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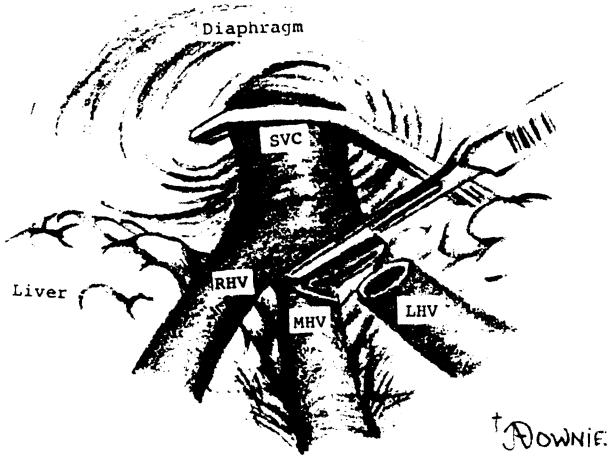

FIG. 1

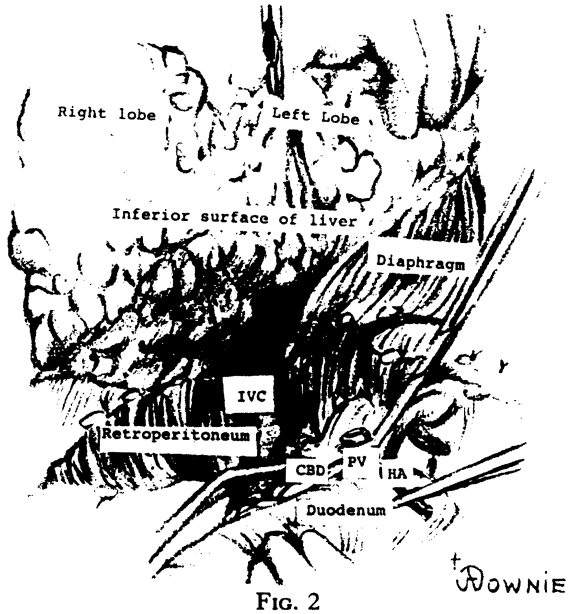

FIG. 2

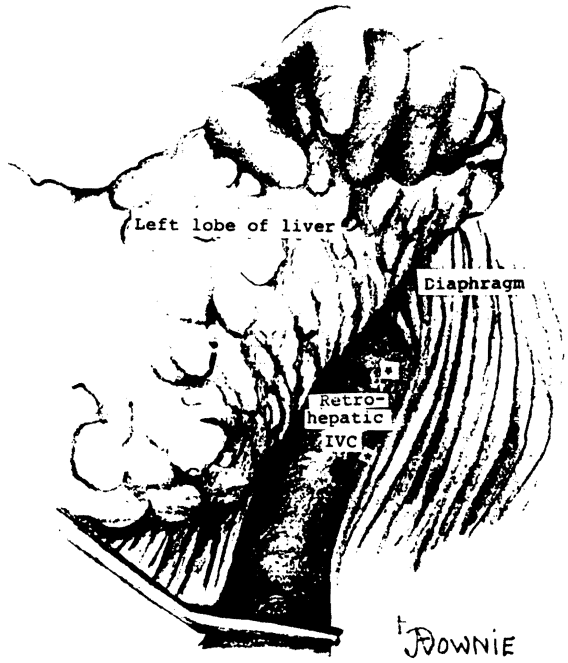

FIG. 3

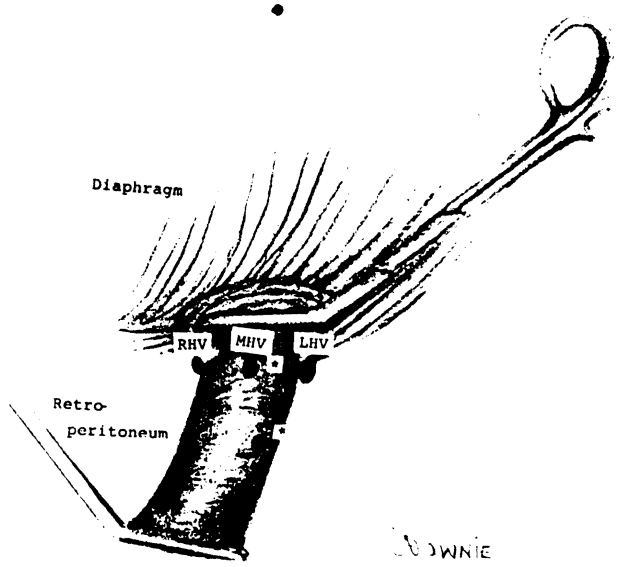

FIG. 4

FIG. 1. Division of left and middle hepatic veins, *LHV* and *MHV*, after stripping down the hepatic parenchyma covering. *SVC*, Superior vena cava, and *RHV*, right hepatic artery.

FIG. 2. Liver is pulled up and to the right, exposing the infrahepatic vena cava, *IVC*. *PV*, Portal vein; *HA*, hepatic vein, and *CBD*, common bile duct.

FIG. 3. The liver has been almost completely "peeled off" the retrohepatic cava; two minor hepatic veins have been cut in the process, *. *IVC*, Inferior vena cava.

FIG. 4. The retrohepatic vena cava after the removal of the liver. The stumps of the hepatic veins can be seen below the upper part of the clamp. *RHV*, Right hepatic vein; *MHV*, middle hepatic vein, and *LHV*, left hepatic vein.

Preservation of the Retrohepatic Vena Cava During Recipient Hepatectomy for Orthotopic Transplantation of the Liver.—Andrei C. Steiber, J. Wallis Marsh, Jr., and Thomas E. Starzl.

PRESERVATION OF THE RETROHEPATIC VENA CAVA DURING RECIPIENT HEPATECTOMY FOR ORTHOTOPIC TRANSPLANTATION OF THE LIVER

Andrei C. Stieber, M.D., J. Wallis Marsh, Jr., M.D., *and*
Thomas E. Starzl, M.D., PH.D., F.A.C.S., *Pittsburgh, Pennsylvania*

ORTHOTOPIC HEPATIC TRANSPLANTATION has been an accepted therapeutic modality for end-stage disease of the liver of various causes for several years (1). As a result, the number of hepatic transplant centers, as well as the number of transplants each individual center performs, have increased dramatically. In spite of the remarkable standardization of the technique involved in this procedure, the operation remains a formidable technical challenge. The recipient hepatectomy, including the caval cuff formation, represents the key to the success of this operation (2). We present herein a modification of the final phase of the recipient hepatectomy, which we believe makes this part of the procedure easier and safer.

Total hepatectomy is a crucial step during the orthotopic transplantation of the liver and the key to the ultimate success of the operation. Two of the most important steps of the hepatectomy are the identification and ligation of the right adrenal vein, as well as the preservation and preparation of the vena cava cuffs, for the subsequent implantation of the donor liver. Of the two cuffs involved (suprahepatic and subhepatic), the suprahepatic cuff has the potential for being the most difficult to dissect or for being too short, or both. Obviously, a cuff that is too short or damaged during the final phase of the hepatectomy will make the subsequent anastomosis both extremely difficult and hazardous. We are describing herein what we think is an easy, safe and satisfactory method for preservation of the retrohepatic inferior vena cava "in toto" during the final part of the recipient hepatectomy, which enables the transplant surgeon to control the right adrenal vein and to prepare the caval cuffs in a leisurely and secure manner.

As soon as the portal vein has been sectioned and the patient placed on venovenous bypass (the use of which we advocate very strongly), the left triangular, falciform and gastrohepatic ligaments are rapidly divided. The infrahepatic vena cava can be easily encircled with a finger at this point and clamped. Any additional dissection around the infrahepatic cava, except for what is necessary to be able to place the vascular clamp, is useless and dangerous. The peritoneal reflections of the right, left and falciform ligaments around the anterior aspect of the suprahepatic cava can then be sectioned as well, the upper cava encircled digitally and then immediately clamped. The left and middle suprahepatic veins are then dissected proximally (into the hepatic parenchyma) for approximately 2 centimeters, using both sharp and blunt technique, then severed (Fig. 1). At this point, the surgeon displaces the left lobe to the right, in this manner, exposing the caudate lobe and left aspect of the retrohepatic cava. Then, with the left fingers, the caudate lobe is grasped

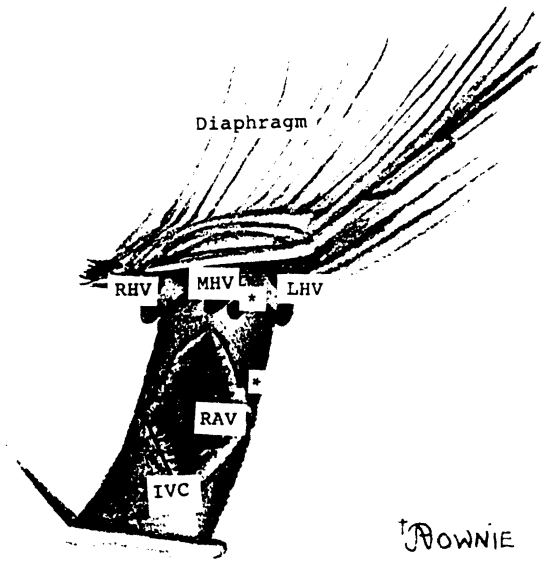

FIG. 5. The anterior caval wall has been opened. The ostium of the right adrenal vein, *RAV*, is seen from within the caval lumen. *RHV*, Right hepatic vein; *MHV*, middle hepatic vein; *LHV*, left hepatic vein, and *IVC*, inferior vena cava.

From the Department of Surgery, Transplantation Division, University of Pittsburgh Health Center, Pittsburgh.

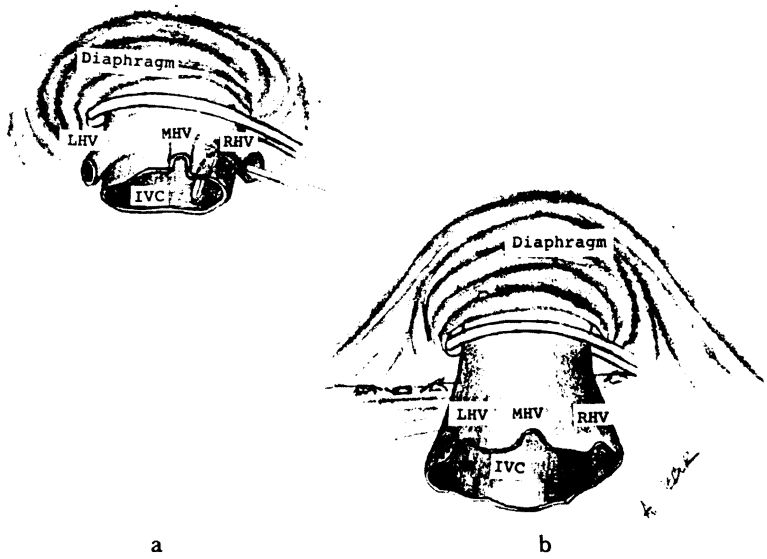

FIG. 6. a, The septa between the lumens of the hepatic veins and inferior vena cava are being opened. b, The final funnel-like single lumen cuff. *LHV,* Left hepatic vein; *MHV,* middle hepatic vein; *IVC,* inferior vena cava, and *RHV,* right hepatic vein.

and pulled anteriorly to define the plane between the hepatic parenchyma and the vein (Fig. 2). The liver can be then rapidly "peeled off" the retrohepatic vena cava with sharp technique, cutting the accessory hepatic veins in the process and moving from left to right over the anterior surface of the cava (Fig. 3). The hepatic tissue present in the angle between the upper anterior portion of the vena cava and the major hepatic veins can be left in situ, to be removed at a later time. The dissection proceeds further to the right with the division of the right suprahepatic vein 2 centimeters from its confluence, then the adrenal gland and the retroperitoneal area behind the right lobe of the liver are exposed, all the while taking precautions not to injure the adrenal gland (Fig. 4).

Once the liver has been removed, the anterior wall of the retrohepatic vena cava is opened in the center, to stay far enough from the two future cuffs. The ostia of the right adrenal vein and of the diaphragmatic veins occasionally encountered at this level are identified from within the caval lumen (Fig. 5) and subsequently ligated with ease, by simply passing ties around these branches, behind the cava. Forming of the upper and lower cuffs, as well as hemostasis of the retrohepatic "bare area" can then be easily accomplished. Because of the ease of this technique, it is tempting to ligate the stumps of the suprahepatic vein and anastomose the donor liver to the recipient cava below these branches. This is not advisable, since the length of the remaining cava is too great and the liver, when allowed to fall back after performance of the anastomoses, will cause kinking of the vessel with consequent outflow obstruction. The suprahepatic vein stumps must be opened longitudinally on their inferior aspect instead (Fig. 6a), in this manner forming an ample funnel-like channel with the main caval lumen (Fig. 6b) funnel that can then be trimmed to the appropriate length. We believe that this method represents the safest way of completing the recipient heptectomy during the orthotopic hepatic transplantation procedure, to have perfect control of the retrocaval branches and the establishment of cuffs.

SUMMARY

A modified final phase of recipient hepatectomy in orthotopic hepatic transplantation is presented. It involves preservation of the retrohepatic vena cava "in toto" to decrease the risk of injury to the adrenal gland and assure better control of the adrenal vein, as well as the forming of the caval cuffs, for the subsequent implantation of the donor liver.

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