ERRORS IN SURGERY OF THE BILIARY TRACT*

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The Incision

IT has been said by generations of surgical teachers that abdominal wounds heal from side to side and not from end to end. The implication is that it makes no difference how long the incision is, so long as it gives adequate exposure.

Any abdominal incision, if long enough, affords good exposure. But is it really true that the length of the incision makes no difference to the convalescence of the patient? By reductio ad absurdum it is obvious that an incision 1 inch long would give less chance of wound disruption, hernia, hematoma, and infection than one 18 inches long. How long an incision can one make without increasing the incidence of these complications? Statistics on the subject are not available, but it is amazing and a little frightening to see the high incidence of hernias in the scars of upper abdominal operations. Since hernias are incomplete wound disruptions, the incidence of complete disruptions with their attendant mortality must also be significant.

The first consideration in all surgery is exposure, and no one will argue that this prerequisite of an accurate operation should be jeopardized by a keyhole incision. On the other hand, both the exposure afforded and the strength of the closure depend as much on the type of incision made as on its length. Most gallbladders lie fairly far lateral, away from the line of a right rectus incision. Adequate exposure of the gallbladder can be obtained by retraction, if the incision is long enough, but through a much shorter subcostal incision comparable exposure of both gallbladder and common duct is obtained and the strength of the closure, as in all oblique or transverse incisions, is considerably greater.

Since technics of abdominal closure vary, and a method that is successful in the hands of one surgeon may fail in those of another, a single surgeon's experience is not necessarily representative of the over-all experience of the profession. Nevertheless, in my own hands the incidence of postoperative hernia and wound disruption has been much less when abdominal incisions have been closed not with catgut but with interrupted, figure-of-eight, stainless steel sutures, and it is even lower when subcostal or transverse incisions are employed.

Injuries of the Hepatic Artery

Injuries of the bile ducts rank high among the complications of biliary surgery, yet it is quite possible that injuries to the hepatic artery are even more common. In the Navy, I had considerable experience in assisting inexperienced

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surgeons in cholecystectomies, and was surprised to find that the most frequent serious mistake from which they had to be directed was not injury of the common duct but ligation of the hepatic artery. When a tortuous hepatic artery loops up to the gallbladder and gives off only a tiny cystic branch, it is easy to mistake a small hepatic for a large cystic artery.

If the hepatic artery is ligated in some cases there may be no untoward sequelae but in others the patient may die with high fever, urinary suppression, jaundice and shock. This syndrome, resulting from necrosis of liver substance and perhaps from the multiplication of anaerobic organisms, is not always recognized to be the result of damage to the artery, and perhaps some deaths attributed to renal or liver failure are in reality the result of this accident. It can be prevented by:

1. Never ligating fat and peritoneum in mass without dissecting out their component parts.
2. Never ligating a large cystic artery until it has been traced upward and its branches on the gallbladder demonstrated.
3. In doubtful cases, dissecting from the fundus down, and ligating *only* on the wall of the gallbladder.

Injuries of the Common Duct

In the surgical literature there is much implied criticism of surgeons who injure the common duct during cholecystectomy. Sometimes this criticism is just, for the accident can result from carelessness. The fact that many of the injuries occur in thin patients with uncomplicated chronic cholecystitis rather than in the difficult cholecystectomies done for acute or subacute cholecystitis indicates that it is the "easy case" that may tempt the surgeon to proceed rapidly with insufficient attention to detail. It is in this same type of case that a very short cystic duct pulls up a loop of common duct so that if the common duct is small it may be divided before it is recognized.

Sometimes, however, even when the greatest care is employed, ducts accidentally may be injured. I remember a slender young woman in her thirties with an uncomplicated cholecystitis. Exposure was excellent. At the base of the gallbladder I picked up a small duct no bigger than a normal cystic duct and followed it down into the gastrohepatic omentum looking for its junction with the common duct. I could not find the junction. Realizing that there was an anomaly of the duct system, I removed the gallbladder carefully from above downward. At the completion of the dissection, the duct that I had originally found was seen to lead directly from the bottom of the gallbladder into the gastrohepatic omentum.

A cholangiogram showed that diatrast injected into the duct entered the duodenum promptly but showed no communication with the radicals of the

biliary tract. There were only two ties in the gallbladder bed, one on the pulsating cystic artery and the other on a tiny structure the size of a match stick which I had interpreted as an accessory vessel or accessory cystic duct. I removed the tie from this, and bile flowed from a tiny hole in the liver. A cholangiogram of this sinus showed the hepatic duct system: tiny hypoplastic ducts not one-third their usual size. It was with the greatest difficulty that this duct was dilated to admit the smallest T tube and was then anastomosed to the equally small lower end of the common duct.

This case was deeply disturbing to me, because it showed that even in the presence of a recognized anomaly of the cystic duct and with the most careful dissection of which I was capable, it was possible for me to injure a hypoplastic and anomalous common hepatic duct. On still another occasion I have seen a gallbladder with no cystic duct and with the common hepatic duct entering one side of the bladder and the common duct leaving from the other in such a way that complete removal of the gallbladder would lead inevitably to injury of the duct. In view of these observations I cannot feel too critical of those who have injured anomalous ducts. I do believe, however, that the majority of accidents should be recognized and the damage repaired at the time of the cholecystectomy, and that if the surgeon is constantly aware of how easy it is to injure a duct, he will double check the anatomy of the common and hepatic ducts before closing the abdomen. His attitude, when things do not seem right, should not be: "It is impossible for this to have happened to me, everything must be all right regardless of how it looks." Instead, it should be: "It is perfectly possible for any surgeon to injure a duct and until I prove to myself that I have not injured it, I must assume that I have."

Role of Cholangiography

One of the best ways to evaluate the anatomy of the biliary tract is by operative cholangiography. Anomalies, stones, and obstructions due to pancreatitis or to tumors can be visualized clearly. The technic is simple and if properly executed does not add more than five minutes to the operating time. Injuries of the common duct would largely be avoided if cholangiograms were performed routinely before gallbladders were removed. Cholangiography is at least as accurate as exploration in determining the presence or absence of stones. Its routine employment at the time of cholecystectomy saves many needless explorations of the common duct and the attendant increase of morbidity and hospitalization.

Cholangiography is not one hundred per cent accurate and a normal appearing cholangiogram should not be interpreted as conclusive evidence that stones are not present. If there are clear-cut indications, such as a history of jaundice or a dilated cystic duct with small stones in the gallbladder, the common duct should be explored regardless of the cholangiogram. The accuracy either of

cholangiography alone or of exploration alone may be approximately 90 per cent, but the combination of the two methods increases the accuracy to nearly 100 per cent. Clinical indications of stones should therefore remain as clear indications for both cholangiography and exploration.

Cholangiography performed after the common duct has been opened is never as accurate as when it is done through the cystic duct before there is any possibility of air bubbles entering the duct system. Nevertheless, even after exploration, if the duct has been irrigated and barbotaged with water and if all air has been aspirated before the cholangiogram is made, air bubbles do not often cause confusing negative shadows. Certainly in all cases in which multiple stones have been removed, exploration should be followed by cholangiography. The necessity of this procedure was emphasized by a recent case in which careful exploration of the duct with scoops, catheters, and lavage had recovered 29 stones. I was certain that the duct system was clear, but before closing the abdomen we took a postexploratory cholangiogram. Three negative shadows were present, and on re-exploration I found out what had happened: I had been pushing the three stones into the short dilated stump of the cystic duct which trapped them like a diverticulum, as I withdrew the probe. Later they fell back into the common duct. After removing the three stones, cholangiograms showed the duct to be clear.

Operations on the Ampulla of Vater

In recent years much has been written about spasm of the sphincter of Oddi, and about pancreatitis occurring in the presence of a common opening of the pancreatic and common bile ducts. The pioneers in this field have perfected technics of sphincterotomy which in their hands are reported to be safe and satisfactory, but end results in these conditions require years to evaluate. Occasionally any operation or even a strong suggestion causes prolonged improvement in the typically anxious or hysterical type of patient who develops the postcholecystectomy syndrome. Sphincterotomy is not an easy operation, and in my experience it has been accompanied by a high morbidity and occasionally by fatal pancreatitis. For this reason it is not to be undertaken lightly, or as a routine measure just because cholangiography shows a common opening or evidence of sphincter spasm. Diseases of the biliary tract should be treated first, and theoretical disorders of the sphincter mechanism and of the pancreas disregarded until the results of the biliary tract operation have been assessed. If symptoms persist, after stones and obstructions of the biliary tract have been treated, the problem of the sphincter of Oddi should be considered and if operation is to be done it should be by a surgeon who has a particular interest and technical experience in this difficult and dangerous field.

SUMMARY

The most serious errors in surgery of the biliary tract involve complications of closure of the incision, injuries to the hepatic artery and common duct, and residual stones in the common duct. Technical errors should be corrected and repaired at the time of the primary operation. Operative cholangiography is a valuable adjunct to surgery of the biliary tract. The problems of chronic pancreatitis and spasm of the sphincter of Oddi have not as yet been satisfactorily solved.