TRANSPLANT INTERNATIONAL

Transplant International ISSN 0934-0874

INVITED COMMENTARY

Should ABO-incompatible deceased liver transplantation be reconsidered?

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Received: 29 March 2015
Accepted: 31 March 2015

doi:10.1111/tri.12573

In this issue of Transplant International, two separate groups, one from China and one from northern Europe, present their retrospective experiences and results in ABO-incompatible (ABOin) deceased donor liver transplantation (DDLT) in adult recipients [1,2]. Both groups conclude that ABOin DDLT might be life-saving and might be used in urgent cases.

In the study by the Sun Yat-sen University group from Guangzhou, China [2], in a population of recipients suffering from acute hepatitis B virus liver failure, ABOin graft survival was 28% at 3 years, compared with 66.5% and 71% for ABO compatible (ABOc) and ABO identical (ABOid) grafts, respectively ($P < 0.05$). The increased rate of failures in ABOin DDLT was related to vascular thrombosis and biliary complications. In this Asian series, 77% of the recipients were blood group O patients receiving non-O grafts, and the number of A2 ABOin DDLT was not determined. The immunosuppression was quite classical, associating basiliximab, calcineurin inhibitors, mycophenolate mofetil and steroids [2]. The second study by Thorsen *et al.* [1] reported the experience in ABOin DDLT from two centres of Norway and Sweden. In 88% of the cases, this European series included blood group O patients receiving non-O grafts. Considering global patient survivals of the whole series, their results were excellent, with patient survivals at 79% and 75% at 3 and 5 years, respectively. However, these patient survivals came at the price of a high rate of vascular and biliary complications and a high rate of retransplantations. The graft survivals of the A2 ABOin DDLT were slightly better (although statistically nonsignificant due to the small sample size) than the non-A2 ABOin DDLT (80% vs. 60% at 1 year and 67% vs. 48% at 3 years, respectively) [1].

In contrast to other types of transplanted organs, the liver graft is somehow protected against preformed antibodies. It has been established for decades that liver transplantation against blood group is possible both in children and in adult recipients, with prolonged graft survivals without rejection in some cases [3]. Pretransplant lymphocytotoxic cross-match is not considered before DDLT by most groups [4]. Combined liver and kidney transplantation has been advocated to allow kidney transplantation in highly sensitized cross-match positive kidney candidates [5]. In the 80s of last century, ABOin DDLT was regularly performed to save patients with fulminant hepatic failure, either as a definitive treatment or as a bridge to ABOc DDLT [6]. However, with the success of DDLT and the increased waiting lists, it was considered that ABOin graft survival was not sufficient to ethically justify this policy. As a consequence, in most allocation schemes, ABOin DDLT

was forbidden, even in urgent cases. The eurotransplant organization applied this policy in the 90s of last century [7].

In the meantime, in countries where DDLT is not available, living donor liver transplantation (LDLT) has been established first in children and afterwards in adults. In these countries, protocols of ABOin LDLT have been successfully developed, with excellent graft survival rates at the price of heavy immunosuppressive regimens and a higher risk of biliary complications [4]. In these countries, ABOin LDLT remains the exception, and if a suitable ABOc living donor is available, this ABOc donor is chosen for donation. Ethically, in these programmes, ABOin LDLT is justified when no ABOc living donor is available as there is no possibility of ABOc DDLT and because ABOin LDLT does not decrease the chances of other compatible candidates waiting for DDLT. Indeed, these ethical arguments justify the starting up of ABOin living donor kidney transplantation programmes in both Eastern and Western countries [8].

In the developed world, we are facing an increasing deceased liver graft shortage. We are now using high-risk (aged donors, steatotic liver grafts, donation after circulatory death) deceased grafts to partially overcome this problem [9,10]. ABOc LDLT is also regularly performed, but ABOin DDLT is not a part of the solution. Indeed, it is the contrary, as demonstrated by Thorsen *et al.* [1], that ABOin DDLT often requires retransplantation to achieve sufficient survival rates, and therefore, ABOin increases the deceased liver graft shortage. The only reason to perform ABOin DDLT that could be ethically acceptable is when an ABOc, or better still, an ABOid recipient, cannot be found for a specific liver graft. But apart from the rare case of a blood group AB donor with no potential compatible blood group AB candidate, I doubt that in the modern era, no suitable ABOc recipient can be found for the other blood group donors. I do agree that when used as a bridge to ABOc DDLT, ABOin DDLT might be life-saving, but it is at the price of an increased mortality risk for the other ABOc patients on the waiting lists.

In the two series of ABOin DDLT reported in this issue, blood group O recipients represented the vast majority of patients requiring ABOin DDLT [1,2]. And it seems clear that the O liver candidates might have a longer waiting time than other blood groups. The reason for this fact is not purely medical; as to my knowledge, there is no reason for the blood group O population to have an increased susceptibility to liver diseases or a decreased rate of organ donation. The only logical reason is that these blood group O liver transplant candidates are disadvantaged by the liver graft allocation if the use of ABOc DDLT in some urgent or less urgent cases is allowed. Any blood group O deceased liver graft transplanted in an ABOc but not ABOid recipient increases the waiting time and the mortality of blood group O candidates.

Finally, Thorsen *et al.* confirmed that A2 to O ABOin DDLT might provide equivalent results as ABOid DDLT [1,11], but before implementing a policy of performing A2 to O ABOin DDLT, it has to be demonstrated that the waiting time and mortality risk of blood group O patients is significantly higher than blood group A DDLT candidates.

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