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LETTER TO THE EDITOR

Effective and Safe Living Donor Hepatectomy Under Intermittent Inflow Occlusion and Outflow Pressure Control

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Keywords Living donor liver transplantation · Living donor hepatectomy · Pringle's maneuver · Vena cava clamping

Abbreviations
LDH Living donor hepatectomy

We read the article provided by Sultan et al.[1] showing better performance in harmonic scalpel, with statistically significant shorter operative time (360 min vs. 440 min, $p < 0.01$) statistically non-significant but smaller amount of blood loss (300 ml vs. 500 ml, $p = 0.11$), and similar grade III complication rate (11.1% vs. 16.7%, $p = 0.49$) compared with clamp-crush technique for living donor hepatectomy (LDH). Contradictory to the results, they concluded clamp-crush technique as a simple, easy, safe, and cheaper method for LDH. It is true that clamp-crush is cheaper as the authors concluded. However, simplicity, easiness, or proficiency in surgical processes should be associated with operative time and blood loss, and safety with complications. We are concerned about the inconsistency between the actual results and the conclusion with preference in clamp-crush technique.

Moreover, we regret possible rooms for improving their surgical outcomes regardless of the instruments used for their parenchymal transection method without the use of hepatic blood flow control. As the authors mentioned in the introduction, safety of the donors is the main concern in living donor liver transplantation and all potential risk factors for the development of donor-related morbidities, mainly associated with blood loss, should be avoided.[1] Thus, we have performed LDH with several technical tactics to perform parenchymal transection more effectively with less blood loss under a learning curve, even under upper midline incision approach.[2, 3]

In our center, inflow control was performed by Pringle's maneuver for total hepatoduodenal occlusion. Outflow venous pressure control was performed by infrahepatic vena cava clamping and zero end-tidal airway pressure.[3] After the mobilization of the right lobe, the intrahepatic vena cava was carefully isolated and controlled using a 4-Fr polyvinyl tape with a tourniquet. The hepatoduodenal ligament was also controlled. The parenchymal transection was initiated using cavitron ultrasonic surgical aspirator (CUSA™; Valleylab Inc., Boulder, CO, USA) for isolating Glissonean and venous branches without inflow and venous pressure control, but end-tidal airway pressure was set at zero by an anesthesiologist. Proceeding of the parenchymal transection might reveal venous blueish bleeding with atrial-venous pulsation, or inflow reddish bleeding from white Glissonean branches. Once a surgeon recognizes significant venous bleeding on the transection plane, total or subtotal infra-hepatic vena cava intermittent clamping was applied for 15 min followed by a 5-min release. For inflow bleeding, the intermittent Pringle's maneuver was applied.

One hundred and fifty-six cases of right lobe LDH was performed, infrahepatic vena cava clamping was applied for 74 cases (47.4%), and the Pringle maneuver was for 108 cases (69.2%). The mean vascular occlusion time was 31 ± 13 min for vena cava clamping, and 32 ± 16 min for Pringle's maneuver, respectively. The mean operative time and blood loss was 275 ± 45 min and 214 ± 101 ml, respectively. The mean peak of total bilirubin and aspartate aminotransferase was 1.8 ± 0.8 mg/dl and 417 ± 158 IU/L, respectively. Grade III postoperative complications observed in three cases (1.8%), including intra-abdominal bleeding ($n = 1$), portal vein thrombosis ($n = 1$), and biliary leakage ($n = 1$), were successfully treated. Thus, our smaller amount of operative blood loss (214 ml vs. 500 ml) might be associated with decreased grade

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III complication rate (1.3% vs. 16.7%), compared with the results by Sultan et al.[1]

For inflow control, Imamura et al.[4] revealed that the application of intermittent Pringle's maneuver in LDH made no negative outcomes both on donors and recipients. For outflow venous pressure control, Ueno et al.[5] showed vena cava clamping made significantly decreased blood loss during anatomical hepatic resection for tumors. Thus, intermittent inflow occlusion and venous outflow pressure are the key techniques in hepatic resection including LDH, although there have been no evidences to prove the ideal instruments for parenchymal transection as the authors mentioned.[1]

We regard that the current article by Sultan et al.[1] showed that harmonic scalpel made better performance with shorter operative time in LDH compared to clamp-crush technique. Moreover, they should apply intermittent inflow occlusion and outflow pressure control in LDH, in order to have less blood loss, shorter operative time, and less complication rate.

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