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Case Report

Urgent Endovascular Treatment of Severe Celiac Artery Stenosis during Liver Transplantation

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ARTICLE INFO

Article history:

Received: 21 October, 2020

Accepted: 2 November, 2020

Published: 12 November, 2020

Keywords:

Liver transplantation

arterial reconstruction

endovascular revascularization

arterial inflow

hepatic reperfusion

ABSTRACT

Arterial reconstruction during orthotopic liver transplant (OLT) can often be quite challenging in cases where the recipient hepatic artery is inadequate to provide inflow to the allograft. In these situations, an aorto-hepatic interposition graft is typically performed using the donor iliac artery [1, 2]. We present a case describing the use of urgent endovascular treatment of severe celiac artery stenosis intra-operatively during liver transplantation in a patient with significant aorto-iliac atherosclerotic disease precluding the use of an interposition graft.

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Case Report

The patient is a 64-year-old female with end stage liver disease (ESLD) secondary to nonalcoholic steatohepatitis (NASH) cirrhosis along with hypertension, hyperlipidemia, and known peripheral arterial disease (PAD). Preoperative workup did reveal significant atherosclerotic disease. On pre-operative computed tomography angiography (CTA), she had evidence of celiac, superior mesenteric artery (SMA), and inferior mesenteric artery (IMA) stenosis along with severe narrowing of bilateral renal and iliac vessels. She did have an abdominal ultrasound with doppler that revealed patent main, right, and left hepatic arteries with peak systolic velocities of 144, 67, and 61 cm/second respectively. This was reviewed by the selection committee and felt to be suitable for transplantation.

On March 18, 2019, the patient underwent an OLT using a whole liver from a Donor after Brain Death (DBD). Intra-operatively, both donor and recipient arterial anatomy were found to be standard. Graft arterial inflow was provided by anastomosing the donor common hepatic artery

to the recipient right-left hepatic branch patch using 6-0 polypropylene suture. Following this, arterial inflow was assessed and noted to be extremely poor. An intra-operative ultrasound was obtained which revealed flow within the left hepatic artery but with tardus parvus waveforms and a resistive index (RI) of 0.35 indicating severe stenosis [3]. No flow was visualized within the main hepatic artery. At this point, we attempted to improve arterial inflow by passing a Fogarty catheter across the area of known celiac artery stenosis. There was some improvement in flow following this maneuver, but it was still felt to be inadequate. The recipient infra-renal aorta and iliac vessels were then examined for possible interposition graft using autogenous donor artery. Given pre-operative imaging findings of severe atherosclerotic disease in the recipient and heavily calcified arteries noted intra-operatively, we did not feel there was a safe area for cross clamping. Given the patient's body habitus, it was too hazardous to attempt exposure of the supra-celiac aorta.

Vascular surgery was consulted at this time to assess for alternatives to improve arterial inflow. Decision was made to perform a selective celiac

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arteriogram with possible intervention. For this to be possible, the patient had to be transferred to our hybrid operating room. The patient was left in biliary discontinuity and an external biliary drain was placed. Her abdomen was left open and an Abthera VAC was placed. She was then transported to the hybrid operating room. A selective celiac arteriogram was performed revealing a focal high-grade celiac ostial stenosis of >80% (Figure 1). This area was balloon dilated followed by placement of a 6x15mm Herculink balloon expandable drug eluting stent. A completion angiogram was then performed showing <20% residual celiac stenosis (Figure 2). The patient was kept intubated and transported to the surgical intensive care unit with plans to return to the operating room within 24 hours.

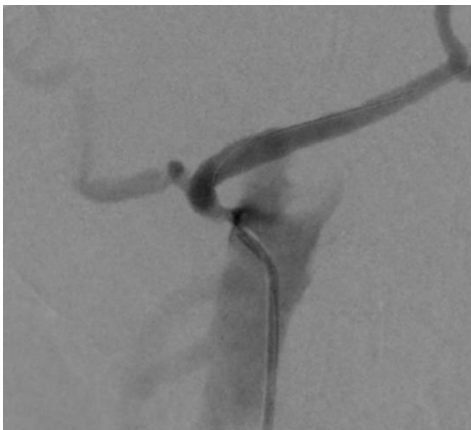


Figure 1: Selective celiac arteriogram showing focal high-grade ostial stenosis.



Figure 2: Arteriogram status post celiac artery stenting showing near resolution of stenosis.

The following day, she was taken back to the operating room and a good pulse was noted within the main hepatic artery which had not been present prior to the celiac stent placement. The biliary anastomosis was

created, and the transplant was completed. An ultrasound was obtained the following day that demonstrated a patent celiac artery and hepatic arterial system. Main hepatic artery peak systolic velocity was measured at 273cm/sec with an RI of 0.57 and normal waveforms. The remainder of the patient's postoperative course was relatively uncomplicated. She was started on dual antiplatelet therapy with Aspirin and Clopidogrel. She was discharged to rehab on post-op day 10. Abdominal ultrasound performed at two months and one-year post-transplant revealed a patent hepatic arterial system with RIs within the normal range and normal waveforms.

Discussion

Although the use of endovascular techniques to treat arterial complications following liver transplantation is widely described in the literature, we describe here a unique situation where it was used intra-operatively to provide arterial inflow. Even with evidence of significant aorto-iliac calcifications on pre-operative CTA, we opted to proceed with OLT given the encouraging doppler ultrasound findings. However, by identifying the clinically significant celiac stenosis intra-operatively, we were able to immediately intervene on it to prevent prolonged arterial ischaemia to the allograft and the resultant biliary complications.

Abbreviations

OLT: Orthotopic Liver Transplant

ESLD: End Stage Liver Disease

NASH: Nonalcoholic Steatohepatitis

PAD: Peripheral Arterial Disease

CTA: Computed Tomography Angiography

SMA: Superior Mesenteric Artery

IMA: Inferior Mesenteric Artery

DBD: Donor After Brain Death

RI: Resistive Index

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