



## Original article

# 1000 Consecutive Liver Transplants. Descriptive Analysis and Evolution of a Single Center<sup>☆</sup>

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## A B S T R A C T

Between 1991 and 2013, 1000 liver transplantations were performed at Virgen del Rocío Hospital (Seville, Spain). A retrospective study was conducted, analyzing the characteristics of recipients and donors, indications, surgical technique, complications and survival in 2 different stages (1991–2002 vs 2003–2013) coinciding with the implementation of the MELD scale as a prioritization model. The most frequent indication was of hepatopathy of hepatocellular origin in 48.8%. There was a significant increase in the indications for hepatocarcinoma (8.6% and 24.1%  $P=.03$ ), and the rate of retransplantation (5.9% vs 9.6%,  $P=.04$ ). There was a change in the age of donation, going from 27.7 years in 1990 to 62.9 years in 2012 ( $P=.001$ ). The percentage of patients who did not require blood transfusion doubled (6.16% vs 14.31%,  $P=.001$ ). Survival of all patients after 1, 5 and 10 years was 77%, 63.5% and 51.3%, respectively.

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## 1000 trasplantes hepáticos consecutivos. Análisis descriptivo y evolución de un centro

## R E S U M E N

Desde 1991 a 2013 se realizaron en el Hospital Virgen del Rocío 1.000 trasplantes hepáticos. Se realizó un estudio retrospectivo, en el que se analizaron las características de los donantes y los receptores, las indicaciones, la técnica quirúrgica, las complicaciones y la supervivencia en 2 etapas diferentes (1991-2002 vs 2003-2013), coincidiendo con la implantación del MELD como modelo de priorización. La indicación más frecuente fue la hepatopatía de origen hepatocelular en 48,8%. Hubo un incremento significativo en las indicaciones por hepatocarcinoma (8,6% y 24,1%  $p = 0,03$ ), y de la tasa retrasplantes (5,9% Vs 9,6%,  $p = 0,04$ ). Se apreció un cambio en la edad de donación, pasando de 27,7 años en 1990 a

## Palabras clave:

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62,9 años en 2012 ( $p = 0,001$ ). El porcentaje de pacientes que no precisaron transfusión de hemoderivados se duplicó (6,16 vs 14,31%,  $p = 0,001$ ). La supervivencia de todos los pacientes a uno, 5 y 10 años fue del 77, 63,5 y 51,3%, respectivamente.

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## Introduction

Since the first liver transplantation (LT) was performed in 1963 by Starzl et al.,<sup>1</sup> the management of terminal liver disease has undergone major changes, and LT is currently considered the treatment of choice for this disease.<sup>2,3</sup>

In the late eighties and early nineties, the development of surgical and anesthetic techniques, preservation solutions and new immunosuppressive agents, as well as improved candidate selection, led to an increase in the survival rates of LT recipients.<sup>4,5</sup>

Spain accounts for only 0.7% of the world's population. However, 10% of the world's LT are conducted in this country thanks to the higher donor rates per inhabitant. These donation rates and, therefore, LT make it possible to develop and maintain 24 transplant centers nationwide that carry out an important annual activity in the field of LT.<sup>6</sup>

The objective of this study was to analyze the first 1000 LT performed at the Virgen del Rocío Hospital in Seville, Spain, and evaluate the changes experienced over time with regard to donors, grafts, recipients and surgical technique, as well as the survival results obtained over the course of the first 22 years of the program.

## Methods

Between 1991 and 2013, the first 1000 LT were carried out at the Virgen del Rocío Hospital in Seville. The analysis was conducted throughout the first quarter of 2017, to ensure a follow-up of at least 3 years in all patients included and to be able to study the survival adequately. In order to evaluate the changes after the implementation of the MELD model, we divided the study period into 2 phases: the first from the initial LT (1991) until the year 2002, with a total of 406 LT; and the second from 2003 until LT number 1000 (2013), with 596 LT. During this period, the patient variables were collected in a prospective database: demographic aspects of the donor and recipient, indication for LT, ischemia time, type of anastomosis, complications, retransplantation (reLT), hospital stay, readmissions and mortality.

An observational, descriptive study was carried out for the most part, although we analyzed the changes produced between the stages in a retrospective manner. The categorical variables are expressed in percentages. Continuous data have been reported as mean $\pm$ SD or median (range). To test the hypothesis, the chi-squared test, Student's *t* test and ANOVA were used if the conditions for their application were met; or its non-parametric alternatives if they were not met. Survival

estimates were calculated using the Kaplan-Meier method, and the comparison of results between the groups was performed using the log-rank test. A *P*-value less than .05 was considered statistically significant. The statistical analysis was completed using the SPSS<sup>®</sup> 24.0 statistical package (SPSS, Inc., Chicago, IL, USA).

## Results

### Donors

In the first stage, donors came from all over Spain as a result of the national allocation of donors; after 2003, 88.2% of the grafts came from donors in Andalusia, 44.4% of which belonged to the Seville healthcare sector (Seville and Huelva), 43.8% from the other 3 Andalusian sectors, 11.6% from the rest of the country and 2 donors from other European medical centers. The type of donation was mainly complete grafts from brain dead donors (98.9%), although 11 were complete grafts from living donors affected by familial amyloid polyneuropathy (FAP). A change in donor age was observed during these 22 years, increasing from 27.7 years in 1990 to 62.9 years in 2012 ( $P = .001$ ). The group of donors > 75 years was significantly higher in the second stage, 0.1% in the first stage (one donor) and 6.6% in the second stage ( $P = .0001$ ), with the majority in the last 5 years (50 donors) (Table 1).

The classic Starzl extraction technique was used in 61.6% of the donors, the Nakazato rapid technique in 37.2% and in the remaining 1.2% different techniques were used (domino, split).

### Recipients

The first 1000 LT were carried out in 916 patients: 17 received multiple-organ transplants (15 liver-kidney, one liver-pancreas and one liver-heart), 11 received complete grafts from living donors with FAP, and one patient received a reduced graft from an adult donor. The remaining 84 LT were reLT.

The median age of the LT recipients during the period of analysis was 53.5 years ( $Q_1$ : 46,  $Q_3$ : 49), with an observed increase in the age of the LT recipients in the post-2003 phase (49 vs 53 years,  $P = .043$ ). Ages ranged between 14 and 69 years, and 71.3% of the patients belonged to the 40-59 age group. The age limit of our group is 70 years for patients without comorbidities (Table 1).

The most frequent indications for LT in the series were hepatopathies of hepatocellular origin (alcoholic cirrhosis, hepatitis B and C virus cirrhosis) in 488 cases (48.8%), followed by hepatocellular carcinoma (HCC) in 178 (17.8%), reLT in its different acute and elective modalities in 84 cases (8.4%) and

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