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The Influence of Accessory Right Inferior Hepatic Veins on the Venous Drainage in Right Graft Living Donor Liver Transplantation

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ABSTRACT

Background/Aims: Proper venous outflow reconstruction is essential for the success of living donor liver transplantation (LDLT). It has also a decisive impact on postoperative graft dysfunction. The accessory right inferior hepatic veins (IHVs) usually drain parts of the lateral sector of the right hemiliver graft (RHL).

The purpose of our study was to: 1) evaluate the drainage patterns of the IHVs in right hemiliver grafts; 2) analyze the influence of IHVs on the dominance relationships between the right and middle hepatic veins in RHL's; 3) evaluate some potential correlation between drainage patterns of IHVs and the portal vein anatomy.

Methodology: We analyzed 3-dimensional CT-imaging reconstructions of 71 potential live liver donors evaluated at our Institution between January 2003 and October 2004.

Results: 1) Thirty-six (51%) donors had inferior hepatic veins (IHV) with detectable venous drainage territories, 2) the RHV/IHV-complex was dominant in 97% of cases, and the RHV as a single vein without anatomical IHV was dominant in 94% of right hemiliver grafts, 3) 27 of 71 livers (38%) showed a central (n=11) or peripheral (n=16) PV anomaly, 4) IHV provided a mean 32% of venous drainage in the right lateral sector, and in some cases drained up to 25% of the right medial sector irrespective of the PV anatomy, 5) such cases required IHV reconstruction to prevent severe tissue congestion in the right hemiliver graft.

Conclusions: Accurate insight into the drainage patterns of the right and middle hepatic veins and precise knowledge of the functional volume drained by the IHV are essential when planning for the proper outflow reconstruction of right hemiliver grafts in LDLT.

KEY WORDS:

Liver surgery; Living donor liver transplantation; Hepatic vein dominance; Accessory right inferior hepatic vein; Venous drainage; 3-Dimensional reconstruction; Small-for-size syndrome

ABBREVIATIONS:

Caudate Veins (CHV); Computed Tomography (CT); Right Hemiliver Graft (RHL); Total Liver Dominance (TLD); Hemiliver Dominance (HLD); Accessory Right Inferior Hepatic Vein (IHV); Inferior Vena Cava (IVC); Living Donor Liver Transplantation (LDLT); Left Hepatic Vein (LHV); Middle Hepatic Vein (MHV); Right Hepatic Vein (RHV); Total Liver Volume (TLV); Three-Dimensional (3-D); Small-For-Size (SFS)

INTRODUCTION

In LDLT surgeons and recipients are faced with an inevitable small-for-size (SFS) situation due to graft swelling, expected early after transplantation. Vascular outflow, with its high degree of variability, was found to be of equal or greater importance than vascular inflow in assuring optimal graft outcome after right graft procurement (1,2). The assessment of the dominance relationships between the middle and right hepatic veins plays an essential role in planning right graft LDLT.

Pivotal to the concept of venous outflow reconstruction is the avoidance of segmental congestion. Such congestion is typically seen in the marginal zone of the graft (medial sector), and bears the risk of lethal graft failure due to SFS syndrome (1,2). The lack of a constant pattern of venous anatomy further increases the risk of outflow complications in right graft LDLT (3,4). The accessory right inferior hepatic veins (IHVs) are commonly

expected to drain parts the portal segments 6 or 7 (Couinaud) in the postero-lateral sector of the RHL (5).

In this paper we present our experience with venous mapping using the software HepaVision (MeVis, Bremen-D) in surgery planning for right graft LDLT.

The purpose of this study was to analyze the influence of accessory right inferior hepatic veins (IHVs) on the dominance relationships between the right and middle hepatic veins in the right hemiliver graft (RHL) by: 1) assessing the drainage patterns of the IHVs in the RHL, and 2) evaluating some potential correlation between drainage patterns of IHVs and the portal vein anatomy. As a consequence of this analysis, the potential necessity of IHV and/or middle hepatic vein (MHV) reconstructions in the graft was given special consideration.

METHODOLOGY

Study population: We evaluated 71 potential