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## Retransplantation of the liver after side-to-side caval anastomosis

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**Abstract** Caval reconstruction in orthotopic liver transplantation is generally performed by two end-to-end anastomoses, using a portal and caval-axillary bypass to sustain hemodynamic stability. In the “piggyback” modification, the donor’s suprahepatic inferior vena cava (IVC) is anastomosed end-to-side to the recipient’s preserved IVC. We have used a recently described variant of

the piggyback in 18 patients in whom both IVCs are anastomosed side-to-side. We report two patients who needed three retransplants after this reconstruction and conclude that regrafting can be performed in a quick and safe manner.

**Key words** Liver, transplantation  
Cava side-to-side, liver retransplantation

### Introduction

In orthotopic liver transplantation, the recipient’s inferior vena cava (IVC) is usually removed from above the renal veins to the diaphragm during hepatectomy. The anhepatic phase is made safe by a venovenous bypass decompressing the occluded cava and the portal vein [4]. In some very frail and hemodynamically unstable patients, however, it is probably desirable to avoid total occlusion of the IVC. In addition, the venovenous bypass causes occasional problems [3], and it may not be feasible in small children. These difficulties have been largely overcome by the piggyback modification of the operation, in which the peripheral end of the donor’s IVC is closed and its central end anastomosed end-to-side into the preserved recipient’s IVC [5]. Recently, Belghiti et al. described an alternative technique to the piggyback approach, by preserving the full length of the recipient’s cava, closing both ends of the donor’s IVC, and performing a side-to-side caval anastomosis, using lateral clamping of the recipient’s IVC and no bypass [1]. We have selected this new method as our first choice procedure for caval reconstruction. One of its major advantages is that it allows easy retransplantation. This paper briefly describes the fashioning of a further side-to-side caval anastomosis with a new graft without IVC crossclamping.

### Patients and methods

We performed 18 consecutive primary orthotopic liver transplantations without venovenous bypass. The recipient’s IVC was clamped laterally and a side-to-side caval anastomosis was done according to Belghiti’s description [1]. The results of this initial experience have been satisfactory, with no fatality or complication related to the technique. Three retransplants were, however, needed: two in a 46-year-old woman for hepatic artery thrombosis and later for poor primary function of unknown etiology, and one in a 68-year-old female for chronic rejection.

The retransplantation technique is as follows. The nonfunctioning allograft is removed, but the cavocaval anastomosis and a cuff of the first donor’s IVC are preserved. The recipient’s IVC is clamped laterally so that venous return is maintained.

As can be seen in Fig. 1, the new graft is brought into the operative field and rotated to the right for access to the caval area. The posterior (right) row of the new cavocaval anastomosis between the IVCs of the first and second donors is completed. The same 4/0 Prolene running suture is used to perform the anterior (left) row. Although this view is from the left-hand side of the patient, the surgeon usually works from the right.

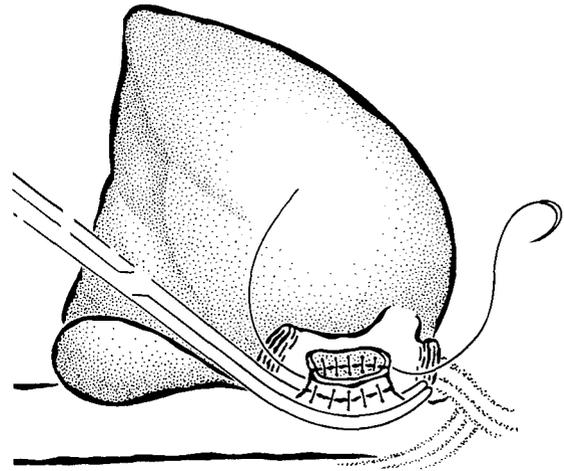
Should a third transplant be necessary, as was the case with one of our patients, another similar anastomosis can be done, joining an IVC cuff of the second donor to the new liver.

## Results

We were able to perform the three reoperations without caval occlusion or bypass. Fashioning a new side-to-side anastomosis turned out to be surprisingly simple, as the operative time was, on the average, 5.6 h (range 315–380 min), compared to 7.7 h (range 300–715 min) for the primary transplants. The relative ease of the regrafting procedures was also reflected in a moderate blood loss (mean 13.6 RBC, 18 FFP, 4.7 platelet units, and 1.61 autotransfusions) compared to the 18 primary transplants (mean 19.6 RBC, 23.3 FFP, 7.9 platelet units, and 1.91 autotransfusions). No technique-related complication was recorded postoperatively.

## Discussion

The side-to-side caval anastomosis described by Belghiti et al. avoids retrocaval dissection and shortens the anhepatic phase [1]. It also obviates the need for venovenous bypass; the IVC is, indeed, not occluded and a temporary left portal-to-IVC shunt may be done if splanchnic decompression is deemed necessary. These advantages prompted us to use this new method routinely, and no intra- or postoperative complication directly related to the technique occurred in any of our 18 patients. We used the temporary portocaval anastomosis in the first patient but omitted it in the other 17 with no technical or hemodynamically detrimental effect. The fact that, on three occasions, we were able to retransplant very fragile patients without crossclamping of the IVC or bypass strengthens our hypothesis that this technique appears to be as safe as the classical



**Fig. 1** A cuff of the first donor's IVC is anastomosed side-to-side to the second donor's cava

caval reconstruction with two end-to-end anastomoses. In addition, retransplantation without occlusion of the IVC may be easier than after the piggyback modification or the recently described "face-à-face" vena cava plasty, in which a patch of donor IVC, including the hepatic veins, is tailored to accommodate an oval incision of the recipient's preserved IVC [2] because the caval phlebotomy in the latter procedures is transverse rather than longitudinal, thus making partial occlusion more difficult.

In conclusion, the ease of retransplantation after side-to-side caval anastomosis makes this technique a useful addition to the liver transplant surgeon's armamentarium.

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