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LETTER FROM THE FRONTLINE

Wow, That Portal Vein is Small: Preventing Portal Vein Thrombosis in Liver Transplantation for Small Children

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TO THE EDITORS:

Portal vein thrombosis after pediatric liver transplantation is a common and devastating complication. Occurring in up to 8% of pediatric liver transplant recipients who are less than 15 kg, it frequently leads to graft loss and the need for emergent retransplantation.[1,2] Children with biliary atresia are at particularly high risk and often develop an atretic portal vein; this makes the portal vein anastomosis particularly difficult. Adding further complexity is the frequent use of left lateral segment allografts, which frequently introduce portal vein size mismatching and orientation issues.

Several options exist for managing the technical challenges related to portal vein anastomoses. Although the traditional approach has been end-to-end portal vein anastomoses, size differences often make this approach impossible. When this is the case, a proximal mesenteric vein anastomosis, branch vein patch, or donor venoplasty may be necessary to complete the anastomosis.[3] When angulation issues result in low portal flow after transplantation, augmentation can be achieved through the ligation of the left renal vein or other mesocentral venous collaterals. Portocaval and porto-arterial anastomoses have also been proposed to increase flow.

Although these approaches may effectively lower the risk of portal vein thrombosis after liver transplantation, they are less than optimal solutions for pediatric recipients with diminutive portal veins or preoperative portal vein thrombosis. A potential answer to this issue may be the use of a renoportal anastomosis. This approach has been described in adult liver transplantation with promising results.[4] In pediatric patients, we believe that this technique provides a unique solution to issues relating to flow, size, and orientation mismatch.

In general, there are no specific criteria for using a renoportal anastomosis; however, we find that size mismatch and portal flow issues are the most frequent indications. If the recipient portal vein measures 2 to 3 mm in size or is less than half the diameter of the donor portal vein, we often consider this technique. Additionally, if the portal vein flow is inadequate despite clamping of the left renal vein, we will also consider this approach.

TECHNIQUE

An appropriately sized venous conduit is prepared; this depends on the size relationship between the donor and recipient vessels. Suitable conduits include the external iliac vein, femoral vein, superior mesenteric vein, splenic vein, and saphenous vein (for living donors). The procurement of all these potential conduits is appropriate to facilitate as many technical options as possible during the transplant operation.

The transplant hepatectomy proceeds as usual. As much length as possible of the recipient portal vein should be maintained. Before the completion of the hepatectomy and the clamping of the portal vein and inferior vena cava, the left renal vein of the recipient is exposed. On the back table, an end-to-end anastomosis is fashioned between the left portal vein of the donor and the vein conduit. The liver is brought to the field, and the hepatic vein anastomosis is completed. A clamp is placed on the recipient left renal vein toward the kidney, and the vein is ligated at the level of the inferior vena cava. The renoportal anastomosis is created between the conduit and the left renal vein. The clamps are removed, and the liver is reperfused. Once the bleeding is under control, a partial clamp is placed on the side of the vein conduit. An anastomosis is created between the end of the recipient portal vein and the side of the donor conduit (Fig. 1). The portal vein clamp is removed, and the arterial anastomosis is completed.

In conclusion, using a renoportal anastomosis for hepatic portal inflow overcomes 2 issues that commonly challenge pediatric liver transplantation in small children. First, the renal vein, the donor left portal vein, and the conduit are well matched in size. Second, there frequently is little flow through the mesenteric venous system of these small children. Using the left renal vein as inflow provides a reliable amount

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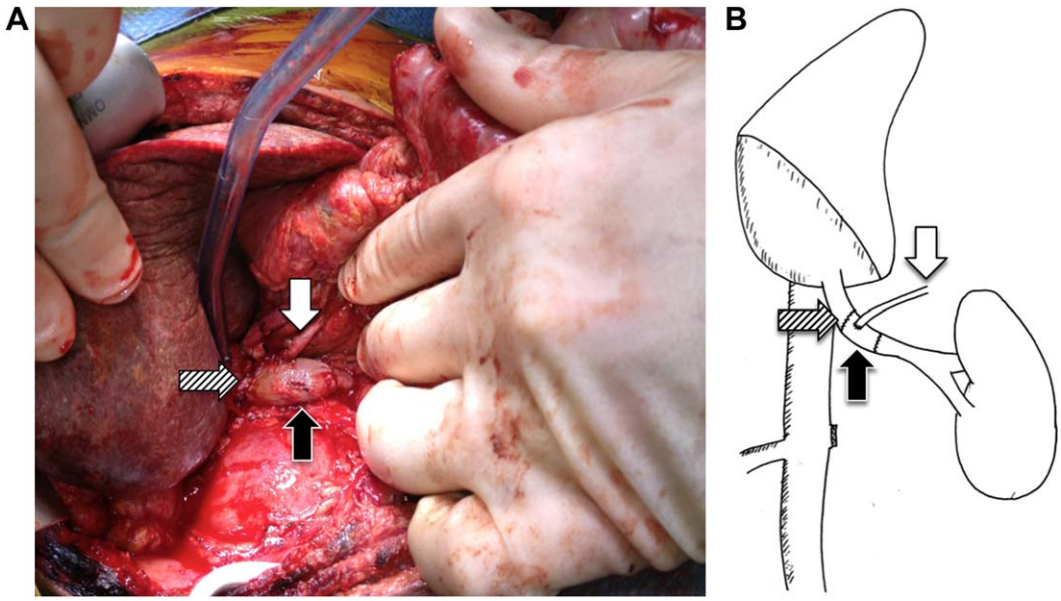

Figure. 1. Establishing hepatic inflow through the use of a renoportal anastomosis. The white arrows represent the recipient portal vein, the black arrows represent the venous conduit to the left renal vein, and the dashed arrows represent the renoportal anastomosis. Panel A represents an intraoperative photograph of the procedure and Panel B represents schematic drawing (with permission from Seth A. Waits).

of flow to the allograft. Although the sewing of the donor portal vein to the iliac vein conduit may not be necessary, it dilates with time and frequently becomes the dominant inflow to the liver. Even in the setting of pretransplant portal vein thrombosis, the left renal vein provides adequate inflow and likely also adequate mesenteric venous drainage.

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