Transplant International

LETTER TO THE EDITOR

The role of steatosis of the liver graft in the development of post-transplant biliary complications

doi:10.1111/j.1432-2277.2009.00997.x

We read with interest the article by Heidenhain *et al.* [1] recently published online on Transplant International. The authors retrospectively reviewed 1843 liver transplant recipients over a period of 17 years performed at the University of Berlin to investigate incidence and risk factor of Ischemic Type Biliary Lesion (ITBL). After excluding primary sclerosing cholangitis patients and any other causes of biliary problems such as hepatic artery thrombosis, ABO-incompatibility, biliary anastomotic stricture, and chronic ductopenic rejection, the authors reported an incidence of ITBL of 3.9% that compares favorably with most of the series reported in literature [2–4]. They found donor age, cold ischemic time, type of conservation solution (HTK versus UW), arterial pressure perfusion, organ shipped from other centers, and Child-Pugh recipient's score C as significant risks factors for ITBL. Correctly, in the discussion, the authors suggest a potential impact of donor's graft steatosis on ITBL, but they stated that those data are not available either in the present study or in other series. At the Liver Transplant Center of Udine, Italy, we retrospectively analyzed 117 consecutive liver transplantations from heart beating deceased donors over a 3-year period for the development of any type (anastomotic or not) post-transplant biliary complications. At univariate analysis, we identified interval between portal and arterial hepatic reperfusion and macrovacuolar steatosis of the graft greater than 25% as an independent risk factor for biliary complications after liver transplantation. Notably, stepwise logistic regression analysis demonstrated that a macrosteatosis of the graft >25% [OR = 5.21 I.C.95% (1.79–15.15) $P = 0.002$] was the only independent risk factor predicting biliary complications after liver transplantation [5]. Although limited by numbers of patients and length of follow-up, this is, to our knowledge, the first reported evidence in the literature of a possible role of steatosis on the development of biliary complication after liver transplantation. A possible pathogenetic explanation might come to the fact that fatty liver compromises hepatic microcirculation as observed in human fatty donor livers and in experimental models of hepatic steatosis [6,7]. There is an inverse correlation between the degree of fat infiltration and both total hepatic blood flow and flow in microcirculation. Fatty accumulation in the cytoplasm of the hepatocytes is associated with an increase in the cell volume that reduces the size of the hepatic sinusoid space by 50% compared with a normal liver and may result in partial or complete obstruction of the hepatic sinusoid space [8]. This phenomenon might especially impair microcirculation of the peribiliary vascular plexus increasing the risk of biliary complications in the hepatic graft.

Umberto Baccarani, Gian Luigi Adani, Dario Lorenzin, Annibale Donini and Andrea Risaliti
Department of Surgery & Liver Transplantation Unit University Hospital of Udine, Udine, Italy

References

1. Heidenhain C, Pratschke J, Puhl G, *et al.* Incidence of and risk factors for ischemic-type biliary lesions following orthotopic liver transplantation. *Transpl Int* 2009 [Epub ahead of print]. DOI: 10.1111/j.1432-2277.2009.00947.x
2. Nakamura N, Nishida S, Neff GR, *et al.* Intrahepatic biliary strictures without hepatic artery thrombosis after liver transplantation: an analysis of 1,113 liver transplantations at a single center. *Transplantation* 2005; **79**: 427.
3. Otto G, Roeren T, Golling M, *et al.* Ischemic type lesions of the bile ducts after liver transplantation: 2 years results. *Zentralbl Chir* 1995; **120**: 450.
4. Piecuch J, Witkowski K. Biliary tract complications following 52 consecutive orthotopic liver transplants. *Ann Transplant* 2001; **6**: 36.
5. Baccarani U, Adani GL, Isola M, *et al.* Steatosis of the graft is a risk factor for posttransplantation biliary complications. *Transplant Proc* 2009; **41**: 1313.
6. Ijaz S, Yang W, Winslet MC, Seifalian AM. The role of nitric oxide in the modulation of hepatic microcirculation and tissue oxygenation in an experimental model of hepatic steatosis. *Microvasc Res* 2005; **70**: 129.
7. Seifalian AM, Chidambaram V, Rolles K, Davidson BR. *In vivo* demonstration of impaired microcirculation in steatotic human liver grafts. *Liver Transpl Surg* 1998; **4**: 71.
8. Ijaz S, Yang W, Winslet MC, Seifalian AM. Impairment of hepatic microcirculation in fatty liver. *Microcirculation* 2003; **10**: 447.

