

Liver Transplant Using a Severely Lacerated Graft Treated by Arterial Embolization

Quirino Lai, Stefano Ferretti, Massimo Rossi, Pasquale B. Berloco

Abstract

Organ shortages present a problem for liver transplant. Use of traumatized livers could be a way of expanding the donor pool.

We report the case of a liver transplant we did in which we used a deeply lacerated liver obtained from a donor, previously treated with a super-selective embolization of segment VI-VII arterial branches to control bleeding. At the back table, the lacerations were repaired using fibrin sealant and stitches. Organ reperfusion was homogeneous, without signs of bleeding. The recipient's postoperative course was uneventful.

Injured livers, if well selected, may not be considered an absolute contraindication for liver transplant. However, in these cases, arterial embolization must not routinely be used for a graft for a liver transplant.

Key words: *Blunt injury, Liver transplant, Interventional radiology, Expanded donor pool, Fibrin sealant*

Introduction

Organ shortages represent a challenging problem for a liver transplant (LT). Today, extended-criteria donations are largely adopted to expand the donor pool¹; traumatized livers from deceased-donors after blunt injury are considered in this group.²

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Trauma is a common cause of multiorgan donor death.³ However, limited reports exist on the use of injured livers for LT.^{2,4-8} Many centers consider traumatized grafts a contraindication for LT, mainly because of high-grade lacerations; consequently, several of these donors are commonly declined.⁹ We report the case of a successful LT performed using a high-grade lacerated liver previously treated with a super-selective arterial embolization for bleeding control.

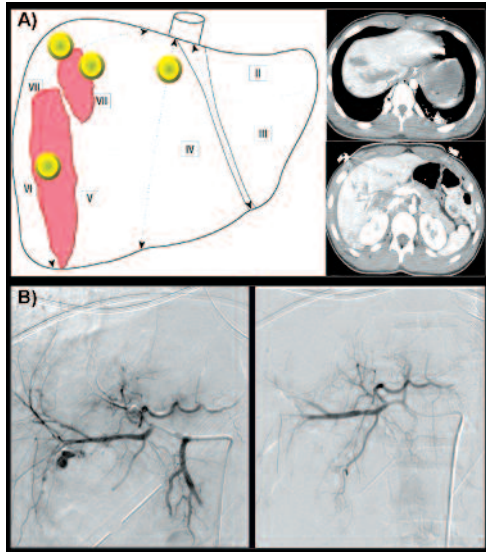
A 15-year-old boy was hospitalized in an emergency department after he had been in a motor vehicle accident. On admission, the boy was comatose, with a systolic blood pressure of 60 mm Hg and no response to pain stimuli. After he was stabilized, a computed tomography scan was performed, which showed a massive intracerebral hemorrhage and a grade 4 liver laceration involving segments VI and VII (Figure 1A). After unsuccessful liver packing, a hepatic arteriography followed by a super-selective embolization of the VI-VII arterial branches were performed, blocking the bleeding (Figure 1B).

After confirming the status of the brain death, the patient was considered suitable for organ donation. Procurement was performed 48 hours after the first laparotomy: during depacking, no signs of bleeding were observed. At the back table, deep parenchymal lacerations of segments VI-VII were repaired using a fibrin sealant and then stitched. Other minor parenchymal lesions were stitched exclusively. At the level of the porta hepatis, no lesions involving vessels and major bile ducts were ruled out. We used Prolene 2.0 and 3.0 for the stitches, placing simple and figure 8 stitches according to the characteristics and dimensions of the liver lacerations to be repaired.

The liver recipient was a 57-year-old woman who had hepatitis C-related cirrhosis. She was selected according to the philosophy of "the sickest first": in fact, this patient had a higher Model for End-Stage Liver Disease score (17 points) compared with the

other candidates of the same blood group on the waiting list.

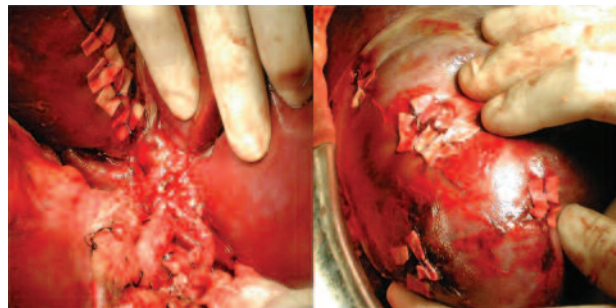
Figure 1A. Computed Tomography Scan of the Donor. **1B.** Hepatic Arteriography



(A) Computed tomography scan of the donor immediately after admission to emergency department: A grade 4 liver laceration involving segments VI and VII can be seen. On the left, a scheme of the liver with the reported lesions: red areas are the deep lacerations of the liver parenchyma, and yellow circles indicate minor lesions. (B) Left: Hepatic arteriography showing active bleeding at the level of the branch for segment VI. Right: After super-selective embolization, no signs of bleeding were seen.

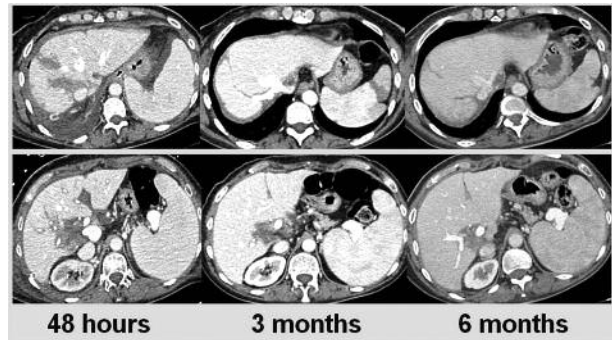
Organ reperfusion was homogeneous and without bleeding from the lacerated areas (Figure 2); an immediate liver function restoration was observed. A computed tomography scan performed 48 hours after an LT showed a normal parenchyma without signs of altered perfusion or segmental ischemia. The patient was discharged 14 days after the LT, and was followed until the time of this writing in our out-patient clinic for 36 months (Figure 3).

Figure 2. Graft After Reperfusion



The graft immediately after reperfusion: Deep parenchymal lacerations were repaired during the back table procedure using a fibrin sealant and then stitched, while the minor lesions at the level of the liver surface were directly stitched.

Figure 3. Recipient Computed Tomography Scans



Recipient computed tomography scans at 48 hours, and 3 and 6 months after the liver transplant. No signs of bleeding were seen immediately after surgery, and the follow-up was uneventful.

Transplant surgeons consider traumatized livers as high-risk grafts: parenchymal lacerations, postreperfusion bleeding, and posttraumatic hypoperfusion areas may represent risk factors for developing initial poor graft function.² Moreover, an injured liver also could lead to hepatic abscesses or bilomas.⁵

Only careful donor selection could reduce these risks.⁴ In our case, a super-selective arterial embolization was performed to stabilize the donor before procurement. A radiologic approach is commonly used to manage massive liver trauma, and arterial branch embolization is often adopted as first-line approach with excellent results.¹⁰

Obviously, despite the excellent results obtained in the aforementioned case, this case represents an exception more so than a rule. In our opinion, systematic application of embolization in severely lacerated livers for an LT must be avoided, and only well-selected organs not affected by major vascular or biliary lesions should be considered for this approach.

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