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Tripartition of the deceased's liver

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Background: Driven by organ shortage, the liver transplant community has introduced liver bipartition to augment the number of grafts for transplantation. However, split liver transplantation has not yet reached its full potential application and results not even in the centers that do high volume splitting. This probably in part is due to the high rates of complications associated with it. Based on the knowledge gleaned from an intricate anatomical study, author presents two theoretical techniques for tripartition of the deceased's liver that might overcome the complications associated with ischemic or congested grafts and expand the deceased donor pool.

Materials and methods: The tripartition proposed here has been based on data obtained from the dissection of 18 normal fresh livers of adult cadavers at the Centers for Surgical Anatomy and Technique, Emory University School of Medicine, Atlanta, Georgia, USA. The livers were obtained from Emory's Body Donor Program after ensuring the adherence of the research project to ethical guidelines. The livers were injected differentially with colored latex; dissection casts were prepared; and the intricate architecture at the sheath ramifications' level was studied.

Proposed technique: The liver parenchyma is split on the right sides of the falciform ligament and middle hepatic vein to procure a graft composed of the inferior part of the left medial section (S4b) and the major superficial fraction of its superior part (S4a). The left parenchymal incision starts superiorly inferior to the junction of the left and middle hepatic veins. The right parenchymal incision starts superiorly distal to the middle hepatic vein's tributary from segment 8. The superior parenchymal incision runs between the superior ends of the right and left parenchymal incisions and is deepened, aiming at the hilar plate. This graft is drained by the middle hepatic vein transected below the confluence of its major tributary from segment 8 and by the umbilical fissure's vein in case the latter is/more than 5 mm in diameter. The graft's artery is the artery of segment 4 and its duct constantly begins at the corner formed by the umbilical and transverse portions of the left portal vein. This segment 4 graft is procured with venous patch formed by the right half of the umbilical part of the left portal vein. The second graft is composed of the left lateral section, caudate lobe's part to the left of the inferior vena cava, and the deep part of S4a. The celiac axis and left hepatic duct are maintained with the graft. The third graft is composed of the right lobe, the part of caudate lobe located deep to the inferior vena cava and caudate process. The bile duct, right branch of the hepatic artery, and main portal vein trunk are maintained with the graft. The inferior vena cava is split: the left aspect of the cava is maintained with the second graft; the anterior and right aspects of the cava are maintained with the third.

Conclusion: Our anatomical results suggest that tripartition into viable grafts might be feasible. The techniques are complex; however, as the learning curve is mastered they would be gainable.

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