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Successful adult-to-adult living donor liver transplantation using liver allograft after the resection of hemangioma: A suggestive case for a further expansion of living donor pool

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ABSTRACT

INTRODUCTION: Hepatic hemangioma is one of the most common benign liver tumors. There are few published reports regarding liver transplantation using liver allografts with hemangioma.
PRESENTATION OF CASE: A 45-year-old man was evaluated as a living donor for 19-year-old son with cirrhosis due to hepatic fibrosis. Preoperative investigations revealed 20 and 7 mm hemangiomas, at segment 2 (S2) and 4 (S4) respectively. Considering the anatomical relation of S2 hemangioma and Glisson 2, liver graft was designed as left lobe excluded S2 hemangioma by partial resection. Estimated graft recipient weight ratio (GRWR) even after partial resection of hemangioma was reasonable. During the donor operation, a partial hepatic resection of S2 hemangioma was performed. Intraoperative pathologic findings revealed a cavernous hemangioma, and then, the left hepatic graft with the caudate lobe was harvested. Actual GRWR was 0.90%. Donor's postoperative course was uneventful. Recipient's postoperative course was almost uneventful. Postoperative computed tomography of the recipient showed the graft regeneration without increase or recurrence of hemangioma.
DISCUSSION: Organ shortage is a major concern in the field of liver transplantation. A novel donor source with a further option is extremely crucial for a guarantee of liver transplantation. We experienced the first case of adult-to-adult living donor liver transplantation using liver allograft after the resection of hemangioma.
CONCLUSION: We advocate that the use of liver allograft with hemangiomas in adult-to-adult LDLT settings can be remarkable strategy to reduce the problem of organ shortage without any unfavorable consequences in both living donor and recipient.

1. Introduction

Because the usage of extended criteria for donation of liver transplantation has been needed due to donor organ scarcity for transplantation [1], liver grafts from marginal donors including liver with benign tumors have been accepted as treatment options. Hepatic hemangioma is one of the most common benign tumors of the liver, as described up to 7% in autopsy findings [2].

The hemangioma usually remains asymptomatic [3] and has a benign course [4–6], although symptomatic hemangiomas may rarely require either interventional or surgical treatment [7–9]. There are few published reports regarding liver transplantation using liver allografts with hemangiomas [10–16]. In not only deceased donor liver transplantation but also living donor liver transplantation (LDLT), liver allografts with hemangiomas have been utilized for transplantation. However, in LDLT setting, there are only two published reports about liver allografts with hemangioma, and they were both liver transplants for pediatric recipients [12,15]. Until now, there has been no report in adult-to-adult LDLT with liver grafts with hemangioma.

We present here the first report of successful adult-to-adult LDLT using liver allograft with hemangioma.

2. Presentation of case

A 19-year-old male was admitted with liver failure due to congenital hepatic fibrosis. A prior diagnosis of congenital hepatic fibrosis had been established by gastroenterologists before 13 years. His liver function deteriorated progressively, with the

Abbreviations: LDLT, living donor liver transplantation; GRWR, graft recipient weight ratio; POD, post-operative day; GV/SLV, graft liver volume to standard liver volume.

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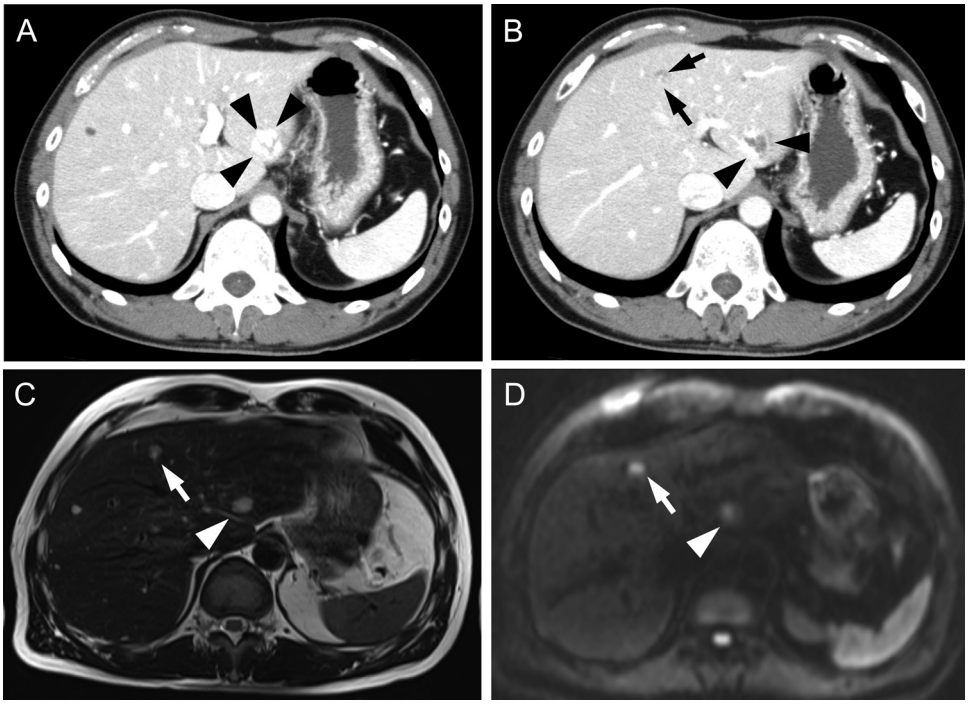

Fig. 1. Preoperative contrast-enhanced abdominal computed tomography (A, B) and magnetic resonance imaging (C, D) of the donor liver with cavernous hemangiomas. S2 hemangioma was indicated by arrowheads, and S4 hemangioma was indicated by arrows.

following laboratory findings: serum total bilirubin 25.2 mg/dl, prothrombin time-international normalized ratio 1.78, aspartate aminotransaminase 119 IU/l, and alanine aminotransferase 71 IU/l. No rupture of esophageal and gastric varices was seen. However, he had some critical episodes of grade 2 hepatic encephalopathy, and intensive cares including plasma exchange was seriously required. The preoperative liver profile was evaluated as Child-Pugh classification of grade C (11 points) and an MELD (Model for End Stage Liver Disease) score of 34 points.

A 45-year-old male was evaluated as a living donor for his son. The liver function tests of the donor were totally within the normal range with no evidence of any coagulopathy. Donor preoperative computed tomography and magnetic resonance imaging revealed 20 mm and 7 mm hemangiomas, at segment 2 (S2) and 4 respectively (Fig. 1). Estimated left lobe volume with the caudate was 503 ml. Considering the anatomical relationship of S2 hemangioma and Glisson 2, liver graft was designed as the left lobe graft with caudate lobe excluded S2 hemangioma by partial resection (Fig. 2). Estimated graft volume after hemangioma partial resection was 482 ml, which accounted for 0.83% of graft recipient weight ratio (GRWR).

Thus, the recipient status was an end-stage liver disease (i.e., advanced liver cirrhosis), and this donor was only a candidate for this recipient. After an approval of institutional ethical committee, we scheduled LDLT for this case.

A LDLT donor and recipient procedure was performed as described elsewhere [17,18]. At the beginning of living donor operation, in vivo partial hepatic resection of the S2 hemangioma was performed without the Pringle maneuver. Intraoperative ultrasonography was used to identify the location of S2 hemangioma and Glisson 2 to avoid the injury to Glisson 2 structures (Fig. 3A). The resected specimen from the donor liver was confirmed to be a cavernous hemangioma by an intraoperative pathologic examination, and then, the left hepatic graft with caudate lobe was harvested. The donor operation time was 521 min, and the bleeding volume of the donor operation was 1250 ml, but most of the bleeding occurred

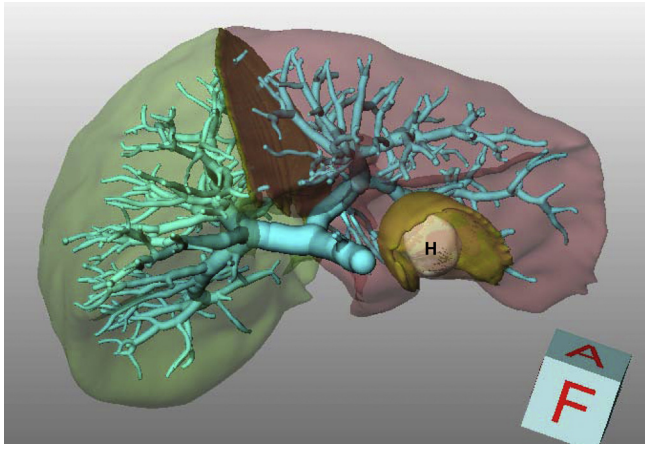

Fig. 2. The 3D-image simulation. Hemangioma was shown in H, with partial resection margin.

after the resection of the hemangioma. The actual liver graft weight was 504 g, and resulting in an actual GRWR of 0.90%.

The recipient operation was performed with standard procedures. At the time of reperfusion, no bleeding was observed from the resection site of S2 hemangioma (Fig. 3B). Splenectomy was added in this case, because of the existence of splenic artery aneurysm. Recipient operation time was 632 min, and blood loss was 5320 ml.

The donor's postoperative course was almost uneventful, and he was discharged from the hospital on the post-operative day (POD) 12. The recipient was discharged from the hospital on POD 31 without subsequent liver necrosis or bile leakage from the resection site of S2 hemangioma. However, on POD 39, the recipient was re-admitted to the hospital because of the intra-abdominal bleeding, and urgent operation was performed for hemostasis. The cause of bleeding was gastric varix rupture close to splenectomy site, and there was no bleeding sign from the resection site of S2 heman-