ORIGINAL ARTICLE

Subtotal hepatectomy and whole graft auxiliary transplantation for acetaminophen-associated acute liver failure

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Abstract

Background: An acetominophen overdose (AOD) is the leading cause of acute liver failure (ALF) in the UK and USA. For patients who meet the King's College Hospital criteria, (mortality risk > 85%), an emergency orthotopic liver transplantation (OLT) is conventionally performed with subsequent life-long immunosuppression. A new technique was developed in 1998 for AOD-induced ALF where a subtotal hepatectomy (right hepatic trisectionectomy) and whole graft auxiliary liver transplant (WGALT) was performed with complete withdrawal of immunosupression during the first year post-operatively.

Results: During 1998–2010, 68 patients were listed for an emergency transplantation for AOD ALF at our institution: 28 died waiting, 16 underwent OLT and 24 a subtotal hepatectomy with WGALT. Eight OLT (50%) and 16 WGALT remain alive (67%); actuarial survival at 5 years OLT 50%, WGALT 63%, $P = 0.37$. All patients who had successful WGALT are off immunosuppression. Poor prognostic factors in the WGALT group included higher donor age (40.4 versus 53.9, $P = 0.043$), requirements for a blood transfusion (4.3 versus 7.6, $P = 0.0043$) and recipient weight (63.1 versus 54 kg, $P = 0.036$).

Conclusion: Although OLT remains standard practice for AOD-induced ALF, life-long immunosuppression is required. A favourable survival rate using a subtotal hepatectomy and WGALT has been demonstrated, and importantly, all successful patients have undergone complete immunosuppression withdrawal. This technique is advocated for patients who have acetominophen hepatotoxicity requiring liver transplantation.

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Introduction

Acute liver failure (ALF), defined as the presence of hepatic encephalopathy and coagulopathy in patients with no history of liver disease, is the result of an abrupt loss of both hepatic metabolic and immunological function, and in many cases can rapidly progress to multi-organ failure.[1] The aetiology of ALF is diverse including viral, autoimmune and drug-related causes.[1–3] An acetominophen overdose (AOD) is the predominant cause of ALF in the UK and USA and the overall mortality in this group is as high as 28%.[4–6] Patients with AOD-induced ALF who meet King's College Hospital (KCH) criteria have a mortality risk of more than 85% without emergency liver transplantation.[2,5,7] The overall 5-year survival rate after an orthotopic liver transplantation (OLT) for AOD-induced ALF is reported to be up to 67%.[4,6] However, OLT results in the need for life-long immunosuppression and in the AOD patient group there are concerns about psychological and/or psychiatric problems that can make adherence to treatment unmanageable, even with full social support.[8]

To minimize the risks of poor compliance and also reduce the long-term risks of immunosuppression associated with OLT, an auxiliary liver transplantation (ALT) may be considered as an alternative. With AOD-induced ALF, time and appropriate supportive therapy give the potential for full hepatic recovery. With this notion, an auxiliary liver transplant can be used to bridge the gap to give the native liver time to recover. Once sufficient native liver function has returned, immunosuppression can be withdrawn and the transplanted liver allowed to atrophy.

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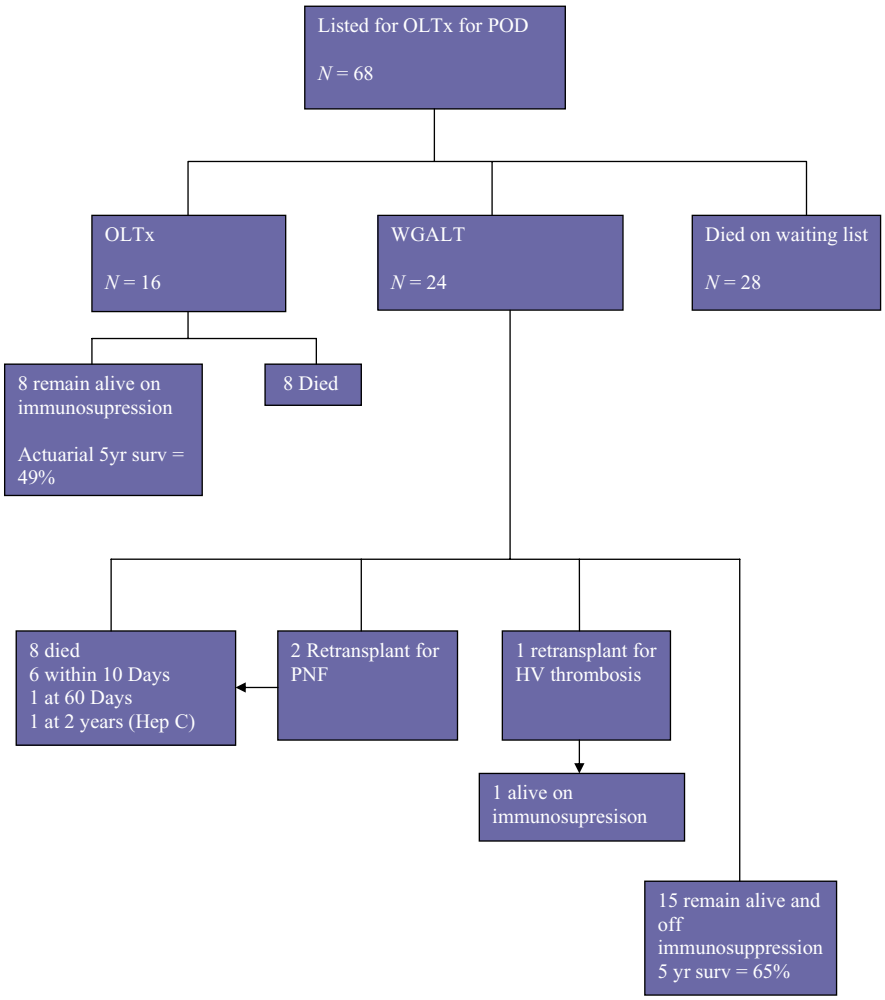

Figure 1 Flow chart depicting the course for the 68 acetominophen overdose (AOD) patients admitted to our institution. In total, 24 had whole graft auxiliary transplant (WGALT)

Our institution performs more than 250 solid organ transplants and over 300 liver resections annually, and has the largest reported experience worldwide with hepatic trisectionectomy.[9,10] The senior author developed a new technique in 1998 in which a right hepatic trisectionectomy was performed as a subtotal hepatectomy combined with whole graft auxiliary liver transplant (WGALT) for AOD-induced ALF, and initial results were reported in 2008.[11] In this study, the largest reported series is presented and the long-term results are demonstrated.

Methods

During January 1998 to July 2010, 24 patients underwent a subtotal hepatectomy with WGALT for AOD at our institution. Patients referred for further management after AOD from other UK hepatology and gastroenterology centres were commenced on medical therapy prior to transfer. Patients were listed for 'super-urgent' liver transplantation based on KCH criteria for AOD.

Surgical principles

The surgical principles and techniques have been described in detail previously.[11] In summary, after a right hepatic trisectionectomy (resection of liver segments 4, 5, 6, 7 and 8), a whole graft is implanted in an orthotopic manner. Caval anastomosis is performed using a donor upper end to recipient side cavo-cavostomy, with suture closure of the lower donor IVC. The donor portal vein is anastomosed end to end to the recipient right portal vein. Arterial anastomosis was initially to the recipient right hepatic artery but after early hepatic artery thrombosis in case 3 it has been performed using a conduit from the right common iliac or external iliac artery. A Roux-en-Y hepaticojejunostomy to the donor CBD/CHD is performed to avoid any risk of stricturing the recipient biliary tree.

Donor liver policies

According to our policy for super-urgent OLT, there was no donor selection bias in that the first liver offered nationally was accepted