prefer a ureteral or intravenous catheter over the Taut cholangiogram catheter to intubate the cystic duct.

Elevate the left side of the patient about 10 cm above the horizontal table to prevent the image of the CBD from being superimposed on the vertebral column with its confusing shadows. This is done by having the anesthesiologist inflate a previously positioned rubber balloon under the left hip and flank (Fig. 77.6a); alternatively, two folded sheets may be placed underneath the patient's left hip and flank.

Now stand behind a portable lead shield covered with a sterile sheet. If a C-arm fluoroscopy unit is available, make the injection under fluoroscopic control. If not, follow the procedure described here and record two exposures in sequence. After the film and x-ray tube have been positioned, slowly inject no more than 4 ml of contrast medium for the first exposure. X-ray film is then put into position and a second exposure recorded after an additional injection of 4–6 ml. When radiographing a hugely dilated bile duct, as much as 30–40 ml may be required in *fractional* doses. On rare occasions, spasm in the region of the ampulla of Vater does not permit passage of contrast medium into the duodenum unless a small dose of nitroglycerin is administered intravenously. We have found nitroglycerin to be superior to intravenous glucagon (1 mg) for relieving sphincter spasm. If the duodenum is still not visualized, choledochotomy and exploration are indicated.

While waiting for the films to be developed, continue with the next step in the operation, ligating and dividing the cystic artery, without removing the cannula from the cystic duct. Ensure objectivity by *requesting the radiologist to provide immediate interpretation of the cholangiographic films*. Inspect the films yourself as well.

When cystic duct cholangiography is performed prior to instrumentation of the CBD and ampulla, dye almost always enters the duodenum if there is no CBD or ampullary pathology. When T-tube cholangiography is performed after completing the bile duct exploration, spasm often prevents visualization of the terminal CBD and ampulla. This problem can be averted by routine cholangiography prior to choledochotomy, even if you have already decided to explore the CBD.

Common Errors of Operative Cholangiography

Injecting too much contrast material. When a large dose of contrast material is injected into the ductal system, the duodenum is frequently flooded with dye, which may obscure stones in the distal CBD.

Dye too concentrated. Especially when the CBD is somewhat enlarged, the injection of concentrated contrast material can mask the presence of small radiolucent calculi. Consequently, dilute the contrast material 1:2 with normal saline solution when the CBD is large.

Air bubbles. Compulsive attention is necessary to eliminate air bubbles from the syringe and the plastic tubing leading to the cystic duct. Also, never try to aspirate bile into this tubing, as the ligature fixing the cystic duct around the cholangiography cannula may not be airtight and air may be sucked into the system and later injected into the CBD. It may then be impossible to differentiate between an air bubble and a calculus.

Poor technical quality. If the radiograph is not of excellent quality, there is a greater chance of a false-negative interpretation. It is useless to try to interpret a film that is not technically satisfactory. One technical error is easily avoided by elevating the left flank of the patient about 8–10 cm so the image of the bile ducts is not superimposed on the patient's vertebral column (Fig. 77.6a). Especially in obese patients, it is important to be sure that all the exposure factors are correct by using a scout film prior to starting the operation. Using an image-enhancing film holder with a proper grid also improves technical quality. If the *hepatic ducts* have not been filled with contrast material, repeat the radiography after injecting another dose into the cystic duct. Otherwise hepatic duct stones are not visualized. It is sometimes helpful to administer morphine sulfate, which induces sphincter spasm. Dye injected into the cystic duct then fills the hepatic ducts.

Performing cystic duct cholangiography routinely serves to familiarize the technicians and the surgical team with all of the details necessary to provide superior films. It also shortens the time required for this step to 5–10 min.

Sphincter spasm. Spasm of the sphincter of Oddi sometimes prevents passage of contrast medium into the duodenum. Although this outcome is far more frequent after CBD exploration with instrumentation of the ampulla, it does occur on rare occasions during cystic duct cholangiography. We have found that giving nitroglycerin intravenously seems to be more effective than using intravenous glucagon to relax the sphincter. Simultaneous with sphincter relaxation, there is generally a mild drop in the patient's blood pressure. At this time inject the contrast medium into the CBD. Nitroglycerin is also useful when performing completion cholangiography when the CBD exploration has been completed.

Failing to consult with the radiologist. It is not reasonable for the operating surgeon to be the only physician responsible for interpreting the cholangiographic films. The surgeon tends to be overoptimistic, tends to accept poor technical quality, and is responsible for an excessive number of false-negative interpretations. Always have a consultation with a radiologist familiar with this procedure before forming a final conclusion concerning the cholangiogram.

Ligating the Cystic Artery

Gentle dissection in the triangle of Calot reveals the cystic artery, which may cross over or under the common or right hepatic duct on its way to the gallbladder. It frequently divides into two branches, one anterior and one posterior. Confirmation of the identity of this structure is obtained by tracing the artery up along the gallbladder wall and demonstrating the lack of any sizable branch going to the liver. Often the anterior branch of the cystic artery can be seen running up the medial surface of the gallbladder. Tracing this branch from above down to its point of origin leads to the cystic artery. Ligate this artery in continuity after passing a 2-0 silk ligature around it with a Mixter right-angle hemostat (Fig. 77.9). Apply a hemoclip to the gallbladder side of the vessel and transect the cystic artery, preferably leaving a 1-cm stump of artery distal to the ligature (Fig. 77.10). If there is fibrosis in Calot's triangle and the artery is not evident, pass a Mixter clamp underneath these fibrotic structures. While the first assistant exposes the structures by elevating the Mixter clamp, the surgeon can more easily dissect out the artery from the surrounding scar tissue. If the cystic artery is torn and hemorrhage results, control it by inserting the left index finger into the foramen of Winslow and compressing the hepatic artery between the thumb and forefinger until the exact source of bleeding is secured by a clamp or a suture.

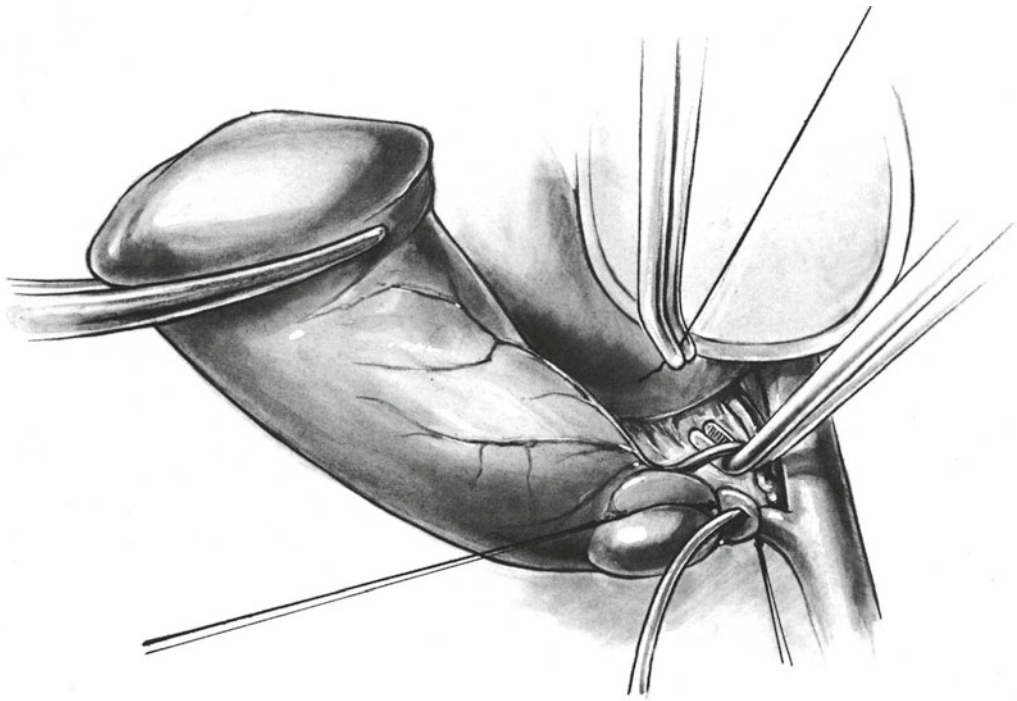

Fig. 77.9

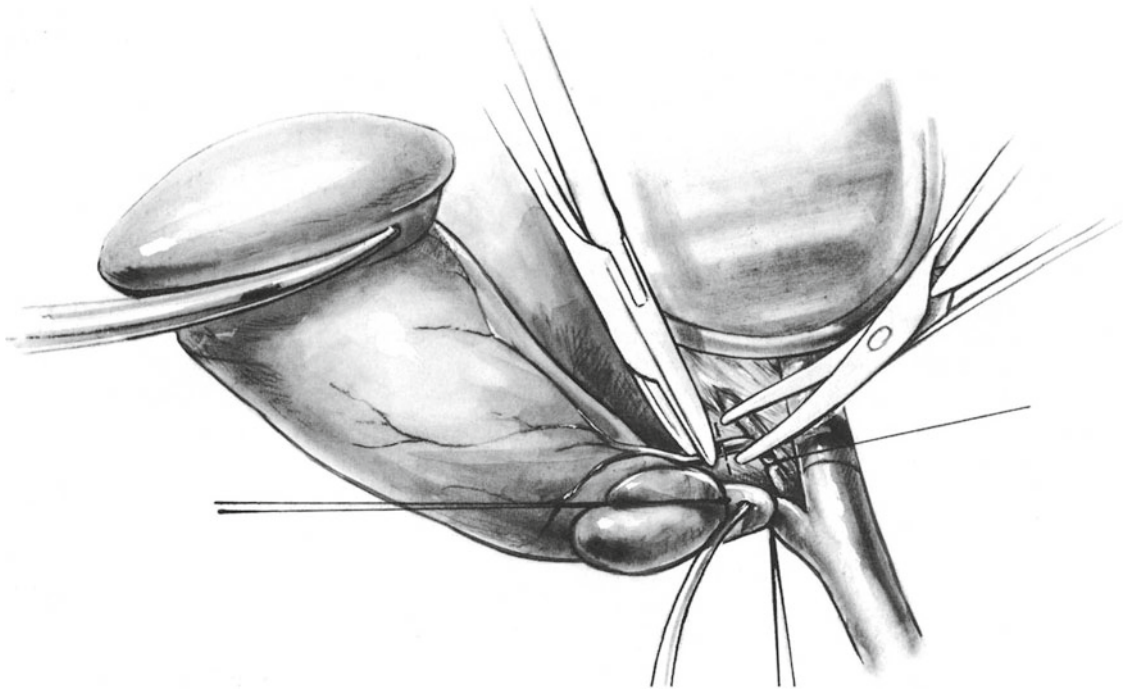

Fig. 77.10

Dissecting the Gallbladder Bed

In no case during cholecystectomy is the cystic duct transected or clamped prior to complete mobilization of the gallbladder. Mobilization may be done by taking advantage of the incision in the peritoneum overlying Calot's triangle as described above and simply continuing this peritoneal dissection from below upward along the medial border of the gallbladder. Insert a Mixter clamp underneath the peritoneum while the first assistant makes an incision using electrocautery (Fig. 77.11). Alternatively, make a scalpel incision in the superficial layer of the gallbladder wall across its fundus. Use

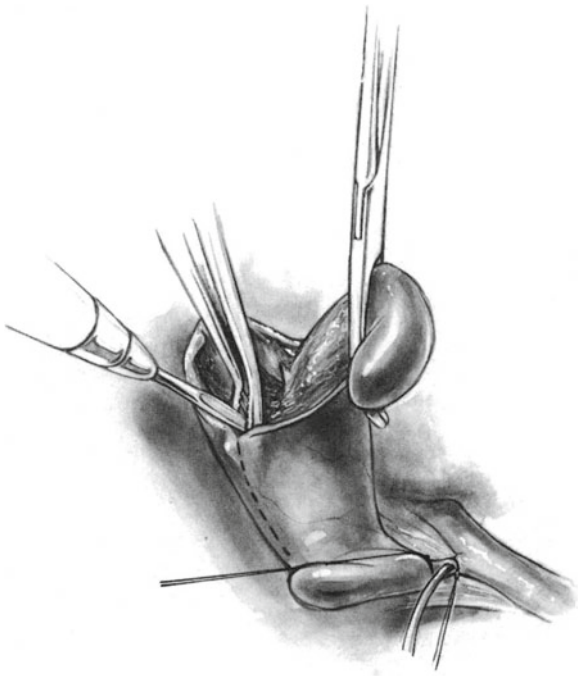

Fig. 77.11

electrocautery to dissect the mucosal layer of the gallbladder away from the serosal layer, *leaving as much tissue as possible on the liver side*. This leaves a shiny layer of submucosa on the gallbladder. Tiny vessels coming from the liver to the gallbladder can be identified and individually controlled with electrocautery. When the plane of dissection is deep to the serosa, raw liver parenchyma presents itself. Oozing from raw liver is difficult to control with electrocoagulation. In this case, either prolonged pressure with moist gauze or application of a small sheet of Surgicel to the raw liver surface can provide excellent hemostasis after 10–15 min of local compression.

As the dissection proceeds down along the liver, do not apply any hemostats, as the vessels in this plane are small. Near the termination of this dissection along the posterior wall of the gallbladder, a bridge of tissue is found connecting the gallbladder ampulla with the liver bed. Instruct the assistant to pass a Mixter clamp through the opening in Calot's triangle that had been made when the cystic artery was ligated (Fig. 77.12). This clamp elevates the bridge of tissue, and the surgeon dissects out its contents by carefully nibbling away at it with Metzenbaum scissors to rule out the possibility that it contains the common hepatic duct. In cases

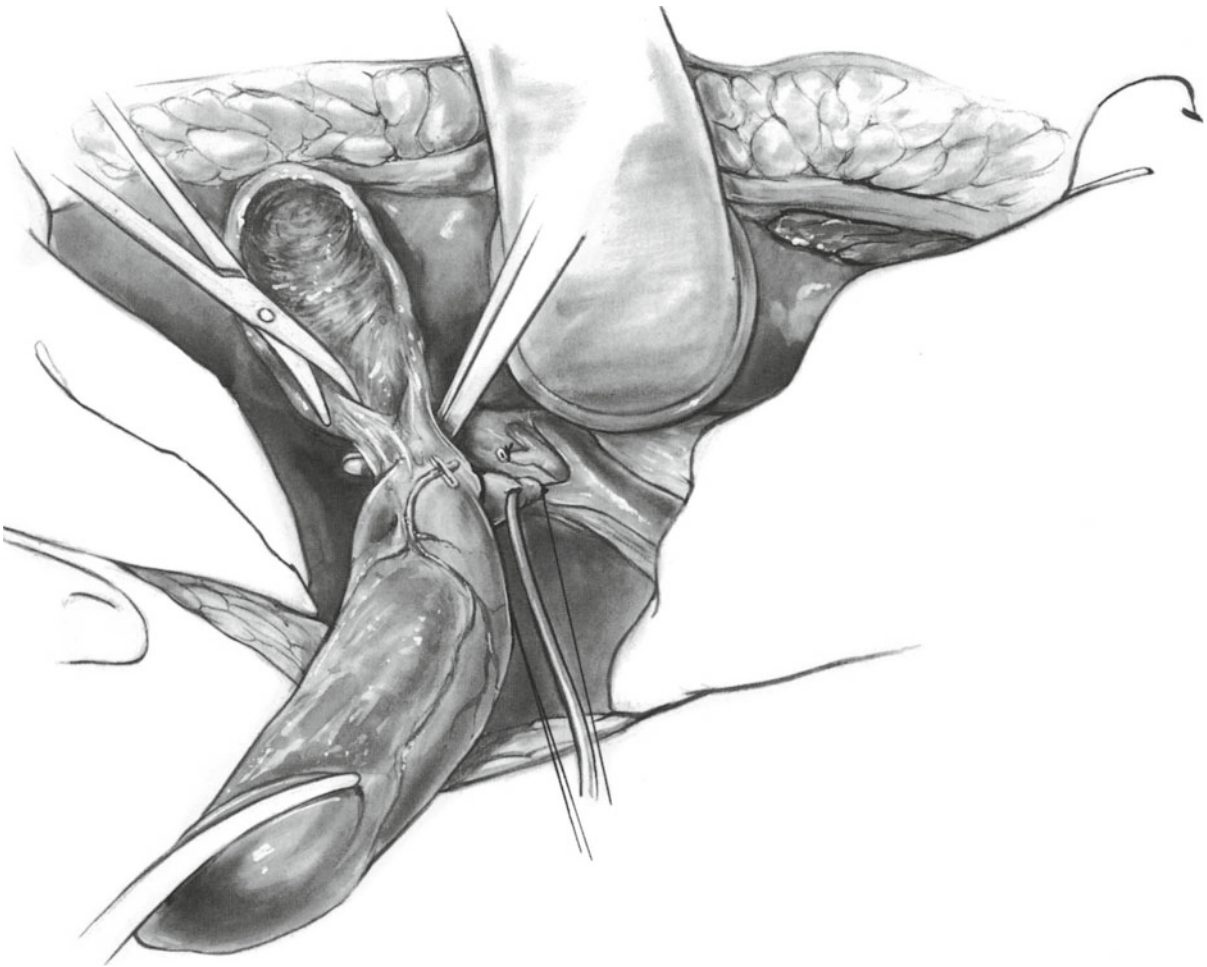

Fig. 77.12

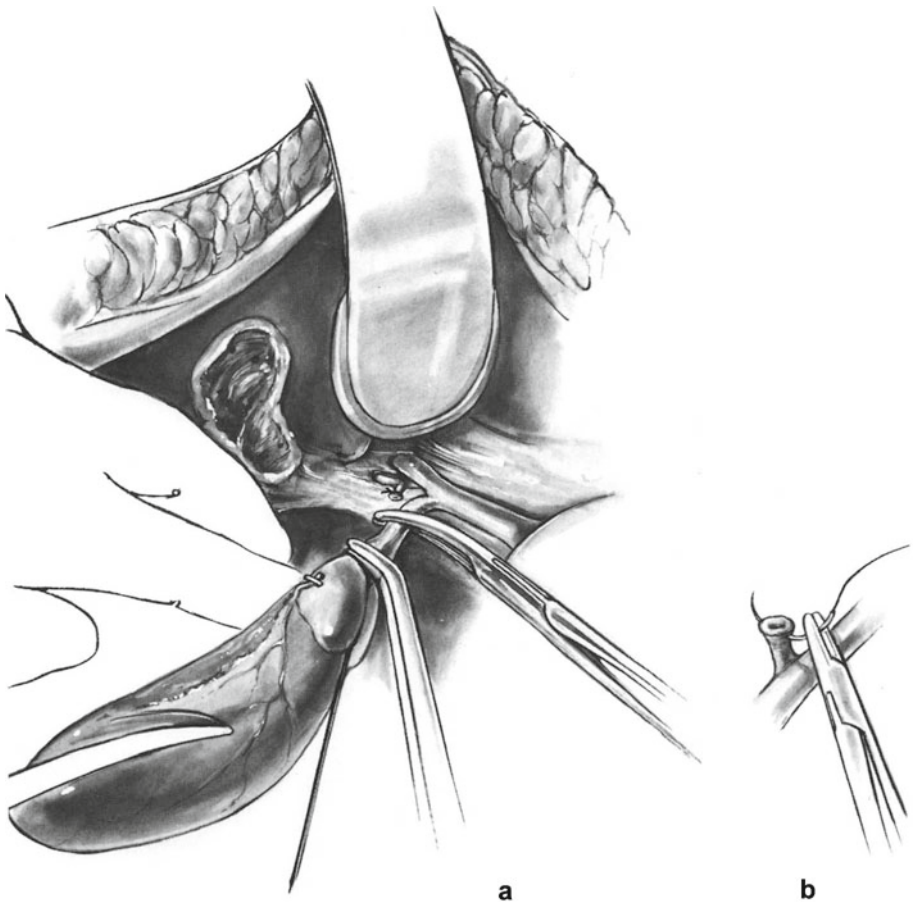

Fig. 77.13

where excessive fibrosis has prevented identification and ligature of the cystic artery, there is generally, at this stage of the dissection, no great problem identifying this vessel coming from the area near the hilus of the liver toward the back wall of the gallbladder.

With the gallbladder hanging suspended only by the cystic duct, dissect the duct down to its junction with the common hepatic duct. Exact determination of the junction between the cystic and hepatic ducts is usually not difficult after electrocoagulating one or two tiny vessels that cross over the acute angle between the two ducts. Rarely, a lengthy cystic duct continues distally toward the duodenum for several centimeters.

The cystic duct may even enter the CBD on its *medial* aspect near the ampulla of Vater. In these cases it is hazardous to dissect the cystic duct down into the groove between the duodenum and pancreas; it is preferable to leave a few centimeters of duct behind. The anatomy may be confirmed by cholangiography. In general, clamp and divide the cystic duct at a point about 1 cm from its termination (Fig. 77.13a). Transfix the cystic duct stump with a 3-0 PG suture ligature (Fig. 77.13b). *Never clamp or divide the cystic duct except as the last step during a cholecystectomy*.

Achieve complete hemostasis of the liver bed with electrocautery (Fig. 77.14). If necessary, use suture ligatures.

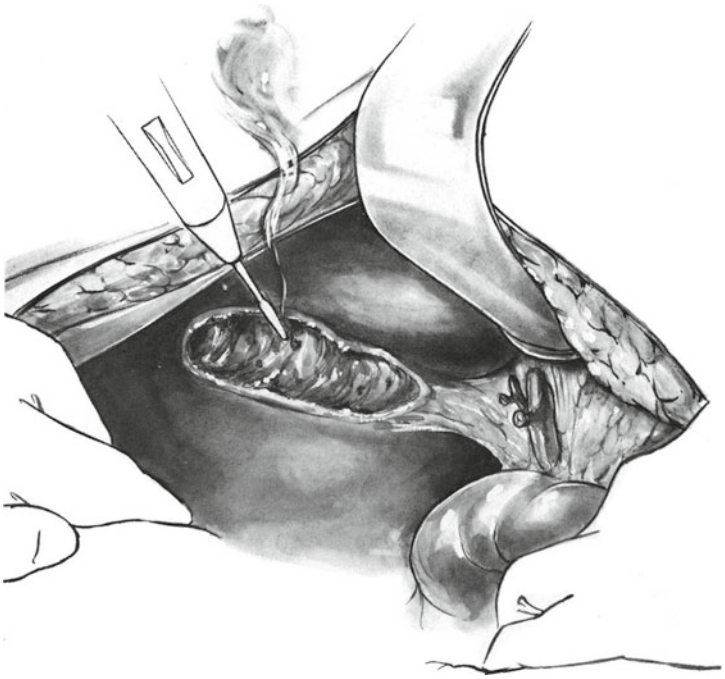

Fig. 77.14

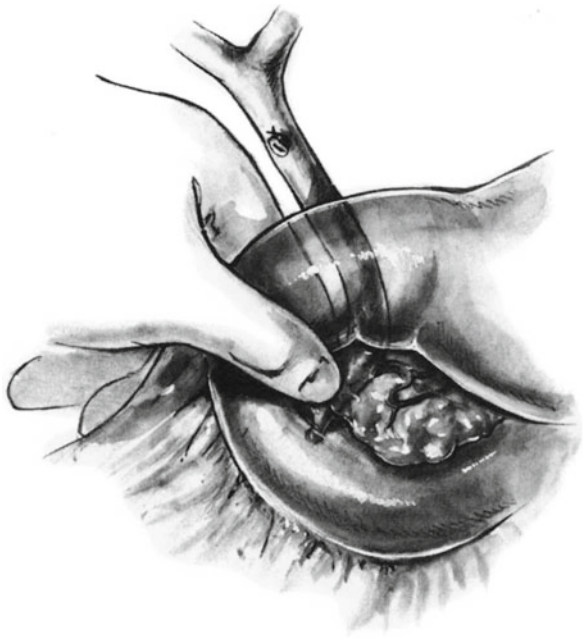

Fig. 77.15

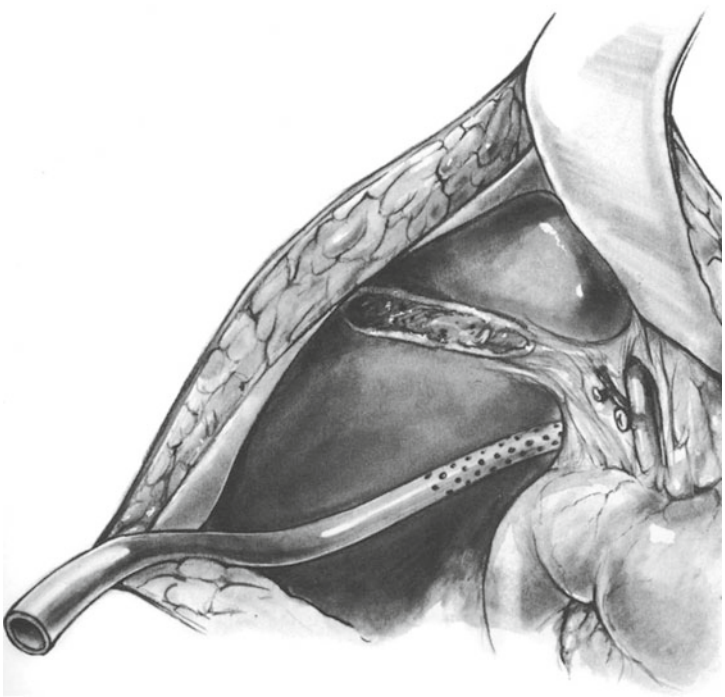

Fig. 77.16

In unusual cases, leave a sheet of topical hemostatic agent in the liver bed to control venous oozing.

Palpating the CBD

Prior to terminating the operation, especially if cholangiography has not been performed, it is essential to palpate the CBD properly to reduce the possibility of overlooked calculi. This is done by inserting the index finger into the foramen of Winslow and palpating the entire duct between the left index finger and thumb. Because a portion of the distal CBD is situated between the posterior wall of the duodenum and the pancreas, *it is necessary to insert the index finger into the potential space posterior to the pancreas and behind the second portion of the duodenum*. It is not necessary to perform a complete Kocher maneuver. Gently insinuate the left index finger behind the CBD and continue in a caudal direction behind the pancreas and the duodenum. In this fashion, with the index finger behind the second portion of the duodenum and the thumb on its anterior wall, carcinomas of the ampulla and calculi in the distal CBD can be detected (Fig. 77.15). Do not use force if the index finger does not pass easily; rather, proceed to a formal Kocher maneuver.

Drainage and Closure

We insert a flat Silastic Jackson-Pratt closed suction catheter following cholecystectomy only in cases of acute cholecystitis. Bring the catheter out from the renal fossa through a puncture wound just lateral to the right termination of the subcostal incision (Fig. 77.16). There is abundant evidence that a patient who has undergone a technically precise and uncomplicated simple cholecystectomy does not require insertion of any type of drain.

Do not reperitonealize the liver bed, as this step serves no useful purpose. Close the abdominal wall in routine fashion (see Chap. 3). We use No. 1 PDS suture material for this step.

Postoperative Care

After an uncomplicated cholecystectomy, nasogastric suction is not necessary. In patients with acute cholecystitis, paralytic ileus is not uncommon, so nasogastric suction may be necessary for 1–3 days.

After uncomplicated cholecystectomy, antibiotics are not required except in the older age group (>70 years). Elderly patients have a high incidence of bacteria in the gallbladder bile and so should be given perioperative antibiotics prior to and for two or three doses after operation. Following cholecystectomy for acute cholecystitis, administer antibiotics for 4–5 days, depending on the Gram stain of the gallbladder bile sampled in the operating room. Unless there is a significant amount of bilious drainage, remove the drain on approximately the fourth postoperative day.

Complications

Bile leak. Minor drainage of bile may follow interruption of some small branches of the bile ducts in the liver bed. This does not occur if the outer layer of the gallbladder serosa is left behind on the liver bed. On rare occasions a duct of significant size may enter the gallbladder, but we have never encountered such an instance. Bile drainage of 100–200 ml occurs if the surgeon has inadvertently transected an anomalous duct draining the dorsal caudal segment of the right lobe. If this complication is diagnosed by a sinogram radiograph, expectant therapy may result in gradual diminution of drainage as the tract becomes stenotic. Endoscopic retrograde cholangiopancreatography (ERCP) and papillotomy or nasobiliary drainage may hasten resolution.

If there is any infection in the area drained by the duct, recurrent cholangitis or liver abscess may occur. In this case, permanent relief may eventually necessitate resecting the segment of the liver drained by the transected duct. If the volume of bile drainage exceeds 400 ml/day, suspect transection of the hepatic or the common bile duct.

Jaundice. Postcholecystectomy jaundice is usually due to ligature of the CBD or an overlooked CBD stone. If other causes are ruled out, ERCP is indicated to identify the obstruction.

Hemorrhage. If the cystic artery has been accurately ligated, postoperative bleeding is rare. Occasionally, oozing from the liver bed continues postoperatively and may require relaparotomy for control.

Subhepatic and hepatic abscesses. Following cholecystectomy these two complications are seen primarily in cases of acute cholecystitis. Postoperative abscesses are rare in patients whose surgery was for chronic cholecystitis unless a bile leak occurs. Treatment by percutaneous computed tomography-guided catheter drainage is usually successful.

Further Reading

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