



Liver Transplant With a Marginal Donor Graft Containing a Hydatid Cyst—A Case Report

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ABSTRACT

Liver transplantation has become the standard treatment for acute failure and end-stage liver disease, but there are fewer donor organs available than patients on the waiting list. The donor pool may be increased by using marginal donor candidates. Some infectious and metabolic diseases have been transmitted to the recipient via marginal donor grafts. Hydatid cyst disease is rarely transmitted to a recipient from the donor graft. A literature search showed only 2 previous cases of liver transplantation using a donor graft that contains a hydatid cyst. We treated a 19-year-old woman who experienced acute on chronic end-stage liver failure secondary to cryptogenic cirrhosis. The liver graft from a 97-year-old marginal cadaveric donor contained a calcified hydatid cyst. No complication was associated with the hydatid cyst at 3 years after transplantation. The present case shows that donor livers with an inactive, calcified hydatid cyst may be used for emergency liver transplantation after considering the location, size, and relation of the cyst to vascular and biliary structures. The cyst may be resected on the back table with a successful treatment outcome.

LIVER transplantation has become the standard treatment for acute failure and end-stage liver disease. A new patient is added every day to the waiting list worldwide; the number of patients on the list is much larger than the number of organs in the donor pool. Therefore, 7% to 16% of waiting list patients die, and 8% patients deteriorate to not be able to undergo transplantation.^{1–4} Many centers have broadened the donor selection criteria developing novel strategies to increase the donor pool by using marginal candidates.⁵ However, the main concerns about these donors include possible non-optimal graft function with early loss.⁵ Another problem, albeit rare, is the threat of the recipient acquiring an infectious or metabolic disease in the asymptomatic, marginal donor.⁶ Hydatid cyst is a disease that is uncommonly transmitted from a donor liver graft to the recipient, because the disease frequently causes a space-occupying lesion that is easily identified preoperatively.^{7,8} We treated a patient with liver transplantation using a cadaver donor organ that contained a hydatid cyst.

CASE REPORT

A 19-year-old woman had been placed on the waiting list for liver transplantation because of end-stage liver failure secondary to cryptogenic cirrhosis. Her Child-Pugh score was 9 points; Model for End-Stage Liver Disease (MELD) score, 24. The total bilirubin was 16 mg/dL, albumin 2.6 g/dL, aspartate aminotransferase (AST)

224 U/L, alanine transaminase (ALT) 173 U/L, alkaline phosphatase (ALP) 196 U/L, gamma glutamyl transpeptidase (GGT) 92 U/L, and International Normalized Ratio (INR) 2.43. Serologic tests were negative for hepatitis B and hepatitis C. During the waiting period, her general condition deteriorated; she developed clinical signs and symptoms of grade 3 hepatic encephalopathy. An emergency liver transplantation was scheduled because of acute-on-chronic liver failure. Although there was no living donor candidate available, a marginal donor organ that had been rejected by other centers was offered to us by the National Coordination Center. The graft that had belonged to a 97-year-old woman contained a hydatid cyst in segments 6 to 7 with degenerative contents and a calcified capsule. Because of the patient's urgent condition we accepted the graft. At surgery, the cyst was opened on the back table, to drain its degenerative material, before washing with diluted (1/30) cetrimide chlorhexidine solution. A partial pericystectomy was performed with the remaining cyst wall cauterized using bipolar cautery. The recipient vena cava was preserved during the hepatectomy; implantation was performed using a "piggyback" technique. The postoperative course was uneventful;

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there were no complications. The blood flow in the hepatic artery, portal vein, and vena cava remained patent after surgery, as documented with Doppler ultrasonography. The patient who was treated with prednisolone, tacrolimus, and mycophenolate mofetil was discharged from the hospital at 18 days after the surgery. Albendazole was not administered after the surgery. Follow-up tomographic evaluation at 3 years after surgery showed liver segments 6 and 7 with a cystic space-occupying lesion (3×6 cm) that contained hypoechoic fields and calcification (Fig 1). Liver function tests were normal and there were no cyst-related or other problems.

DISCUSSION

The main strategies to meet the increasing demands of the waiting list include living donation, split donation, domino donation, and use of marginal (expanded) donors.^{2,4-6,9,10} In the past, the last group of donor livers were excluded because of potential complications including organ dysfunction and mortality.^{5,9} Although they are functionally not optimal, they prefer an alternative approach to the high mortality of patients on the waiting list.^{5,9} Despite the absence of an international consensus about marginal donor criteria, factors that predict graft dysfunction after surgery include donor age above 60 years; body mass index above 30 kg/m^2 ; hepatic macrosteatosis over 30%; systemic or intraabdominal infection; intensive care unit stay beyond 7 days; cold ischemia time greater than 12 hours; serum sodium above 160 meq/L; positive titer for hepatitis B, hepatitis C, or human immunodeficiency virus; hypotension ($< 60 \text{ mm Hg}$) for more than 4 hours; high dose inotropic support; previous cardiac arrest; non-heart beating donor; graft reuse; AST $> 150 \text{ IU/L}$; total bilirubin $> 3 \text{ mg/dL}$; and extracranial malignancy.^{1,2,4,5,9,10-12}

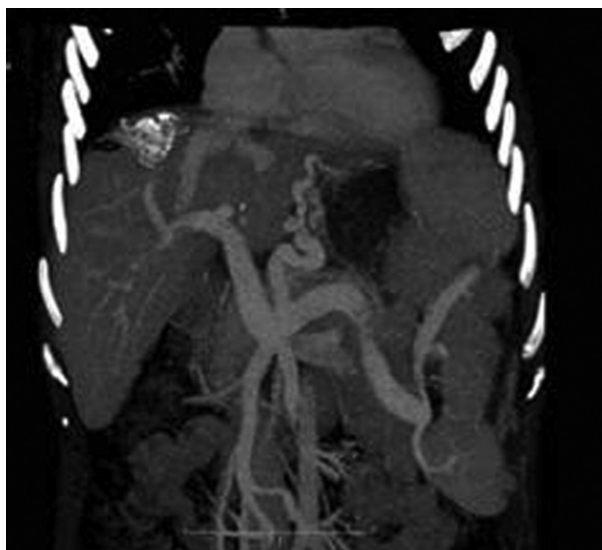


Fig 1. Post-operative 3rd year CT angiogram of the transplanted liver. A calcified hydatid cyst was at the dome of the liver.

In addition to the increased use of marginal liver donors, asymptomatic donors show increased incidences of uncommon metabolic and infectious diseases in their liver grafts^{1,13}; human T-lymphotropic virus types 1 and 2 (HTLV-1 and HTLV-2), West Nile virus, rabies virus, histoplasmosis, strongyloidiasis, schistosomiasis, malaria, and echinococcosis.⁶

Echinococcosis is an infectious disease caused by *Echinococcus* species. The most common type worldwide is *E granulosus*, the agent of cystic echinococcosis (hydatid disease). The second most common is *E alveolaris*. In humans, the larvae of *E granulosus* most commonly infect the liver, particularly the right lobe. Hepatic hydatid cysts grow slowly (average, 1 cm per year) and typically cause symptoms after being present for 10 to 20 years. The clinical symptoms depend on the cyst size, location, and proximity to adjacent structures.¹³ Echinococcosis usually causes 1 to 2 cystic lesions in the liver, but there have been cases with extensive hepatic involvement.

Numerous patients have had liver transplantations because of cystic disease with extensive liver involvement or alveolar hydatidosis. However, only 2 cases of liver transplantation using liver grafts with a hydatid cyst were identified in a literature search using the words “liver transplantation,” “donor,” “living,” “deceased,” “cadaveric,” “*Echinococcus granulosus*,” “*Echinococcus multilocularis*,” and “hydatid cyst” in various combinations in several databases (PubMed, Google Scholar, MEDLINE, EMBASE, and EBSCO).^{7,8} In the first reported case, a liver obtained from a 36-year-old cadaveric donor had a good appearance pre-transplantation, but at 3 weeks after surgery an ultrasonogram showed a calcified hydatid cyst (3 cm) in its central region.⁸ The second reported case underwent successful transplantation after resection of a calcified hydatid cyst (7×4 cm) from segments 2 and 3 of the donor liver.⁷ In the present case, the proximity of the cyst to the hepatic vascular structures precluded a safe resection without injuring vascular structures; therefore, we performed a partial cystectomy.

Hydatid cysts are uncommon among liver donor grafts despite the high prevalence of hydatid cyst disease worldwide. In Europe and North America, hydatid cyst disease is uncommon. Cystic lesions noted in the donor liver can be resected on the back table before implantation. In contrast, most donor livers in many Asian countries including Turkey are from living donors. Thus, the donor is excluded from the operation when a hydatid cyst is detected by radiologic examination.

Immunosuppressive therapy after transplantation may increase the risk of infection or exacerbate a preexisting infection. Patients are frequently given prophylactic antibiotic therapy. However, an isolated hydatid cyst that is self-limited by forming a cavitory structure, and grows ≤ 1 cm per year would not be expected to cause a severe complication in a recipient. No aggravation of hydatid cyst disease has been reported in the 3 cases (including the present one) in which liver grafts with a hydatid cyst were

used, presumably because of partial inactivity of the pathologic infection. Therefore, it is possible that only livers with inactive or partially inactive hydatid cysts may be acceptable for liver transplant donation.

In summary, hydatid cyst disease may be present in livers from cadaveric donor candidates from endemic areas. It appears safe to use donor livers with hydatid cysts when the cyst is calcified or does not have any detectable connection to the biliary system. The treatment of choice may include complete resection of the cystic lesion without damaging the great vessels or bile ducts. If partial cystectomy is required, coagulation of the remaining cyst wall with an argon laser or bipolar cautery may be effective after drainage of the cyst contents.

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