Technical refinement of prosthetic vascular graft anastomosis to recipient inferior vena cava for secure middle hepatic vein reconstruction in living donor liver transplantation

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Background: Hemashield vascular grafts has been used for middle hepatic vein (MHV) reconstruction during living donor liver transplantation (LDLT). We occasionally encounter outflow disturbance of MHV conduit at the anastomotic stump of the middle-left hepatic vein (MLHV) trunk. To mitigate the disturbance, we carried out a series of studies regarding hemodynamics-compliant MHV reconstruction.

Methods: This study comprised of three parts; part 1: determining the causes of outflow disturbance; part 2: computational simulative analysis; and part 3: clinical application of our refined technique. The types of Hemashield conduit-MLHV stump reconstruction were end-to-end anastomosis (type 1), side-to-end anastomosis (type 2), and oblique cutting of the conduit end and patch plasty (type 3).

Results: In part 1 study, the reconstruction types were type 1 in 23, type 2 in 25, and type 3 in two. Significant anastomotic stenosis was identified in seven (30.4%) in type 1, six (24.0%) in type 2, and none in type 3. The size of MLHV stump was the most important factor for anastomotic stenosis. Through part 2 study, technical knacks were developed as follows: the conduit end was cut in a dumb-bell shape and a vessel patch attached; and then sutured bidirectionally from the 9 o'clock direction. In part 3 study, these knacks were applied to five patients and none of them experienced noticeable anastomotic stenosis.

Conclusions: Our refined technique to perform conduit-MLHV stump anastomosis helped to reduce the risk of anastomotic stenosis for relatively small MLHV stumps. Further experience and technical evolution will contribute to achieve failure-free MHV reconstruction during LDLT operation.

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