

Domino Liver Transplant: Influence on the Number of Donors and Transplant Coordination

F. Nunes, M. Valente, R. Pereira, and M. Amil

ABSTRACT

The shortage of organs forces coordinators to seek new forms of generating organs for transplantation of the increasing numbers of patients on waiting lists. A recent technique called sequential transplant or domino liver transplant (DLT) allows the transplantation of a patient with chronic liver disease by implantation of a full-size liver derived from a patient with familial amyloidosis polyneuropathy (FAP) who receives a cadaveric graft. Therefore, it is possible to transplant two patients with only one cadaveric liver. The present report illustrates the use of this technique for the first time in our country, thereby increasing the number of hepatic transplants by 25%.

IN THE LAST THREE decades organ transplantation has evolved from an experimental procedure to an efficient therapy capable of treating or improving the quality of life of patients with organ failures. However, the shortage of organs has blocked the development of this therapy and the number of patients that can benefit from it. The number of organs available for transplant is not enough to supply the needs of the ever-increasing waiting list. Therefore, alternatives to allow a larger flexibility in the supply of organs for transplant have been suggested all over the world.

In 1995 a new transplant technique—sequential transplant or domino liver transplant (DLT)¹ was developed in Portugal, by a team led by Prof Linhares Furtado (Coimbra University Hospital); called implantation of a full-size liver from a patient with familial amyloidosis polyneuropathy (FAP), type I into a subject accompanied by transplantation of a cadaveric liver to the donor.

FAP is caused by an anomalous variant of the transtiretin (TTRMet30), a plasma protein, which is synthesized primarily the liver.^{2,3} The first symptoms begin in the third or fourth decade of life, as a mixed and progressive polyneuropathy, initially sensitive, but progressing to motor and autonomic disease, with digestive, cardiocirculatory, renal, and ocular effects. This disease causes death-of at 7 to 15 years after the onset of the clinical manifestations.⁴ In 1993, an international symposium in Sweden declared that hepatic transplant is the only valid treatment for the patients with FAP. Variants of this disease have been described in Sweden, Finland, Japan, the United States, and Brazil.³ However, the most important endemic focus is Portugal, primarily in north of the country. Except for the production

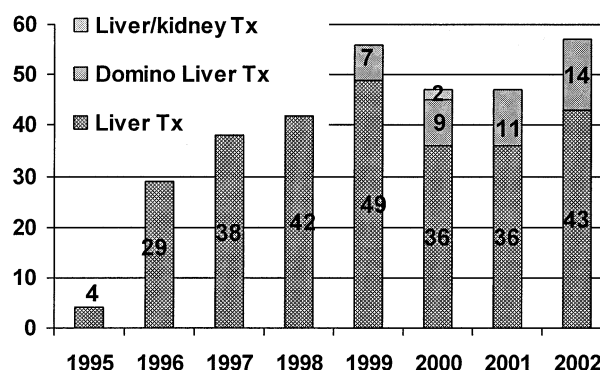


Fig 1. Liver transplants in HGSA (n = 320).

of this altered TTR, the liver of the FAP patient is metabolically and functionally normal. Therefore this organ may be used for transplantation of patients with chronic liver disease. Furthermore, the time for FAP incubation is longer than the expected posttransplant survival.

This transplant type creates a new category of potential donors raising technical, social, and ethical issues. Both the patients—the FAP patient who is simultaneously the living donor and the recipient—are informed of the technique and its risks. They must give their consent to move forward with the process.

From the General Hospital Santo António, Porto, Portugal.

Address reprint requests F. Nunes, Department of Transplantation, General Hospital Santo António, Portugal. E-mail: gccot@hgsa.min-saude.pt

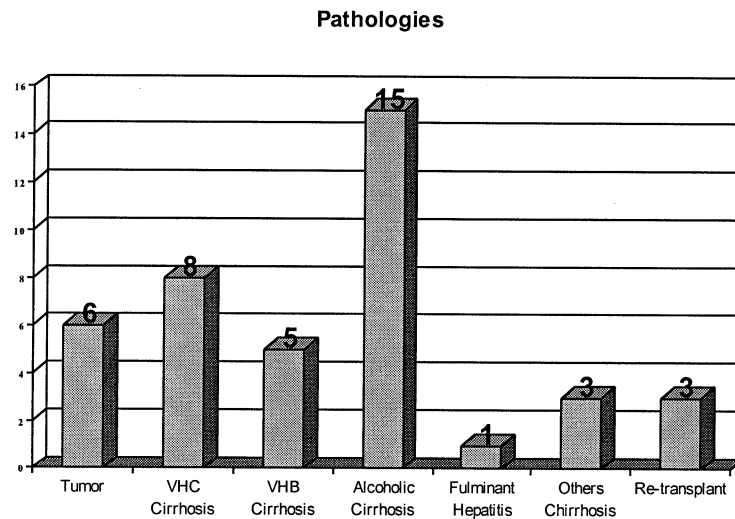


Fig 2. Pathologies of domino liver transplant recipients.

The criteria adopted by our hospital for the choice of sequential transplant recipients are: patients over 50 years of age; with any pathology indicated for hepatic transplant; all cases of hepatocellular carcinoma characterized by a single nodule <5 cm, or 3 nodules <3 cm; all viral pathologies, excluding fulminating hepatitis; and all re-transplants, obviously excluding patients with FAP.

METHODS

A review of DLT cases was performed from April 17, 1999, to December 31, 2002. Simultaneously the time spent on classical waiting lists was compared with sequential transplantations. The increased number of available livers caused by the implementation of this technique was calculated.

RESULTS

The first DLT was performed in our hospital on April 17, 1999. Since that time we have carried out 41 cases among 207 transplants, (19.8%; Fig 1). Most of the transplanted patients were men, (73%, $n = 30$), with 27% $n = (11)$ women. The mean age of domino liver transplant recipients was 53 years (range 32 to 69 years).

According to our criteria, the main pathology was alcoholic cirrhosis (36%), followed by cirrhosis by hepatitis C virus (19% Fig 2).

The importance of DLT to increase the number of available organs for transplantation is shown by the increased proportion: in 1999 DLT represented 12.5% of the total; in 2000, 19.1%; in 2001, 23.9% and in 2002, 24.5%.

The increased the number of organs available did not benefit a single center. When there was no possibility to transplant a patient in our hospital for logistical reasons (or

due to a lack of a recipient), the liver was offered to other transplant centers. Therefore, in this period 16 livers were offered to the other hospitals of the University of Coimbra and seven to Spain namely 23 organs. At a national level; a gradual growth was observed: in 2002 out of a total of 191 transplanted livers, 32 were from living donors with FAP (16.7%).⁵ This number will assuredly grow, since until last year only two centers were using this technique routinely, but actually all transplant centers are capable of performing this type of surgery.

CONCLUSIONS

The use of a metabolically and functionally normal liver from a patient with FAP in patients with chronic liver disease allows an increased number of available organs for transplant, and consequently reduces the overloaded waiting list. The increase may be up to 25% in a single center, or 16% at national level. The inherent risks of the use of this technique are the same as those in the classical transplant. Given that the period of incubation of FAP is 20 to 30 years, recipients will hardly come to suffer from typical clinical manifestations.

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