

Hyperbaric oxygen therapy in liver transplantation; is its use limited to the management of hepatic artery thrombosis?

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Hepatic artery thrombosis (HAT) after liver transplantation (LT) is a severe complication occurring more frequently in pediatric patients or when partial livers (split, living donor graft) are used [1]. Hyperbaric oxygen therapy (HBO) has been described to be effective in relation to treatment of hepatic artery thrombosis after liver transplantation [2–4]; it has been shown to reduce hepatocellular necrosis [5] and promote liver regeneration in living donor liver transplantation (LDLT) [6] and in a massive hepatectomy model in rats [7].

We successfully used HBO therapy in a case of late HAT after split LT. A 64-year-old HCV+ woman underwent LT in May 2005; the weight of the left graft (segments I-II-III-IV) was 480 g and the graft-to recipient body weight (GRBW) ratio was 0.9. The donor common hepatic artery was end-to-end anastomosed to the recipient common hepatic artery. The first postoperative course turned out without complications and the patient was discharged on postoperative day (POD) 11.

Twenty months after LT, Cholangio-MR evidenced the presence of biliary sludge associated with a dilatation of intrahepatic biliary ducts; Doppler ultrasonic (US) and CT Scan showed normal hepatic artery flow. The patient was submitted to a percutaneous transhepatic dilatation of an anastomotic stricture, but the procedure was not effective. Three months later a Roux-en-Y hepaticojejunal anastomosis was performed, and an intra-operative laceration of the hepatic artery next to the hilum occurred. The damaged tract was removed and an end-to-end anastomosis with interposition of an iliac arterial graft was performed. Doppler US at the end of surgery showed a regular patency of intrahepatic arterial blood flow. Patient was started on systemic heparin. On POD 1, Doppler US showed the absence of intrahepatic arterial flow; a spiral high-resolution CT-scan confirmed the absence of arterial flow inside the graft and evidenced a complete occlusion of the interposed graft without any collateral circulation; ischemic areas in the context of segments II-III were also present. Given the technical impossibility to perform a surgical revision, HBO was proposed to reduce the ischemic damages. After ensuring the absence of contraindications [8], the patient underwent

20 HBO sessions, performed once a day in a multiplace chamber (Drass s.p.a. Type 1502). Doppler US showed the presence of intrahepatic arterial blood flow since the 4th day after beginning of HBO. A CT scan performed at the end of HBO showed a significant decrease of ischemic areas and the presence of intrahepatic arterial vascularization by collateral vessels. Eighteen months after HBO, Doppler US and CT scan confirmed the presence of arterial flow inside the graft; ischemic areas completely disappeared.

Our experience suggested that HBO was a safe technique and it contributed to the development of collateral vessels, avoiding a late retransplantation and reducing the risk of hepatic necrosis; the ability of the liver to spontaneously recruit collateral arterial supply in the immediate post-transplant period has been described [9,10], but we should emphasize that in our particular case a split LT was performed 23 months before HAT, and the collateral development was identified shortly after the beginning of HBO.

Given its useful effects also on liver regeneration, prospective clinical studies are required to evaluate whether HBO will, in the future, be able to modify the outcome of malfunctioning partial and marginal grafts, leading to a reduced risk of primary or delayed nonfunction.

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