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Original Article - Technique

SIMPLIFIED TECHNIQUE FOR AUXILIARY ORTHOTOPIC LIVER TRANSPLANTATION USING A WHOLE GRAFT

Técnica simplificada para transplante auxiliar ortotópico de fígado utilizando um enxerto inteiro

Vinicius **ROCHA-SANTOS**, Lucas Souto **NACIF**, Rafael Soares **PINHEIRO**,
Liliana **DUCATTI**, Wellington **ANDRAUS**, Luiz Carneiro **D'ALBURQUERQUE**

From the Disciplina de Transplante de Órgãos do Aparelho Digestivo, Laboratório de Investigações Médicas (LIM 37), Departamento de Gastroenterologia, Faculdade de Medicina, Universidade de São Paulo (Liver and Gastrointestinal Transplant Division, Department of Gastroenterology, University of São Paulo, School of Medicine), São Paulo, SP, Brazil

HEADINGS - Liver transplantation. Acute liver failure. Surgery.

ABSTRACT - *Background*: Acute liver failure is associated with a high mortality rate and the main purposes of treatment are to prevent cerebral edema and infections, which often are responsible for patient death. The orthotopic liver transplantation is the gold standard treatment and improves the 1-year survival. ***Aim***: To describe an alternative technique to auxiliary liver transplant on acute liver failure. ***Method*:** Was performed whole auxiliary liver transplantation as an alternative technique for a partial auxiliary liver transplantation using a whole liver graft from a child removing the native right liver performed a right hepatectomy. The patient met the O´Grady´s criteria and the rational to indicate an auxiliary orthotopic liver transplantation was the acute classification without hemodynamic instability or renal failure in a patient with deterioration in consciousness. ***Results*:** The procedure improved liver function and decreased intracranial hypertension in the postoperative period. ***Conclusion*:** This technique can overcome some postoperative complications that are associated with partial grafts. As far as is known, this is the first case of auxiliary orthotopic liver transplantation in Brazil.

Correspondence:
Lucas Souto Nacif
E-mail: lucasnacif@usp.br

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DESCRITORES - Transplante de fígado. Insuficiência hepática aguda. Cirurgia.

RESUMO - *Racional*: A insuficiência hepática aguda está associada à alta taxa de mortalidade e os principais efeitos do tratamento são para evitar o edema cerebral e as infecções, que muitas vezes são responsáveis pela morte do paciente. O transplante hepático é o tratamento padrão-ouro e melhora a sobrevida de um ano. ***Objetivo***: Descrever uma técnica alternativa para transplante de fígado auxiliar na insuficiência hepática aguda. ***Método*:** Transplante de fígado auxiliar devido à insuficiência hepática fulminante pela infecção pelo vírus da hepatite B. O paciente preencheu os critérios O´Grady e o racional para indicar o transplante de fígado auxiliar foi a hepatite aguda sem instabilidade hemodinâmica ou insuficiência renal em um paciente com deterioração da consciência. Foi realizado o transplante auxiliar de fígado com enxerto inteiro com uma técnica alternativa para transplante auxiliar parcial de fígado. ***Resultados*:** O procedimento demonstrou melhora da função hepática e diminuição da hipertensão intracraniana no pós-operatório. ***Conclusão*:** Esta técnica é viável e pode superar algumas complicações pós-operatórias que estão associadas com enxertos parciais. Tanto quanto sabemos, este é o primeiro caso de transplante de fígado auxiliar descrito no Brasil.

INTRODUCTION

Acute liver failure is associated with a high mortality rate and the main purposes of treatment are to prevent cerebral edema and infections, which often are responsible for patient death[1]. The orthotopic liver transplantation is the gold standard treatment and improves the 1-year survival over than 60%[1].

Auxiliary liver transplantation (ALT) is an accepted modality for selected recipients with ALF[5]. Gubernatis et al.[4] reported the first successful ALT for ALF in 1991[4]. There are three described techniques: heterotopic ALT, auxiliary partial orthotopic liver transplantation and whole graft ALT. The heterotopic has the poorer results[7]. The main goal is to restore hepatic metabolism aiming initially to reduce cerebral edema and posteriorly allowing the native liver to regenerate withdrawing the immunosuppression[3,8]. Auxiliary partial orthotopic liver transplantation is the main style of ALT and it consists in reducing or splitting the graft to fit the graft in the abdominal cavity. Despite its advantages, auxiliary partial orthotopic liver transplantation requires hepatic parenchyma transection imposing longer ischemia time. Moreover, partial hepatic grafts have higher risk of complication, such as bleeding, biliary fistula and vascular thrombosis[3,8].

The objective of this study is to present surgical technique, describing an alternative technique for this novel procedure of ALT in acute liver failure using a whole graft.

METHOD

Surgical technique

Harvest surgery

The deceased donor was an eleven years old child who presented brain death by anoxic encephalopathy whose blood group was identical. He underwent total hepatectomy as conventional harvest donor surgery and the preservation was performed with the University of Wisconsin solution. The total liver graft weight was 590 g.

Auxiliary Liver transplantation

The liver transplantation was performed because the patient met O´Grady´s criteria and the rational to indicate the ALT was the acute presentation of the hepatic failure without hemodynamic instability or renal failure in a patient with progressive deterioration in consciousness due to cerebral edema.

Right hepatectomy

The recipient weighed 54 kg and was performed a right hepatectomy that showed to be feasible, due to the small volume of the native liver. A standard right hepatectomy, resection of hepatic segments 5,6,7,8 to remove approximately 70% of liver volume, was done through the extrahepatic dissection and ligation of the right hepatic artery, right portal vein and right biliary duct. Was performed the liver parenchyma transection with ultrasonic aspirator (Cusa® Valleylab, Boulder, CO, USA), bipolar cautery and Ligaclips (Ethicon® Endo-Surgery, Inc.) in order to minimize blood loss. The time spent in native right hepatectomy was 43 minutes with intraoperative minor bleeding without blood transfusion. In order to create enough space for graft placement in the abdominal cavity, were ligated all small caudate vessels mobilizing the residual left liver, including the left part of the caudate lobe, preserving its veins drainage only by middle and left hepatic veins (Figure1).

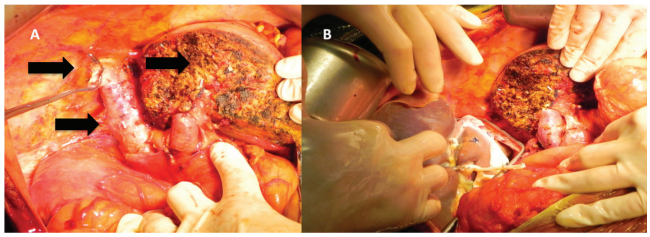

FIGURE 1 - A) After right hepatectomy preparing space to implant the whole liver graft. Upper left arrow showing the right hepatic vein clamps, upper right arrow showing the liver cut native surface and down left arrow showing inferior cava vein; B) the whole liver graft was placed orthotopically in front of the cut surface of the native liver.

Liver transplant anastomosis

Was performed with a side-to-side caval-right hepatic vein anastomosis with 5/0 polypropylene (Ethicon® Inc.) running suture. Then, a vascular clamp was laterally located on the recipient portal vein and end-to-side portal anastomosis with 6/0 polypropylene (Ethicon® Inc.) running suture was done with special attention to perform it as proximal as possible in the recipient portal vein, close to the pancreas (Figure 2).

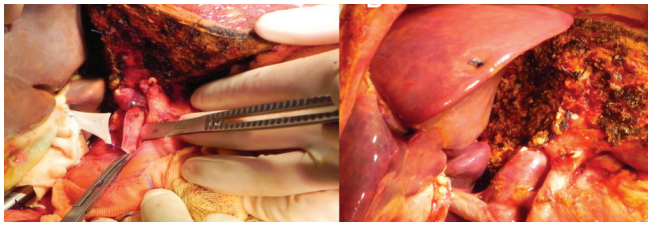

FIGURE 2 - A) Intra-operatory end-to-side anastomosis of allograft portal vein, close to the pancreas; B) end-to-side anastomosis of allograft portal vein and a reperfusion with good flow.

Was observed a quick and homogeneous graft reperfusion and the liver presented soft on hand-touch. The arterial anastomosis was fashioned with a 6/0 polypropylene (Ethicon® Inc.) running suture between the graft celiac trunk and aorta recipient by an iliac artery graft conduit. The common biliary duct anastomosis was performed by Roux-en-Y hepatocojejunostomy. The total surgical time was 325 min, the patient maintained hemodinamically stable and no blood transfusion was necessary.

Post-operative course

The post-operative course was marked by immediately improving liver function tests with PT=53%; INR 1.6; Bilirubin= 2.97 µmol/l on post-operative day five. A color Doppler study demonstrated vascular patency in the graft and the native liver remnant daily for the first five days. The patient improved her level of consciousness, decreased cerebral edema and intracranial hypertension and woke up from the coma. Although, she presented with a good liver function and improved the cerebral damage, she maintained infections signs as fever, leucocitosis and high C-reactive protein in all perioerative period.

DISCUSSION

As far as is known, this is the first case of ALT in Brazil. The selection of patients who may be elected for include the absence of underlying liver disease, young age, relative hemodynamic stability, excellent liver graft and a meticulous surgical technique[3,8]. Auxiliary partial orthotopic liver transplantation, the most common modality of ALT, may present some surgical technical difficulties as prolonged back table period; small size of the hepatic artery and double transplant liver cut surface, which can negatively influence the postoperative course. A whole cadaveric liver graft can overcome these complications since that it is not necessary to split or reduce the graft, leading to a shorter cold ischemia time and greater variety of arterial reconstructions. Arterial anastomosis was performed on the graft celiac trunk using an iliac jump graft from the aorta. This arterial anastomosis differed between the first whole graft technique described that their anastomosis was done between donor aortoiliac conduit end-to-side to right common or external iliac artery[6,7]. The arterial conduct offers a better exposition to end-to-end arterial anastomosis and also a bigger caliber.

The positive factors of using a whole liver graft reducing the morbidity with decrease the risk of bleeding on having two cut liver surfaces and bile leaks, maximize early liver function and accelerate recovery with whole liver volume that avoid any small-for-size syndrome and providing necessary hepatocytes without the complications of partial grafts[6,7]. However, otherwise requiring more space in the abdominal cavity, as well as mobilization of the remnant liver. The use of remains left hepatic lobe after right hepatectomy (70%)

allows a greater cavity space and more options in arterial reconstructions. Other important point about partial ALT it is more cost effective in long term than orthotopic liver transplantation, the intention to treat was lower compared with orthotopic liver transplantation that have greater amount of necrotic liver tissue[2,6].

A unique series using whole graft ALT exclusively found significant factors related to survival that was the donor age, requirement of blood transfusion and recipient weight[6]. Other important point, in vast majority of papers is described its use in acetaminophen overdose; but, in South America is different and in our cases are related to virus B hepatitis.

The late outcome of an ALT may preserve the native liver giving a chance to regenerate, and in the same time withdraw the immunosuppression[3,7,8]. The main objective in liver transplantation for acute liver failure is to reduce the cerebral edema avoiding the patient death. However, infection is also a big issue in this context. These patients underwent many invasive procedures, catheters, surgery, dialysis, intracranial pressure monitoring, and so long the chance of infection is almost higher in patients with fulminant hepatic liver failure. The present case rapid improved the liver function tests and had upgrade on the cerebral perfusion and edema, although the patient died from infection and sepsis.

CONCLUSION

Auxiliary orthotopic liver transplantation with whole donor graft is possible under specific conditions of hemodynamically stable recipient and compatible match of graft size. It can overcome auxiliary partial orthotopic liver transplantation technical difficulties and postoperative complications.

REFERENCES

1. Bismuth H, Samuel D, Castaing D, Adam R, Saliba F, Johann M, et al. Orthotopic liver transplantation in fulminant and subfulminant hepatitis. The Paul Brousse experience. Ann Surg 1995;222:109–119.
2. Chenard-Neu MP, Boudjema K, Bernuau J, Degott C, Belghiti J, et al. Auxiliary liver transplantation: regeneration of the native liver and outcome in 30 patients with fulminant hepatic failure--a multicenter European study. Hepatology. 1996 May;23(5):1119-27.
3. Dokmak S, Aussilhou B, Durand F, Paradis V, Belghiti J. Complete spontaneous liver graft disappearance after auxiliary liver transplantation. Hepatology. 2014 Feb 6. doi: 10.1002/hep.27059.
4. Gubernatis G, Pichlmayr R, Kemnitz J, et al. Auxiliary partial orthotopic liver transplantation (APOLT) for fulminant hepatic failure: first successful case report. World J Surg. 1991;15:660–666.
5. Jaeck D, Pessaux P, Wolf P. Which types of graft to use in patients with acute liver failure? (A) Auxiliary liver transplant (B) Living donor liver transplantation (C) The whole liver. (A) I prefer auxiliary liver transplant. J Hepatol. 2007 Apr;46(4):570-3. Epub 2007 Feb 5.
6. Lodge JP, Dasgupta D, Prasad KR, Attia M, Toogood GJ, et al. Emergency subtotal hepatectomy: a new concept for acetaminophen-induced acute liver failure: temporary hepatic support by auxiliary orthotopic liver transplantation enables long-term success. Ann Surg. 2008 Feb;247(2):238-49.
7. Rajput I, Prasad KR, Bellamy MC, Davies M, Attia MS, Lodge JP. Subtotal hepatectomy and whole graft auxiliary transplantation for acetaminophen-associated acute liver failure. HPB (Oxford). 2014 Mar;16(3):220-8. doi: 10.1111/hpb.12124. Epub 2013 Jul 22.
8. Rela M. Technique of hepatic arterial anastomosis in living donor pediatric auxiliary partial orthotopic liver transplantation. Liver Transpl. 2013 Sep;19(9):1046-8. doi: 10.1002/lt.23699.