Utilization of the Iliac Artery as Inflow in the Morbidly Obese During Orthotopic Liver Transplantation: A Case Report

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ABSTRACT

Arterial conduits are a well-recognized technique used in liver transplantation to achieve allograft arterial inflow when conventional hepatic arterial inflow is compromised. Indications for ectopic inflow include native arterial disease at the time of initial transplantation, as well as reconstruction in the setting of thrombotic complications. Although supraceliac or infrarenal aortic reconstructions are preferred approaches, the right common iliac artery represents a viable alternative. We present the case of a morbidly obese patient with occlusive atheromatous plaque at the celiac origin not amenable to preoperative angioplasty who underwent reconstruction with a donor iliac artery conduit to the recipient right common iliac artery. His hepatic arterial inflow remained patent postoperatively with no thrombotic or hemorrhagic complications.

ARTERIAL conduits are a widely accepted but rarely necessary technique used in the arterial reconstruction of orthotopic liver transplants (OLTxs). A review of the Australian data over a 7-year period found that 31 (5.3%) of 582 OLTx cases required arterial conduits [1]. Of these 31 cases, only 1 was to the right iliac artery, with all others to the infrarenal aorta. A separate review of 613 liver transplant procedures identified 101 (16%) who underwent arterial conduits to the aorta, with none in the conduit group using the recipient right iliac artery for inflow [2]. Still other series describe 2.3% and 6.8% of OLTxs requiring arterial conduits, including both initial and re-operative transplants, with none reported to have used iliac arteries for conduit origin [3,4].

Indications for arterial conduits in OLTxs include both native recipient disease at the initial operation as well as postoperative thrombotic complications. A population that is increasingly undergoing OLTx and is known to have higher rates of cardiovascular and aortic atherosclerotic disease are those with nonalcoholic fatty liver disease (NAFLD) [5–7]. With rising rates of obesity and metabolic syndrome, NAFLD has become the most common form of chronic liver disease in Western society. NAFLD has been estimated to affect as much as 30% of the adult population in the United States and up to 90% of the morbidly obese [8]. This clinical entity encompasses the more aggressive nonalcoholic steatohepatitis (NASH), which can progress to cirrhosis and end-stage liver disease.

NASH is known to be an independent risk factor for the development of hepatocellular carcinoma [7]. In a study conducted from 2001 to 2009, NASH was identified as the third leading indication for liver transplantation in the United States. The percentage of patients undergoing liver transplantation for NASH cirrhosis was noted to increase from 1.2% to 9.7% and was the only indication to increase in frequency over the study interval. Given these findings, it is projected to be the leading indication for liver transplant by 2020 [9]. This observation, particularly in light of the novel medical therapies for the treatment of hepatitis C, highlights a paradigm shift and the need for a better understanding of the technical challenges to transplantation presented by these patients [10].

Poorer outcomes have been shown in obese patients compared with nonobese liver transplant recipients. These outcomes include a higher rate of primary graft nonfunction and an increase in mortality, with the latter being attributable to increased rates of cardiovascular events [11,12]. Liver transplant outcomes in patients with diabetes have also been shown to be associated with higher 5-year mortality and acute rejection (50.9% compared with 25.4% in control subjects) [13]. This finding could lead to increased

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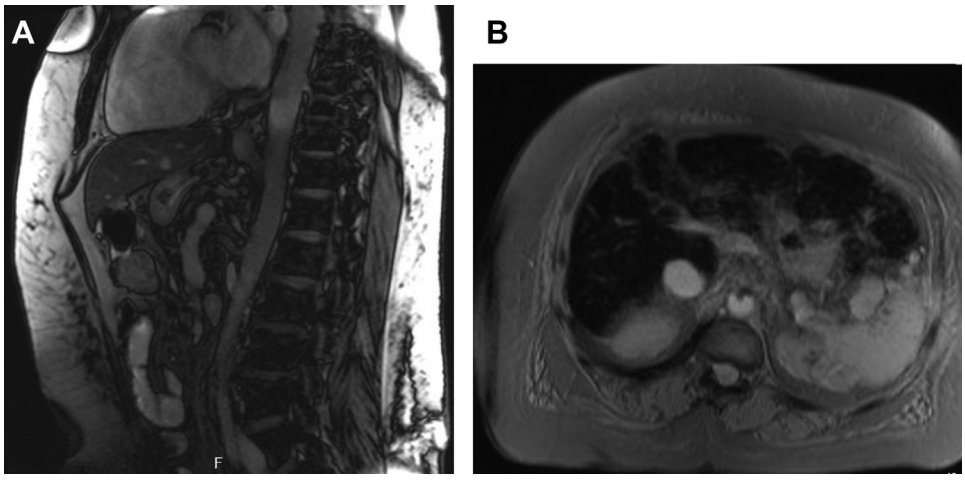

Fig 1. Magnetic resonance imaging of atheroma at celiac origin in (**A**) sagittal and (**B**) axial cross-sections.

selectivity for transplanting these medically comorbid patients who may also present with atypical atherosclerotic profiles. We present a technically feasible approach to achieve adequate arterial inflow in one such patient.

CASE REPORT

History and Presentation

We present the case of a 65-year-old man with history of end-stage liver disease secondary to biopsy-proven NASH diagnosed in 2014 who underwent orthotopic liver transplantation. His preoperative Model for End-Stage Liver Disease score was 26, with a history of hepatic encephalopathy managed with lactulose and rifaximin. Additional comorbid conditions included morbid obesity with a body mass index of 47 kg/m^2, Barrett's esophagus, obstructive sleep apnea, type 2 diabetes mellitus, and hypertension. His only previous surgery was cholecystectomy.

Preoperative magnetic resonance imaging (Fig 1) and computed tomography (Fig 2) scans revealed cirrhosis with no evidence of hepatocellular carcinoma and a short segment filling defect at the origin of the celiac axis believed to represent a large atheromatous plaque, with reconstitution via collateral flow from the superior mesenteric artery (SMA) supply. He underwent an angiogram, which showed a patent SMA and a filling defect at the level of the celiac axis. The hepatic arteries were noted to opacify via branches of the SMA. The celiac occlusion could not be crossed for angioplasty or stenting. Left heart catheterization was normal. Echocardiogram showed an ejection fraction of 71% and normal biventricular systolic function without valvular abnormality. The patient was considered to be a high but acceptable surgical risk candidate with anticipation of a right iliac arterial conduit.

Operative Details

The donor was a 47-year-old, otherwise healthy man, who was pronounced brain dead after a self-inflicted gun shot wound to the head. At the time of procurement, the donor was taking 10 μg/min of Neo-Synephrine (Hospira, Inc., Lake Forest, Ill, United States) and had normal liver function test results. Total cold ischemic time was ~6 hours with 41 minutes of warm ischemic time. Iliac arteries were procured during the donor operation, and back-table

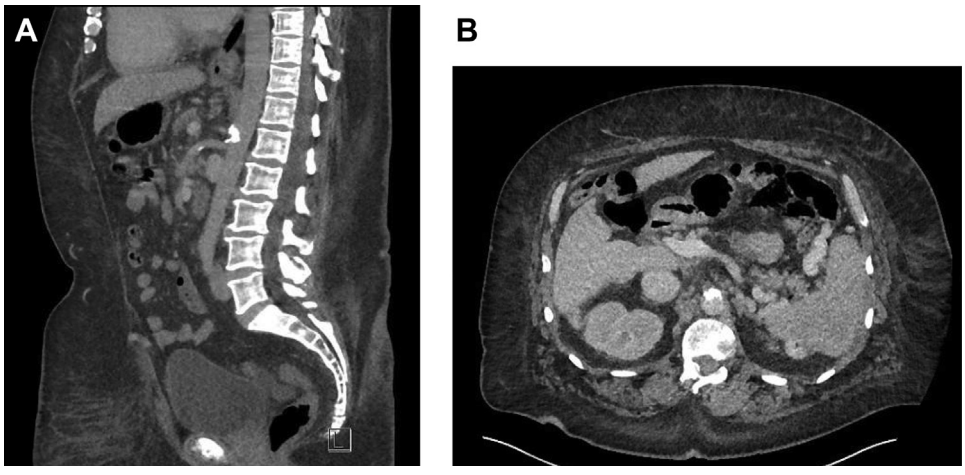

Fig 2. Computed tomography scan of atheroma at celiac origin in (**A**) sagittal and (**B**) axial cross-sections.

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