Hepatic Artery Reconstruction With Autologous Inferior Mesenteric Artery Graft in Living Donor Liver Transplant Recipients

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ABSTRACT

Introduction. In living donor liver transplantation (LDLT), hepatic arterial continuity is crucial to avoid biliary leakage, biliary stricture, cholangitis, and graft and patient loss. Sometimes there exist factors making anastomosis difficult or even impossible. In these cases, a vascular graft may be needed to bridge the two arteries for revascularization.

Method. Medical records of 297 patients who underwent LDLT between June 2000 and July 2016 at the Hepatopancreatobiliary Surgery and Liver Transplantation Unit of Dokuz Eylul University Hospital were reviewed retrospectively. Twenty-eight (9%) patients younger than the age of 18 were excluded from the study. The remaining 269 patients were included in the study. We analyzed data of patients who developed hepatic arterial complications during or after LDLT and underwent revascularization using autologous interposed inferior mesenteric artery (IMA) grafts.

Results. In 8 (2.9%) of the 269 patients who underwent LDLT and were included in the study, autologous interposed IMA grafts were used for the hepatic artery revascularization. All of the patients were males. Their mean age was 42 (range, 25–57). The mean duration of follow-up was 83.25 months (range, 3–144 months). One patient developed intraoperative hepatic arterial thrombosis (HAT) after autologus IMA reconstruction and this patient needed retransplantation. No arterial complications developed in the other 7 patients.

Conclusion. Autologous interposed IMA graft could be used as an alternative vascular graft in hepatic artery revascularization to provide tension-free hepatic arterial continuity.

THE SUCCESS of living donor liver transplantation (LDLT) is possible if the hepatic artery flow is not problematic. A healthy hepatic arterial continuity is a prerequisite to avoid biliary leakage, biliary stricture, cholangitis, and graft and patient loss [1–3]. In LDLT, hepatic arteries of the recipient and graft sometimes have all the necessary features for the standard arterial revascularization (length, diameter compliance, and so on), and sometimes there exist factors making anastomosis difficult or even impossible. Among the most important factors making the hepatic artery anastomosis difficult in a candidate for a liver transplant are atherosclerosis, arterial thrombosis, and, in patients with hepatocellular carcinoma (HCC), endothelial damage that can occur after transarterial chemoembolization (TACE) and intimal dissection caused by fragility [4–6]. In intimal dissection cases, it may be necessary to cut the hepatic artery several times until a solid arterial end with no intimal injury where anastomosis can be

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achieved is found. The resultant shortened arteries may not reach each other for tension-free anastomosis, and a vascular graft may be needed to bridge the two arteries for revascularization [4]. Additionally, additional vascular grafts may be required during hepatic arterial anastomosis in anatomic variations, such as arterial diameter discrepancy, presence of replaced right-left hepatic artery, presence of double arteries in the graft, and in cases when graft retransplantation is needed [7]. Among the other factors that necessitate arterial revascularization in the post-operative period is artery thrombosis or stenosis that cannot be treated with endovascular methods after LDLT, pseudoaneurysm, and low amplitude of hepatic artery flow in Color Doppler Ultrasound Screen (CDUS). Therefore, to overcome all the hepatic artery problems that arise in LDLTs, alternative hepatic artery vascular reconstruction methods should be well known [7–10]. In the literature, many arterial and venous grafts such as splenic artery, gastroduodenal artery, right gastroepiploic artery, left gastric artery, middle colic artery, splenic artery, sigmoidal artery, radial artery, inferior mesenteric artery (IMA), coeliac trunk, inferior mesenteric vein, saphenous vein, gonadal vein, and donor iliac artery have been reported to be used for revascularization if arterial complications develop in LDLTs [4,11–19]. As the experience and the number of transplants have increased, arterial graft use for revascularization has come to the forefront, but there is still no consensus on the gold standard of vessel grafts for revascularization [5,20,21]. In the present study, the results related to patients for whom the autologous interposed IMA graft was used for hepatic arterial revascularization in LDLT are presented.

PATIENTS AND METHODS

Patients

Medical records of 297 patients who underwent LDLT between June 2000 and July 2016 at the Hepatopancreatobiliary Surgery and Liver Transplantation Unit of Dokuz Eylul University Hospital were reviewed retrospectively. Twenty-eight (9%) patients younger than the age of 18 were excluded from the study. The remaining 269 patients were included in the study. Data such as age, gender, body mass index, etiology, Child-Pugh-Turcot (CTP) score, modified end-stage liver disease (MELD) score, acid presence, liver graft type, transplantation indication, duration of surgery, cold ischemia time, duration of intensive care and hospital stays, graft survival, causes of death, survival-mortality rates, retransplantation status, mean duration of follow-up, and donor age regarding the patients who developed hepatic arterial complications during or after LDLT and underwent revascularization using autologous interposed IMA grafts are shown in Table 1.

Surgical Technique

The IMA graft used for arterial reconstruction was dissected from the place where it originated from the aorta. After the arterial branches were ligated, the graft with a length of approximately 3–3.5 cm and an internal diameter of 2–2.5 mm was prepared (Fig 1). The IMA was clamped with a vascular bulldog clamp before the graft was removed to check whether there were any problems

Table 1. Characteristics of the Patients

	Case 1	Case 2	Case 3	Case 4	Case 5	Case 6	Case 7	Case 8
Age of recipient	51	25	46	51	57	33	39	34
Gender of recipient (M/F)	M	M	M	M	M	M	M	M
BMI of recipient (kg/m^2)	31	24	31	26	28	22	22	21
Etiology	Alcholic cirrhosis	Budd-Chiari Syndrome	HBV-related cirrhosis	HBV-related cirrhosis	HCV-related cirrhosis and HCC	Cryptogenic cirrhosis	HBV and HDV–related cirrhosis	HBV-related cirrhosis
CTP	C	B	B	B	B	B	B	B
MELD	21	16	18	18	16	17	16	16
TACE	–	–	–	–	+	–	–	–
Graft type	RL	RL	RL	RL	RL	RL	RL	RL
Operation time (min)	330	420	320	360	420	575	565	365
Cold ischemia time (min)	90	90	80	95	150	140	160	45
Reasons for using IMA graft	HAT	Intimal dissection of recipient HA	HAS	Intimal dissection of recipient HA	Intimal dissection of recipient HA	Intimal dissection of recipient HA	Intimal dissection of recipient HA	Intimal dissection of recipient HA
Graft's survival (mo)	137	11 d	27 d	30 d	134	144	115	133
Recipient's survival (mo)	137	32 d	27 d	30 d	134	144	115	133
Retransplantation	–	+	–	–	–	–	–	–
Death	–	+	+	+	+	–	–	–
Age of donor	20	23	18	25	21	20	38	44
Gender of donor	M	F	M	M	M	F	F	F

Abbreviations: M, male; F, female; BMI, body mass index; HBV, hepatitis B virus; HCV, hepatitis C virus; HDV, hepatitis D virus; RL, right liver; HAT, hepatic artery thrombosis; HA, hepatic artery; HAS, hepatic artery stenosis.