

Technic of Hepatic Lobectomy *

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THE REMOVAL of a large portion of the liver is a relatively infrequent surgical procedure, and few surgeons have had much experience with the operation. However, during his career a busy surgeon will likely encounter a number of hepatic lesions requiring resection. Accumulated experience indicates that the operation can be done with reasonable safety, and with excellent expectation of cure when performed for benign lesions. It is occasionally worthwhile for palliation in malignant disease. As an indication of the increasing interest in hepatic resection, Pickrell and Clay¹⁴ reported three cases of left hepatic lobectomy in 1944, and could find but two previous cases in the literature. In 1951, Altman¹ reported the left lobe of the liver had been removed 68 times for hemangioma alone. Few attempts were made to remove the right hepatic lobe until very recently. Wendel¹⁷ in 1910, is reported to have removed the greater portion of the right lobe together with a portion of the colon for lobular adenoma. In 1949, Wangenstein¹⁶ removed a right hepatic lobe almost entirely replaced by metastasis from a previously resected carcinoma of the stomach. Lortat-Jacob and Robert⁸ reported in 1952, a case of right hepatic lobectomy for metastatic carcinoma in which they ligated and divided the hilus structures before dividing the liver substance. In 1952, in a meeting of the Southern Surgical Association one of us¹⁵ reported three cases of massive resection of the liver, of which one

was the first reported right lobectomy for primary carcinoma of the liver. An acceptable technic by which the liver could be resected was described. Since that time right lobectomy has been performed for benign and malignant lesions at least 15 times.²⁻¹³

Major difficulties in resection of the liver are technical, and the most important is control of hemorrhage. Increasing experience with resection of the liver has in large measure established the validity of principles described in 1952. Because of the feasibility and desirability of excisional therapy for a number of hepatic diseases, the technic is presented again in detail.

Important Steps in Massive Liver Resections

1. Adequate exposure through a large thoraco-abdominal incision.
2. Complete mobilization of the liver by dividing all its peritoneal attachments.
3. Dissection of the porta hepatis with individual ligation and division of the structures entering the involved lobe.
4. Division of the liver substance with a blunt instrument, rather than by sharp incision.
5. Ligation of smaller vessels with fine silk or cotton; control of oozing from the liver surface by Gelfoam packs and omentum; avoiding heavy mattress sutures through masses of liver substance.

The operability of hepatic lesions can be determined only by exploratory laparotomy, although the diagnosis of malignancy may often be established by needle biopsy of the liver. Any of the usual abdominal incisions can readily be converted into a

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thoraco-abdominal one, and the adequate exposure thus obtained is absolutely essential for lesions of the right lobe where the diaphragm should be divided to the vena cava. For left hepatic lobectomy a high vertical incision may suffice. After the falciform ligament has been divided and the attachments to the diaphragm severed, the lobe can be delivered from the abdomen and usually removed without difficulty. This is especially true in those cases in which the weight of the tumor has stretched the remaining liver substance and so thinned it as to make division and removal comparatively simple. In other instances the procedure used for removal of the right lobe may be required.

After the peritoneal attachments of the right lobe have been divided the liver can be readily elevated, and the points of entry of hepatic veins into the vena cava isolated and exposed. The hepatic veins vary from three to five in number. They are short and brittle, and it may be difficult to determine from which side of the liver they are derived. Since it is imperative to preserve the flow of blood from the remaining lobe, it is safer to secure the branches within the liver substance, rather than ligate the main trunks in continuity at the junction with the vena cava. Isolation of these is a dangerous step in the operation, and the cava itself may be easily torn.

The dissection of the porta hepatis is begun by opening the common duct and locating the hepatic ducts with a probe. This instrument should remain throughout the operation, so as to avoid injury to the duct. Hepatic ducts within the liver are very thin and can be damaged easily if the dissection is carried too close. After the cystic duct is ligated and divided the cystic artery is followed to the hepatic artery, the right branch of which is isolated, ligated and divided. After dividing the right hepatic duct, further dissection readily exposes the portal vein and its right and left branches. After dividing the branch to the

involved lobe, the stump is oversewn with a suture of arterial silk rather than trusting to simple ligature.

Division of the liver with a sharp instrument results in profuse hemorrhage which is difficult to control because the vessels retract within the liver substance. Therefore, the section is made close to the falciform ligament with a blunt instrument, such as the handle of a knife, a closed scissors, or small clamp. The liver substance is easily torn through, and the larger ducts and vessels are exposed without cutting them. They may be divided between clamps as encountered and ligated individually. This is accomplished with a minimum of blood loss. Heavy mattress sutures through masses of liver substance are avoided, but small bleeding points are ligated with stick ties of fine silk or cotton. Oozing from the raw liver surface can be controlled with a sheet of Gelfoam gauze. The greater omentum, held in place by large cigarette drains is placed over the Gelfoam. A Penrose drain should be placed between the omentum and the liver surface to prevent the accumulation of blood and bile that might lead to a subphrenic abscess. The right pleural space is drained by an underwater tube, and the diaphragmatic, thoracic and abdominal incisions are closed, with a small catheter draining the common duct. Should a biliary fistula develop from the liver surface slight negative pressure through this catheter may aid in its closure. Adequate blood replacement throughout the operative procedure is mandatory and may require 4,000 to 6,000 cc. although the actual blood loss is often much less.

The postoperative course is usually tranquil, but the complications associated with any major thoraco-abdominal surgical procedure must be anticipated. These include pulmonary difficulties, infections, subphrenic accumulations and disturbances of fluid and electrolyte balance. Measures to prevent or correct complications must be carried out promptly.

Lewis⁷ has performed massive liver resection using hypothermia as an anesthetic adjunct and temporarily occluding the aorta and the vena cava. The involved lobe is rapidly sliced off without blood loss. This is certainly an advance in technic but can only be performed in centers where such facilities and adequate assistance are available. This method at best, probably involves more difficulties and dangers than the technic here described which can be carried out by any experienced surgeon in any hospital, provided expert anesthesia and adequate blood replacement facilities are at hand.

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DISCUSSION

DR. HOWARD PATTERSON: I would like to thank Dr. Quattlebaum for educating us further in this field of liver surgery. His excellent paper, presented before this Association in 1952, stimulated and encouraged us to try some of these major hepatectomies. At Roosevelt Hospital we now have a small series of five, two of which are alive and well at three and one-half years and two and one-half years after operation.

Two anatomical facts about the liver came to me as a great surprise. First, the right and left lobes do *not* come together in the midline, at the notch in the anterior margin, but rather at a point about one and one-third inches to the right of the midline. The line of demarcation is straight and very definite, appearing promptly when one ties the right branch of the hepatic artery. The second surprise came when I heard that the blood supply

to the left lobe may come entirely from a separate artery arising from the left gastric. Mr. Rodney Smith (of St. George's Hospital in London) has emphasized this important anomaly, having encountered it twice in a series of about a dozen major hepatectomies.

It is always a treat to hear from Dr. Quattlebaum about his courageous attack on these distressing hepatoma problems.

DR. LEE BROWN: Dr. Rives, members and guests: I have enjoyed these two excellent papers on liver resection, the first by Dr. Wilson, the second by Dr. Quattlebaum.

I would like to mention a case that was recently hospitalized at the University of Virginia Hospital. He was a 48-year-old white male who presented the complaints of abdominal pain and episodic vomiting of bright red blood. Examination revealed