Laparoscopic Living Donor Hepatectomy for Pediatric Liver Transplantation: the First 7 Cases in Spain

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ABSTRACT

Herein we report on laparoscopic donor hepatectomy (left lateral sectionectomy) for pediatric living donor liver transplantation by using a pure laparoscopic approach. Seven laparoscopic living donor procedures were performed during the period March 2016 to February 2017 at our institution. The average age of donors was 33.3 years. Preoperative liver function was normal in all donors. Four donors required 1 or more Pringle maneuver(s). The etiology was biliary atresia (n = 3), metabolic disorders (n = 2) (OTC deficiency), Alagille syndrome (n = 1), and neonatal ductopenia (n = 1). The graft was implanted orthotopically in 6 patients; we performed an auxilliary transplantation in a patient with an OTC deficiency. The time of donor surgery was 363 minutes. Dindo-Clavien complications among donors were type I (n = 1), type IIa (n = 1), and type IIb (n = 2). The mean hospital stay for the recipients was 14 days. The mean donor stay was 3.7 days. Perioperative donor and recipient mortality was 0%. Graft survival was 87.5% with 1 graft loss secondary to inadequate venous outflow. In conclusion, we can propose the laparoscopic approach in experienced centers as a "standard of practice" due to its minimal complication rate and short hospital stay.

LIVING donor liver transplantation (LDLT) is a challenging procedure, particularly in the pediatric population where cadaveric donors are not readily available. In recent years, laparoscopic liver resection and augmented reality technology have both been implemented in the LDLT technique. In 2002, the first case of laparoscopic donor hepatectomy (left lateral section graft [L-LLS]) was performed for LDLT in children [1,3]. Laparoscopy-assisted donor hepatectomy was extensive to adult liver transplantation, with hybrid techniques or pure laparoscopic right hepatectomy [2]. Experts have recently proposed L-LLS for pediatric LT as a new standard practice for donor hepatectomy. We report the first 7 cases of LLS for pediatric LT performed in Spain.

MATERIALS AND METHODS

During the period from March 2016 to June 2017, 7 cases of L-LLS for pediatric liver transplantation were performed in our unit. Main etiologies included biliary atresia (n = 3), ornithine transcarbamylase deficiency (n = 2), Alagille syndrome (n = 1), and neonatal ductopenia (n = 1). In our series, the relationships between donor and recipient were mother (n = 3), aunt (n = 3), and uncle (n = 1). Mean donor age was 33.3 (range, 27–43) years, and mean body mass index (BMI) was 21.9. The main technical steps in the donor operation have been described previously,[1] with the donor in the supine position. We utilized the "Japanese position," where the surgeon is positioned on the right side of the donor. Five ports are typically used: a 10-mm optical trocar at the umbilical site and another at the right axillary line; a 12-mm trocar at the areolar line 4–5 cm below the right costal arc; a 5-mm trocar at subxiphoid location; and a 10-mm trocar as an extracorporeal tourniquet for intermittent hepatic pedicle clamping (left axillary line). The hepatic pedicle is approached from the left side to identify the left hepatic artery and the left portal vein. In 4 cases, a minor hepatic artery for segment IV from the left hepatic artery was sacrificed without consequences. Then, the LLS is mobilized. Parenchymal transection is initiated 1 cm to the right of the falciform ligament,

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with high-energy devices 1–1.5 cm deep, and then with ultrasonic surgical aspiration. Intrahepatic vascular and biliary structures are divided between titanium clips and polymer clips. The left bile duct is sectioned with a one-row stapler. The left hepatic vein is identified and wrapped with cotton tape. Parenchymal transection is completed with a simple left-hanging maneuver. The LLS remains attached to the liver by the main left vascular structures: the left hepatic artery; the left portal vein; and the left hepatic vein. A plastic bag is placed through a suprapubic incision and remains open below the LLS. The 3 main vascular structures are then divided. The LLS is finally removed through an 8-cm Pfannestiel incision.

RESULTS

The length of the donor surgery was 363 (range, 255–450) minutes. Intermittent hepatic pedicle clamping (15-minute episodes) was used in 4 donors (30, 25, 10, and 25 minutes). In 6 cases, the graft was implanted orthotopically. An auxiliary liver transplantation was performed in an 11-year old recipient with OTC deficiency. The right portal vein was narrowed until a 4-mm Hg gradient of pressure was achieved between the right and the left portal veins. One graft with independent left hepatic veins for segments II and III required an iliac Y-graft interposition. Recipient and graft survival rates at 6 months were 100% and 87.5%, respectively (1 graft loss secondary to inadequate venous outflow). Recipient mean hospital stay was 14 (range, 10–22) days. Complications occurred in 3 donors, including postoperative pain (Dindo-Clavien grade I, in 1 donor), nausea and vomiting (grade IIa, in 1 donor), and dizziness requiring readmission (grade IIb, 1 donor). The length of donor hospital stay was 3.7 (range, 3–6) days.

DISCUSSION

Herein we have reported our initial experience with laparoscopic donor hepatectomy in pediatric liver transplantation in Spain. The laparoscopic approach has several advantages, including a cosmetic effect, less postoperative pain and need for analgesia, faster recovery, and magnified vision of the surgical field. Although L-LLS is not among the most complex laparoscopic liver resection approaches (grade 10-12 on Iwate classification [4]), it requires a high level of experience in both liver laparoscopic resection and LDLT. At a recent (2016) consensus conference it was pointed out that “laparoscopic donor LLS has been well validated and is considered the standard technique for donor liver procurement in experienced centers” [5]. In this sense, our results reflect this statement.

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