

Treatment of Aneurysm of the Hepatic Artery by Excision

Report of Case*

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THE IDEAL TREATMENT of an arterial aneurysm is resection of the deteriorated segment with restoration of arterial continuity if such is necessary for function in the particular instance. Apparently this approach has not been applied to an aneurysm of the hepatic artery, although in the world literature there are reports of 104 persons suffering from the disease. Good fortune in so treating such a patient recently prompts this report.

Of the 104 previously reported instances, most were discovered at necropsy following sudden death from rupture of the aneurysm (half into the peritoneal cavity, half into the gastro-intestinal tract). Two years ago, Sampsel, Barry and Steele²⁶ reported that a total of 90 instances of hepatic-artery aneurysm was available in the medical literature. Since then 14 additional cases have been described. These reports have been made by Dwight and Ratcliffe,⁷ McGregor,²⁰ Siew,³¹ Wolfgang-Schega,²⁷ Krückemeyer,¹⁷ Berschadskij,³ Gamarski and Netto,⁸ Barnett and Wagner,² Quattlebaum,²⁴ Hess,¹³ and Giuseffi and Collins.¹⁰ Thus our case constitutes the one hundred fifth recorded instance of an aneurysm of one of the hepatic arteries. In addition, aneurysmal arteriopathy has been noted along the celiac axis on some 35 occasions,^{9, 18} along the cystic

artery on some five occasions,⁶ along the gastric arteries on five occasions^{6, 26, 29} and but once in the superior pancreaticoduodenal artery.²⁶

Although women are more vulnerable than men to disease of the gallbladder, they have had only one fourth of the hepatic aneurysms.¹⁹ The average age of patients is recorded as approximately 38 years.¹⁹

Prone as they are to rupture, these aneurysms often perforate into the peritoneal cavity, producing sudden shock and death, or they may perforate into the biliary-duct system resulting in hematemesis or melena, or both. Occasionally, there is direct penetration into the duodenum or stomach. The classic triad of symptoms is understandable. This is pain, gastro-intestinal hemorrhage, and frequently jaundice. Jaundice can be produced by constrictive pressure on the biliary ducts with or without actual perforation and bleeding.

There have been only 21 instances^{7, 10, 24} in which the aneurysm has been recognized at the operating table during life. Thirteen of these patients died postoperatively. Only eight patients (and the diagnosis remains in doubt in three of these)^{1, 4, 15} have survived operation despite a variety of remedial attempts.^{1, 4, 7, 10, 15, 16, 22, 24} As far as we can ascertain from rather careful perusal of the available literature, excision of the aneurysm has not been reported previously. In the case summarized below the condition was so treated successfully.

* Submitted for publication October, 1954.

† The Mayo Foundation in Rochester, Minnesota, is a part of the Graduate School of the University of Minnesota.

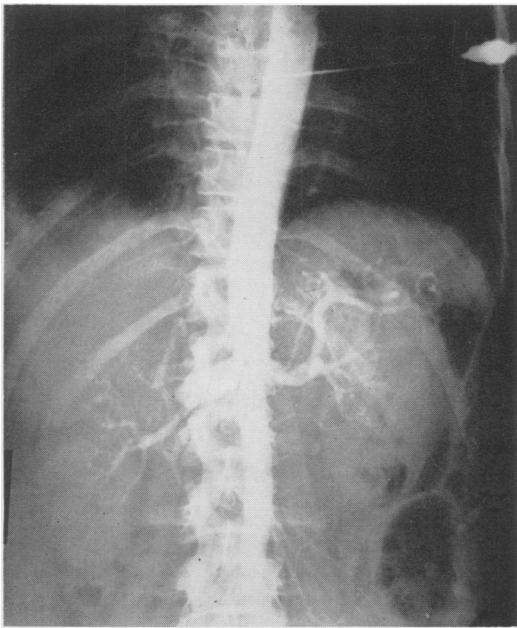


FIG. 1. Transthoracic aortogram demonstrating sacular accumulation of dye in region of celiac axis, that is, just above right renal artery.

REPORT OF CASE

A 52-year-old housewife had been experiencing attacks of abdominal cramps since 1944. They occurred about every 3 months and persisted one-half to 2 hours. Roentgenograms of the gallbladder and stomach, as well as the electrocardiogram, were all said to have been normal in 1947. The attacks were associated with nausea and emesis, but there had been no indigestion between attacks. There had never been any chills, fever or jaundice.

The patient had had a typical attack of cramps in November, 1953, then again on March 1, 1954. On March 18, while eating she had a most severe attack with projection of the pain to the back, followed shortly by syncope and the vomiting of an estimated 1 quart of blood. Later she had melena that lasted 3 days. This was the first time the patient had ever experienced gastro-intestinal bleeding.

Except for these attacks the patient's health had been good. She had had 8 prior operations, which included appendectomy in 1913, partial oophorectomy for cyst in 1920, perineal repairs in 1923, 1924 and 1930, submucous nasal resection in 1930, thyroidectomy in 1928, and hysterectomy for menometrorrhagia in 1948.

Physical examination disclosed a blood pressure of 104 mm. Hg systolic and 68 mm. diastolic, and a soft, nontender abdomen with no palpable masses or organs. The patient seemed vigorous and well

proportioned. Gastroscopy gave negative results on two occasions. Two roentgenograms of the gallbladder did not reveal any concentration of dye in the subhepatic area. Two roentgenograms of the stomach and one of the colon did not disclose any abnormality. The results of hepatic-function studies, including determinations of sulfobromophthalein excretion, prothrombin time and serum bilirubin, were all found to be in the normal range.

Laparotomy in order to ascertain the site of bleeding and in order to remove simultaneously an apparently nonfunctioning gallbladder was seriously considered at that time. The patient, however, was permitted to leave the hospital on April 2. She had stopped bleeding and had required transfusion of but 1 pint of blood.

That evening she vomited blood again and was rehospitalized. She received 2 pints of blood. Four days later she again had hematemesis. Elective laparotomy on April 9, 1954, was undertaken elsewhere. A large, pulsating tumor was noted just below the diaphragm and approximately in the location of the second part of the duodenum. Aspiration of it afforded old blood. It was thought to be an aneurysm. In view of the history and hematemesis and a thickening in the stomach, gastric resection seemed wise. Accordingly a posterior Polya procedure was carried out.

Convalescence was uneventful, but 16 days after gastrectomy the patient began to vomit blood and pass tarry stools. She was again seen at the Mayo Clinic. Esophagoscopy gave negative results. An aortogram was made by percutaneous injection into the thoracic aorta of 20 cc. of 70 per cent urokon sodium (sodium acetate) while the patient was anesthetized. A sacular accumulation was readily detectable just lateral to the area of the celiac axis (Fig. 1). It was interpreted as being indicative of an aneurysm of a main branch of the celiac artery, that is, pancreaticoduodenal, gastroduodenal or hepatic artery.

The patient continued to experience severe back pains associated with hematemesis, and on May 26, 1954, operation for the aneurysm was deemed mandatory. On exploration the spleen, esophageal hiatus and jejunum all felt normal. At the site of the posterior Polya anastomosis there was no evidence of ulceration. All of the duodenum felt normal. An aneurysm 5 cm. long was found extending toward the *porta hepatis*. After meticulous dissection to free the many adhesions and deliver the aneurysm, it became obvious that the lesion involved the hepatic and not the celiac artery (Fig. 2). The aneurysm extended from just beyond the origin of the left gastric artery, to the bifurcation of the common hepatic artery into its right and left branches. Neither branch pulsated, nor did the cystic artery. The gastroduodenal artery, however, did

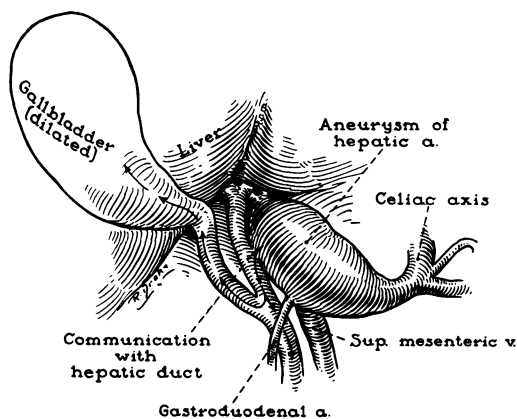


FIG. 2. Anatomic relationships before excision of aneurysm.

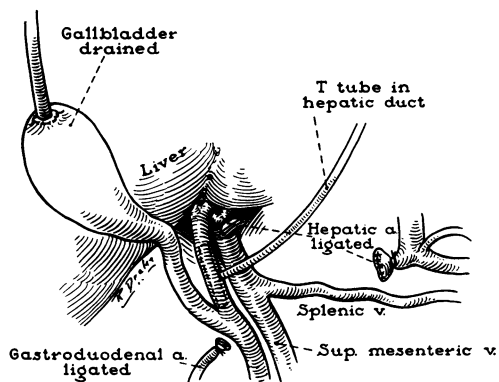


FIG. 3. Anatomic relationships at end of operation.

pulsate. It arose from the approximate center of the aneurysm. No definite right gastric artery was identified.

Since neither the right nor the left hepatic artery was pulsating it seemed obvious that there was little, if any, flow through them. Accordingly it was thought unnecessary to insert the prepared arterial homograft. The aneurysm was simply excised, as follows: The proximal end was doubly ligated and oversewn with interrupted sutures. It was necessary to separate the scarred aneurysmal sac from the portal vein by sharp dissection. Both right and left hepatic branches and the gastroduodenal artery were ligated, and the aneurysm cut free proximal to the ties. Finally the indurated sac was painstakingly peeled off the common bile duct. A definite point of perforation from the aneurysm into the duct was demonstrated. It lay about 2 cm. proximal to the junction of the cystic duct and the common duct (Figs. 2 and 3).

The opening in the common bile duct was enlarged and the duct irrigated. The gallbladder was opened and black, tarry, old blood scooped out. By repeated irrigations and repeated passing of the scoops it was finally felt that the entire biliary tract was free of debris. A T tube was left in the common duct and a No. 28 catheter was left in the gallbladder itself.

Postoperatively the patient did well. She was given antibiotics, 10 per cent solutions of glucose intravenously, and vitamins, and was in an oxygen tent at first. Her temperature remained below 99.8° F. throughout. On the 12th postoperative day the cholecystostomy tube was removed. The T tube was removed on the eighteenth postoperative day.

The results of hepatic-function tests remained unremarkable. On the 20th postoperative day the direct test for serum bilirubin gave a negative re-

sult, while the indirect test gave a value of 0.46 mg. per 100 cc. The prothrombin time was 18 seconds, and the retention of sulfobromophthalein was 8 per cent.

COMMENT

The preoperative aortogram (Fig. 1) which permitted roentgen confirmation of the diagnosis seems to have been the first one to be employed in a patient with an hepatic aneurysm. It demonstrated the lesion superbly.

The urgency of definitive therapy once the condition has been recognized is best expressed in these disquieting figures. In the 104 previously recorded cases of hepatic-artery aneurysm, about 80 per cent of the patients bled to death. Only about *half* of these had external evidence of bleeding; that is, hematemesis or melena. The other half bled silently into the peritoneal cavity. Further, of the 22 patients whose aneurysms were recognized during life (21 at operation), only eight survived, and in three of these the diagnosis is in doubt. The surgical correction in these eight was as follows: ligation, four cases^{4, 15, 16, 24} (including two in which the diagnosis is in doubt); wiring, one;⁷ suturing, one;²² suturing of liver, one¹ (diagnosis in doubt); and endo-aneurysmorrhaphy, one.¹⁰ In addition, there were approximately a dozen patients who died despite ligation.

The entire unresolved question of arterialization of the liver, both its need and its sources, suddenly besets the general surgeon who is unexpectedly confronted with a pulsating, fragile but potentially fatal, aneurysm of the hepatic artery. The available evidence confirms the need of the liver for some arterial blood.²³ This does not preclude the ability of the liver to survive interference with the flow of blood through the normal hepatic artery.

It will be recalled that the celiac arterial axis divides to form the left gastric artery, the splenic artery, and the hepatic artery proper. The last-mentioned artery gives off the gastroduodenal artery, after which it proceeds as the common hepatic artery from which the right gastric artery usually arises. In about 40 per cent of cases the right gastric artery arises proximal to the gastroduodenal artery, that is, from the hepatic artery proper.¹⁴

Since 1905,¹² it has been experimentally recognized that ligation proximal to origins of the gastroduodenal and right gastric arteries is uniformly safe. As the ligature is moved liverward, however, more and more collaterals are excluded with an increasing mortality from hepatic necrosis. An analysis of 27 documented instances of accidental ligation of the human hepatic artery confirms this impression.¹¹

The risk of even distal ligation is greatly mitigated by the presence of additional arteries to the liver in some people. In 1927 Rabinovitsch²⁵ found an additional vessel in 46 per cent of 66 cadavers. Tandler³¹ discovered an accessory artery in some 32 per cent. Segall,²⁸ by perfusing with barium and gelatin, noted communication to phrenic arteries in every one of 37 livers. Of Michels' 200 cadavers,²¹ an accessory or an aberrant hepatic artery was present in 41.5 per cent. Likewise, a study of 500 cadavers at Northwestern University⁵ yielded an accessory vessel in 42.2 per cent, and a replacing aberrant vessel in 34.8 per cent. Thus the surgeon, when he is forced to ligate distal to

the origin of the right gastric and gastroduodenal branches, is favored by the fact that additional arterial sources are present in almost half the people.

If the vessel is already thrombosed, as in our case, the problem is entirely obviated because such a vessel is obviously no longer crucial to life and can be safely excised. It may well be that the slow occlusion from thrombosis somehow facilitates the slow expansion of collaterals till they alone are able to supply the organ's entire requirement. If the vessel is not thrombosed, excision with graft replacement is necessary. In the case reported herein, once the tedious task of exposure which permitted excision was completed, insertion of a graft would have been quite feasible but was not deemed necessary because of the thrombosis.

SUMMARY

A case of hepatic-artery aneurysm is presented which is unique in two regards: (1) the diagnosis was established preoperatively by aortography, and (2) the aneurysm was successfully excised.

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