A Case Report on Successful Liver Transplantation from a Donor with Polycystic Liver

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Abstract Organ shortage is a major issue faced by both transplant surgeons and patients. To enlarge the donor pool, marginal liver grafts are being increasingly used. In this paper, we present the case of a patient in whom a polycystic liver was successfully transplanted from a donor after brain and cardiac death. To our knowledge, this is the first successful case of liver transplantation using polycystic liver from a donation after brain and cardiac death.

Keywords Liver transplantation · Donation after brain and cardiac death · Polycystic liver · Hepatocellular carcinoma

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Case Report

A 54-year-old woman was diagnosed as brain dead due to massive subarachnoid hemorrhage. She had been diagnosed with autosomal dominant polycystic liver disease (PLD) 10 years previously. Blood biochemical testing showed impaired renal function (creatinine 511 $\mu\text{mol/L}$, normal range 53–133 $\mu\text{mol/L}$) and normal liver function. Ultrasonography demonstrated a polycystic liver with the largest cyst size of 3 cm. After obtaining donor consent from her family, the donation was classified as type III (donation after brain and cardiac death (DBCD), controlled category) according to the Chinese classification of donors after circulatory death (DCD). The donor liver was harvested, and the kidney was discarded. The warm ischemic time was 15 min, and the liver graft weight was 1,900 g. Liver cysts ranging in size from 1 to 5 cm were scattered throughout the liver, occupying less than approximately 20 % of the liver parenchyma (Fig. 1).

After 4.2 h of cold ischemia time, orthotopic liver transplantation was performed uneventfully, and the anhepatic phase was 57 min. The recipient was a 62-year-old man who had chronic hepatitis B virus-related cirrhosis and hepatocellular carcinoma (HCC). The size of the tumor was 8×9 cm, without involvement of the portal vein or hepatic artery. The recipient's Child–Pugh score was grade B, and the MELD score was 24. The immunosuppressant regimen included tacrolimus and mycophenolate mofetil. Liver function tests were in the normal range at 10 days posttransplantation. Twelve days after transplantation, the recipient had a secondary infection following liver cyst fenestration and was treated with antibiotics and percutaneous transhepatic drainage (Fig. 2). Afterwards, the patient recovered well, and the percutaneous transhepatic drainage tube was removed 10 days later. The patient was discharged at 32 days posttransplantation on immunosuppressants. When followed up 14 months after transplantation, the recipient had normal liver function;

Fig. 1 Representative image showing the donor liver with cysts scattered throughout both lobes

there was no recurrence of hepatitis B viral infection, HCC, or cyst infection or growth.

Discussion

The success of liver transplantation has led to an increased demand for donor livers, while the number of available grafts remains insufficient. Substantial efforts have been made to expand the potential donor pool, leading to an increased supply of donor organs for lifesaving liver transplantation. DCD, formerly referred to as non-heart-beating donation, is now the fastest growing source of transplanted livers [1]. However, primary non-function (PNF) hepatic artery thrombosis, ischemic cholangiopathy, and substandard graft survival remain significant risks for recipients of DCD livers. With various strategies to optimize the outcome of DCD liver transplantation, some studies have demonstrated that both the graft survival and patient survival in DCD liver transplantation is comparable to those in donation after brain death (DBD) liver transplantations. These successful experiences encourage the continued use of DCD liver grafts.

In China, most DCD liver transplantations are actually DBCD liver transplantations, which belong to the controlled DCD category. The case presented here was that of a successful orthotopic liver transplantation using a polycystic liver graft from a DBCD. PLD is an autosomal dominant disease, which can manifest in two ways, either as a part of ADPKD or as an isolated autosomal dominant PLD. Our donor had ADPKD with extra renal polycystic liver. Intracerebral aneurysms are not uncommon in patients with polycystic disease, and thus death due to cerebral hemorrhage in our donor was not unusual [2]. Among most patients with PLD, normal liver parenchyma and thus normal liver function are preserved. To increase the number of donors, liver grafts from patients with PLD have been used.

Graft function is a major concern for liver transplantation using polycystic livers. PNF has been reported in polycystic liver grafts requiring re-transplantation [3]; however, the cause of PNF was not directly attributable to the multiple large (>6.5 cm) bilobar cysts found in the allograft [4]. Our case, together with these prior reports, suggests that the use of polycystic liver grafts with preserved liver parenchyma and normal liver function is safe and appropriate [3–6].

A further concern about polycystic liver grafts is the progression of PLD. This concern was not substantiated in our case or previously reported cases with long follow-up periods (1–3 years), in which no cyst growth was observed and the grafts functioned well [7].

Cyst infection in a polycystic liver allograft is one of the major complications that can occur after transplantation. In this case, after cyst fenestration on the back table, cyst infection was encountered in the early posttransplantation period. We speculate that to avoid cyst infection, it seems that it might be better to keep the cyst intact.

Given that the number of patients on liver transplantation waiting lists exceeds the number of available organs, the use of marginal donors should be considered. Our case indicates that liver transplantation with polycystic liver grafts, even from DCD donors, have satisfactory outcomes, and the use of donors with PLD can be used to enlarge the donor pool.

Fig. 2 Representative CT images of the graft liver with infection of cyst which under fenestration (**a**, arrow) and after treatment with percutaneous transhepatic drainage (**b**)

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Conflict of Interest The authors have no conflicts of interest to declare.

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