



Early Detection of a Hepatic Artery Pseudoaneurysm After Liver Transplantation Is the Determinant of Survival

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ABSTRACT

Background. Hepatic artery pseudoaneurysm (PA) after liver transplantation (LT) is a rare but potentially fatal complication. Among a series of 50 patients of LT, we experienced 3 such cases. Some authors also have reported cases of PA, either intrahepatic or extrahepatic. The aim of this study was to investigate the important factors that affect the treatment outcome.

Methods. Three patients were presented. To analyze the factors, not only our patients but also the patients with PA reported in the literature (including 10 case series and 23 case reports) were enrolled for analysis. The possible factors probably affecting the survival were compared statistically, including age, sex, clinical manifestation as bleeding (including gastrointestinal bleeding, hemobilia, or intra-abdominal bleeding), treatment (with embolization or surgical exploration or stent), diagnosis establishment before or after bleeding, and so forth.

Results. From univariate analysis, the significant factors that affect survival are sex (female) ($P = .036$), stent treatment ($P = .006$), and early detection ($P = .036$), whereas age ($P = .493$) and presentation with hemorrhage ($P = .877$) are not significant factors. However, according to multivariate analysis, stent treatment has a borderline significance ($P = .056$).

Conclusions. Early detection of such a life-threatening complication is a key determinant of survival. “Early” does not refer to early postoperative days but means the detection prior to the rupture of the pseudoaneurysm. Postoperative imaging studies such as computed tomographic scan or magnetic resonance cholangiopancreatography early and periodically to follow up the graft status is recommended, especially for those who had received other interventions before or after the liver transplantation.

HEPATIC artery pseudoaneurysm (PA) after liver transplantation (LT) is a rare but devastating and often fatal complication [1–26]. Among a series of 50 patients of LT, we experienced 3 such cases. Some authors have also reported cases with PA of the hepatic artery after LT, either intrahepatic or extrahepatic. The aim of the present study was to investigate the important factors that affect the survival.

METHODS

After providing written informed consent, 50 patients who received LT (including cadaver donor and living related donor) at our

institution since January 2011 to December 2014 were enrolled into the study. Institutional internal review board approval was obtained (Table 1).

Before liver transplantation, to assess the variation of vessels and biliary system, both tri-phase computed tomographic (CT) scan of liver and magnetic resonance cholangiopancreatography (MRCP) were routinely performed for each recipient and each living donor

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Table 1. Summary of Our Patients With Hepatic Artery Pseudoaneurysm (PA) After Liver Transplantation

Patient No	Age (yr)	Sex	Cause of LT	Types of Donor	Location of PA	Clinical Presentation	Interval (Days)	Detection Before or After Bleeding	Imaging Studies	Treatment	Outcome
1*	44	M	Alcoholic liver cirrhosis	Deceased	Branch of Rt hepatic artery, extrahepatic	Hypovolemic shock after hemobilia	38	After	CT, arteriography	TAE failed, exploration	Died
2†	63	M	HBV carrier, liver cirrhosis, HCC	Living	Hepatic artery near anastomosis, extrahepatic	Hypovolemic shock after internal bleeding	147	After	CT, arteriography	TAE failed, exploration	Died
3‡	55	M	HBV carrier, liver cirrhosis, HCC	Living	Hepatic artery, intrahepatic	Jaundice, fatigue	762	Before	CT, MRCP, arteriography	Vascular stent for exclusion of PA	Survived

Possible predisposing factor.

Abbreviations: HBV, hepatitis B viral infection; HCC, hepatocellular carcinoma; CT, computed tomographic scan; MRCP, magnetic resonance cholangopan creato graphy; TAE, transcatheter hepatic arterial embolization; ERBD, endoscopic retrograde biliary stent; PTBD, percutaneous transhepatic biliary drainu age.

*Dislodgement of bile duct stent (ERBD stent) for bile duct stenosis, PTBD insertion, hemobilia on the second day after PTBD.

†ERBD stent for bile leak after transplantation, bleeding 4 months later.

‡Mild stenosis at hepatic artery anastomosis, PTBD placement.

as our routine. However, for some cadaver donors, because of the severe critical condition before donation, CT or MRCP could not be performed.

To assess the vessels and bile ducts of the liver graft of each recipient, we routinely performed the follow-up CT or MRCP study at 1, 2, and 4 months after LT. In some instances, it was undertaken earlier if unexpected abnormal laboratory data or unexpected clinical conditions (such as unexplainable fever, changed hemodynamics, etc) occurred. PA of the hepatic artery, either intrahepatic or extrahepatic, was defined from tri-phase CT or MRCP or hepatic arteriography.

The time lapse between the LT and the diagnosis of the PA, clinical manifestations, clinical data, treatment options, and so forth, were collected.

Factors Affecting Outcomes of Those With Pseudoaneurysm After Liver Transplantation

To assess the significant factors affecting the treatment outcome, our sample is small (3 cases). To analyze the factors, not only our patients but also the patients with PA reported in the literature (including 10 case series [Table 2] and 23 case reports [Table 3]) [1-26] were enrolled for analysis. To analyze the significant factors affecting survival, the data were collected from the available description in the literature, including age, sex, clinical manifestation such as bleeding (including gastrointestinal bleeding hemobilia or intra-abdominal bleeding), treatment (with embolization or surgical exploration or stent), diagnosis establishment before (the so-defined “early detection”) or after bleeding, and so forth. In some literature, some patients whose data had not been clearly mentioned were excluded in the analysis about that factor.

Statistical Analysis

Comparisons between the groups of survival and of death were made using SPSS (Chicago, Ill, United States). All the data are reported as mean ± SD. Comparisons between different groups for each point were performed using 1-way analysis of variance (ANOVA) and multivariate analysis. All tests were 2-tailed, and a value of *P* < .05 was considered significant.

RESULTS

Case Presentation

Among our 50 patients, during the study period, PA of the hepatic artery was found in 3 patients. Diagnosis was established after emergency arteriography in 2 patients after unexpectedly massive bleeding. A silent PA of the third patient was detected incidentally after a regular follow-up CT study.

A 43-year-old man received cadaveric donor LT for alcoholic liver cirrhosis (Child-Pugh class C, with esophageal varices (EV) bleeding, refractory ascites, and pleural effusion). The intraoperative and immediate postoperative courses were smooth. However, jaundice developed on the postoperative 3rd week. The abdominal CT scan showed a stenosis of the bile duct anastomosis. Endoscopic retrograde biliary drainage (ERBD) with stent placement (Boston Scientific, 10F, 10 cm) failed, and, subsequently, a percutaneous trans-hepatic biliary drainage (PTBD) (BIOTEQ CORPORATION, Taipei, Taiwan) was established. A sudden onset of massive hemobilia (Hb dropped to

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