

Aneurysm of the Right Hepatic Artery

Preoperative Diagnosis and Successful Excision *

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ANEURYSMS of the hepatic artery or its branches are comparatively rare. However, there is an increased awareness of this entity as shown by the number of recent reports. Several comprehensive reviews have been published within the last few years summarizing the cases reported in the world literature.^{4, 5, 11} The most recent of these was written by Quattlebaum,¹¹ who collected 96 cases and presented three more of his own. Since this paper Steelquist¹³ and Kirklin *et al.*⁹ have added five more cases making a total of 105 cases published to date. Our purpose in reporting this case, aside from the rarity, is that this is one of the few in which the diagnosis was made preoperatively; an aneurysm of the right hepatic artery excised and ligated; and a reconstruction of the common hepatic duct performed.

CASE REPORT

C. M. (Hospital #10284), a 33-year-old white man, was admitted to the Youngstown Hospital on April 15, 1954 after receiving 3 gunshot wounds. One missile struck him in the epigastrium and 2 entered the left chest. The patient was in profound shock on admission but responded to transfusion of blood. A catheter was inserted into the left hemithorax for decompression of a pneumothorax. Following this an abdominal exploration was undertaken. The peritoneal cavity was filled with fresh blood and a retroperitoneal mass approximately the size of a football was found in the region of the right kidney. A right nephrectomy was necessary to control the hemorrhage from the renal pedicle. Blood from a wound in the right lobe of the liver seemed to be dissecting into the gastro-

hepatic ligament. The ligament was incised and Gelfoam® was packed against the liver to control the bleeding. The right kidney bed and the lesser peritoneal sac were drained with two large rubber covered gauze drains. Although the patient had received 5,000 ml. of blood, his condition was still poor at the conclusion of the operation, and postoperatively it was necessary to give an additional 1,000 ml. of blood. Twelve hours after operation profuse bright red bleeding occurred along the drains. Bloody drainage continued until the tenth postoperative day at which time the drains were removed. The patient slowly improved and was discharged on his twenty-first postoperative day.

The patient was re-admitted 3 months later with epigastric pain and emesis of 4 days' duration. Because the pain had suddenly become generalized with referral of pain to the right shoulder, together with abdominal rigidity, he was explored with a diagnosis of perforated duodenal ulcer. Some induration was noted in the gastrohepatic ligament but no gastro-intestinal perforation was found. On the second postoperative day the patient had a recurrence of the severe upper abdominal pain. Wangenstein drainage contained bloody material for the first time. On the following day a large tarry stool was passed; the severe pain subsided. The patient appeared jaundiced. Because of the ulcer and multiple transfusion history, it was thought that the bleeding was possibly from an active ulcer and the icterus from the transfusions. However, laboratory findings indicated an obstructive jaundice. The liver gradually enlarged until it was palpable 5 fingerbreadths below the costal margin and the jaundice deepened. The abdominal pain and melena recurred several times necessitating repeated transfusions. Gastro-intestinal x-ray examination was suggestive of esophageal varices. On the 19th postoperative day the patient went into shock again and passed several tarry stools. Massive transfusion of approximately 4,250 ml. given rapidly did not bring the patient's blood pressure up from shock levels. It became apparent that the bleeding

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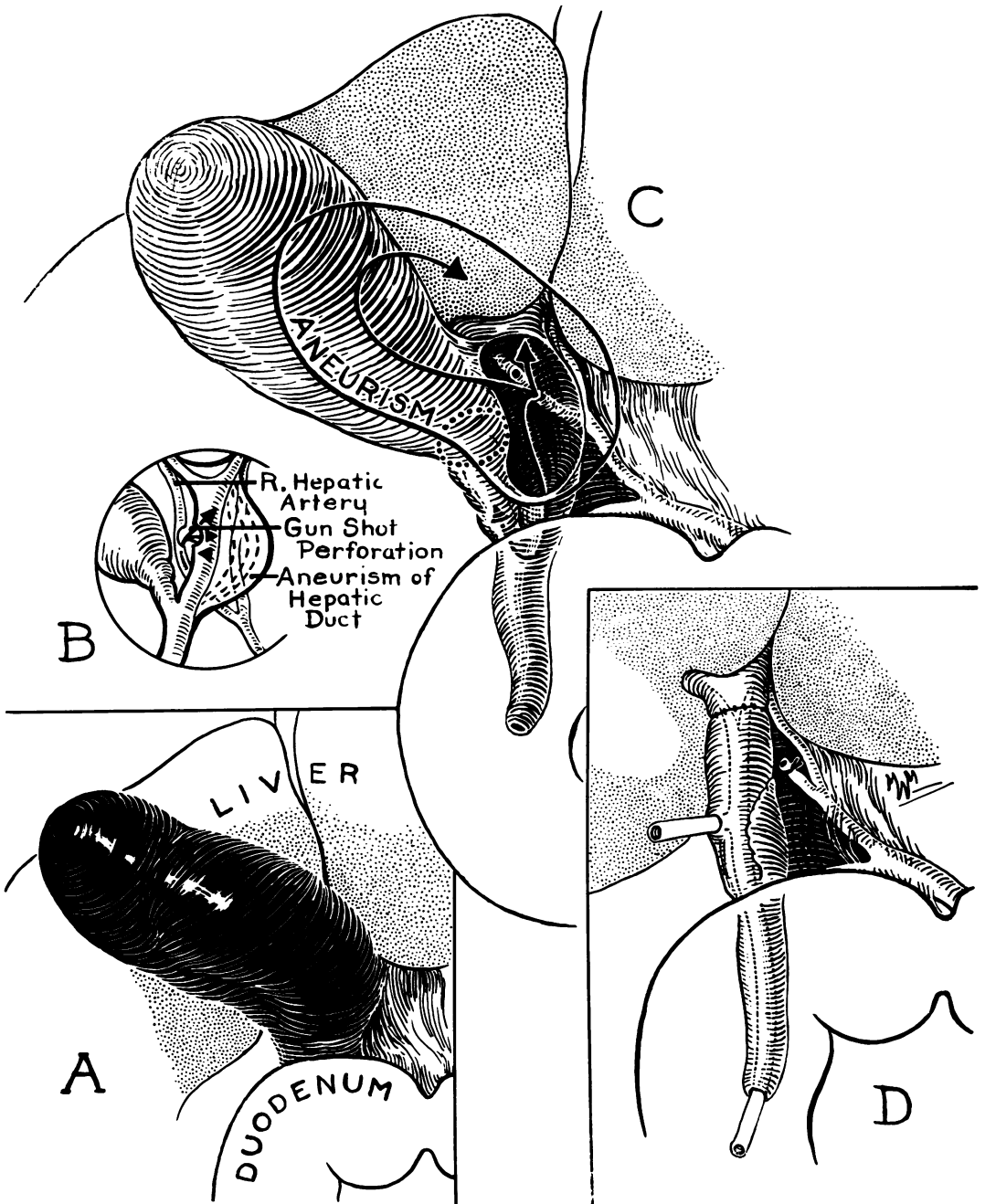


FIG. 1.

had to be controlled to prevent exsanguination. The gastro-intestinal bleeding and jaundice appeared most likely to be due to a traumatic aneurysm of the hepatic artery obstructing the common duct and bleeding into the duodenum or common duct. The patient was operated upon for the

third time, 20 days after the second operation, with the tentative diagnosis of a hepatic aneurysm. There was marked induration of the gastro-hepatic ligament as described by the surgeon who performed the previous two procedures, and a large mass was present in the region of the gall-

bladder. A bruit which could be felt in the gastro-hepatic ligament disappeared on compression of the celiac axis. The gallbladder was mobilized from the liver bed and in the process the gallbladder was entered. A large amount of old, clotted blood was evacuated. This led into a false aneurysm which in turn communicated with the common hepatic duct. In the depth of this false aneurysm could be seen the two ends of the right hepatic artery (Fig. 1 A, B, C). Vigorous bleeding occurred from both ends of the partially transected artery when manual compression of the celiac artery was released. The aneurysmal sac was dissected and an attempt was made to perform a reconstructive aneurysmorrhaphy. This was unsuccessful because of the extreme friability of the arterial wall. It was, therefore, deemed advisable to ligate the right hepatic artery distally and proximally. The common hepatic duct had been destroyed by the aneurysm for a distance of 3 cm. or more. Continuity of the biliary tract was restored with the use of the dilated cystic duct. The long limb of a T-tube was placed through the cystic duct into the duodenum and the short end up into the common hepatic duct, and an anastomosis performed between the ends of the cystic and common hepatic ducts (Fig. 1D). The patient received approximately 7,000 ml. of blood on the day of operation. Massive doses of penicillin (500,000 units every 6 hours) and 0.5 gm. of streptomycin twice daily were given for 21 days. Nineteen days postoperatively a cholangiogram revealed the T-tube to be in place and a small amount of extravasation of dye at the anastomosis. The patient was discharged from the hospital on his 32nd postoperative day, free of jaundice, melena, epigastric pain and in relatively good condition.

The patient was admitted again 4 months after his last operation for re-evaluation. He had gained 5 Kg. (11 pounds) and was feeling well. An intravenous cholangiogram showed fairly good visualization of the primary hepatic radicles and the common duct with the T-tube in place. Laboratory studies revealed normal liver function. The T-tube was removed 9 months postoperatively after a retrograde cholangiogram revealed continuity of the biliary tract without extravasation. At this time the patient weighed 61.4 Kg. (135 pounds), a gain of 11 Kg. (24 pounds) since ligation of the right hepatic artery. One year after operation the patient is well and weighs approximately 68 Kg. (150 pounds).

COMMENT

The preoperative diagnosis of an aneurysm of the hepatic artery is generally a

fortuitous circumstance, as it was in this case. The operator was forced to conclude prior to exploration that this was the most likely diagnosis in spite of the rarity of this lesion. The preoperative conclusion made the work of the operating team simpler since a more direct approach could be made. The choice of repair or ligation of the right hepatic artery was dictated by necessity in this case. A repair of the artery was out of the question due to the extreme friability of the tissues; ligation was the only way that the partial transection of the artery could be corrected. This case illustrates two important surgical principles: (1) that massive transfusion is a life-saving procedure—this patient received 21 liters in all; (2) that ligation of the right hepatic artery can be performed without fatal liver insufficiency under favorable circumstances.

DISCUSSION

The etiology of hepatic artery aneurysms has been ascribed to infection in over half of the cases.^{11, 12} Apparently this inflammatory process involves the vessel wall by direct extension from a nearby focus such as the gallbladder or liver or by infected emboli from such diseases as pneumonia, osteomyelitis, bacterial endocarditis, and typhoid fever.¹² Arteriosclerotic aneurysms are considered to be the second most common type. Only rarely has syphilis been proved to be an etiologic factor. Trauma is said to be responsible for about ten per cent of the cases and is most commonly associated with the intrahepatic type of aneurysm.

This lesion occurs three times more frequently in males than females. The average age is 38 years. It is stated that three-fourths of the hepatic aneurysms are extrahepatic. Hepatic aneurysms tend to rupture into the general peritoneal cavity or erode into the bile ducts, duodenum, gallbladder, stomach or rarely into the portal vein, producing hemorrhage of varying severity and

symptomatology. They may be of the true or false type. True aneurysms tend to be small while false aneurysms may become quite large and intimately adherent to the surrounding structures.

The triad of pain, hemorrhage, and obstructive jaundice has been emphasized by Mallory and Janson¹⁰ as the cardinal manifestations of this abnormality. The pain is most commonly located in the right upper abdomen or epigastrium. The mechanism of this symptom is either compression of the adjacent structures by the aneurysm or perforation of the aneurysm. Hemorrhage may be hidden or manifested by melena or hematemesis. The gastro-intestinal bleeding may be due to perforation into the bile ducts or bowel or may arise from superficial ulceration of the mucosa from the pressure of the adjacent aneurysm. Jaundice is produced by obstruction of the biliary tree from intraductal blood clots or by extrinsic compression of the common duct by the expanding mass. Occasionally, a pulsating tumor can be palpated in the right upper abdomen with or without a bruit or thrill. Sudden exsanguinating hemorrhage from the common duct following choledochostomy was the outstanding feature in several reported cases.^{5, 11} An hepatic aneurysm should always be considered in any bleeding following operations upon the biliary tract.

This difficult diagnosis is made chiefly from the above signs and symptoms. Aortography has been recommended¹³ and used⁹ in the diagnosis of hepatic aneurysm. Preoperative or pre-mortal diagnosis was apparently made on three previous occasions.^{9, 10} The present case should be considered the fourth. Dwight⁴ states that 12, of 26 patients operated upon, died with the lesion still undiagnosed, illustrating the difficulty of recognizing any aneurysm at operation unless this area is carefully explored.

Reconstructive aneurysmorrhaphy, wir-

ing of the aneurysm, wrapping the aneurysm with irritating plastic strips, ligation of the hepatic artery, and excision of the aneurysm are methods that have been used in the past. Other procedures such as replacement by a vein graft or plastic tubing and anastomosis to the nearby left gastric, splenic or gastroduodenal artery have been proposed. This abnormality has such a high mortality that only nine cures have been reported prior to the present case. Dwight and Radcliffe⁴ successfully wired an hepatic aneurysm discovered two years previously during an exploratory laparotomy. Guiseffi and Collins⁶ cured one with reconstructive aneurysmorrhaphy. However, they were considerably concerned about the patency of the vessel and stated that the hazard of postoperative thrombosis is always a possibility despite technical success in the reconstruction of the arterial wall. Steelquist¹³ reported two cases of successful control of unruptured aneurysm with the application of reactive plastic wrapping of the aneurysms. Four cases^{3, 7, 8, 11} are said to have been cured by ligation of the hepatic artery. Kirklin *et al.*⁹ reported the successful excision of an hepatic aneurysm which had been delineated by aortography after being discovered at a previous exploration. The present case is the second successful excision of an hepatic aneurysm (first of the right hepatic artery). Surgeons have been traditionally fearful of ligating the hepatic artery since fatal liver damage has frequently followed accidental ligation of the hepatic artery during biliary surgery. However, accessory hepatic arteries have been found in as high as 46 per cent of cadavers in a study by Brunschwig and Clarke.² There is also evidence that an aneurysm of the hepatic artery does lead to the development of the collateral circulation through branches of the superior mesenteric, left gastric, and inferior phrenic arteries.¹

SUMMARY

A case of an aneurysm of the right hepatic artery is reported. This is one of four that have been diagnosed preoperatively and the second successfully treated by excision and ligation of an hepatic aneurysm and artery (the first of the right hepatic artery). Destruction of the common hepatic duct by the aneurysm necessitated reconstruction of the biliary tract. Ligation of the right hepatic artery followed by massive antibiotic therapy can be successfully accomplished.

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