Liver transplantation: The Spanish experience

R. Matesanz *, G. de la Rosa

National Transplant Organization (ONT), Madrid, Spain

Abstract

Liver transplant activity started in Spain in 1984 and has reached 16,132 interventions at 31st December 2008, with a mean activity of more than 1000 transplants during the last years. There are 25 transplant teams (1/1.85 million inhabitants), two of them paediatric. The maximum activity has been recorded at the Hospital La Fe (Valencia) with 1,557 transplants (more than 100 annually). The majority were standard deceased donor transplants. Other modalities were: 222 living donors (1.4%), 89 donors after cardiac death (0.5%), 187 split (1.1%) and 100 domino (0.6%). Combined transplants made in this period of time were 309 (1.9%): 244 liver–kidney, 15 liver–pancreas, 20 liver–intestine and 30 multi-visceral. Around 5% of transplants were performed under national priority. As Spain leads the world in organ donor rate, liver transplant activity means 6% of all the interventions performed in the world, with the largest relative activity (23–25 per million population). The analysis of the results is performed by the Spanish Liver Transplant Registry jointly managed by the National Transplant Organization and the Spanish Society of Liver Transplantation. As in other international registries, patient and graft survival have been improving across time in the different categories of basic diseases and associated risk factors.

© 2009 Editrice Gastroenterologica Italiana S.r.l. Published by Elsevier Ltd. All rights reserved.

Keywords: Liver transplant; Spain

1. Introduction

Liver transplant activity started in Spain in 1984. Drs. Margarit & Jaurrieta carried out the first liver transplant at Bellvitge Hospital (Barcelona). Since that time, 16,132 liver transplants have been carried out in Spain. Since 2003, more than 1000 liver transplants are performed annually (1,108 in 2008) [1]. As a consequence of this, the liver transplant rate in 2007 was 24.6 per million population (pmp), one of the largest ever reached in the world [2] (Fig. 1).

According to the World Transplant Registry [3] – developed by the Spanish Transplant Organization in collaboration with the World Health Organization – around 20,000 liver transplants are performed annually all over the world. Taking into account the activity of the Spanish Liver Transplant units, between 5 and 6% of this worldwide liver transplant activity take place in Spain, which is a very significant achievement if we consider that the
Spanish population only represents the 0.7% of the world population.

This objective has been reached since Spain registers figures of over 30 donors pmp since 1998 and leads the world in organ donation rate with around 34 donors pmp since 2002 and 34.3 donors per million population in 2007. In this very year, European Union countries registered a global organ donor rate of 16.8 donors pmp while 26.6 donors pmp was the published rate in USA (Fig. 2).

This constant increase in donation rate has been associated with a very important change in Spanish donors’ profile in two important epidemiologic characteristics, such as age and cause of death. Analyzing the cause of death evolution, we observe that, in the early 1990s, cranio-encephalic traumatisms due to traffic accidents were the main cause of death of Spanish donors, present in 43% of the cases. In contrast, only 8.2% of donors registered in Spain in 2008 died due to this cause. This reduction has been more intense in the last three years because in 2005 we registered – in absolute numbers – 249 donors whose cause of death was cranial traumatism after traffic accident and, after the approval and implementation of the point system for drivers licenses, this figure has been reduced to only 129 donors in 2008.

In the same period of time, in 1992 cerebro-vascular accidents were the cause of death in 39% of the donors registered in Spain and, for the last fifteen years, this percentage has been growing regularly representing the 65.4% of the causes of donor death in 2008 (Fig. 3).

If we analyze the evolution of donor age in this period, we observe that mean age has been increasing year after year: from 34.5 years in the early nineties to 54.2 years, which is the mean age of the donors registered in Spain in 2008 (Fig. 4). As a consequence of this, Spain has some of the oldest donors registered at an international level in different solid organ transplants including several liver and kidney transplants from donors aged 89, heart transplant from a 79-year-old donor, lung transplant from a donor aged 70 and a 51-year-old pancreas donor. Considering international statistics, Spain and Italy are the European countries with the highest percentage of over 70 year donors, which is more than 20% of total donors registered in these two countries. If we specify these characteristics for liver transplants, we can observe that Spain and Italy are also the countries with the highest rate of donors over sixty,
which means this age group represents more than 40% of the total [4]. Simultaneously, the recipient’s age has also increased during this period of time. As a result in the last decade, around 30% of the pool of recipients both in the waiting list and finally transplanted were over 60 years old. Although the mean age of Spanish organ donors is 54.2 years in 2008, we register regional differences as three northern regions have mean ages of 59.5, 61 and even 65.1 years [1].

Despite these relevant changes in donor profile, the organ donor pool in Spain has been increasing continuously, due to the great efforts made in brain death diagnosis and also in the identification of potential donors in all the hospitals of the country.

2. Spanish liver transplant activity

In Spain there are twenty-five hospitals with a liver transplant unit (this represents one unit per 1.85 million of population). Four of these centres have carried out over 1,000 liver transplants, and La Fe Hospital (in the region of Valencia) is the centre with the maximum activity, performing 1,557 liver transplants since its first procedure in 1991 and more than 100 liver transplants per year since 1998.

Although every liver transplant unit manages its own waiting list of candidates for a liver transplant, we can analyze the evolution of the national waiting list considering it as a whole. Despite these good figures in the donor rate and transplant activity, the waiting list stays long although steady in time and, since 2004, around 700 patients remain on it at the end of each year (Fig. 5). Mean time on the national liver transplant waiting list was 124 days in 2008 with a mortality rate of 7–8% of patients while awaiting liver transplant.

The rate of indications for liver transplant changes according to different periods of time and different regions in our country. That means that the waiting list inclusion criteria over several periods of time and among different hospitals make for different probabilities of liver transplant for the candidates. This probability in the last five years has remained at around 52% for patients in elective code (this percentage is 80% if we consider urgent code with national priority) although we register regional differences [1].

Liver transplant is a therapeutic option that has demonstrated its effectiveness years ago as the UCLA Registry data shows, where the longest survival after liver transplant is 38 years. The benefits are not only in relation to the number of years after transplant but also in the increasing quality of life of the patients who receive a liver transplant.

The Spanish Liver Transplant Registry (SLTR) [5] started in 1995 and is jointly managed by the Spanish Transplant Organization and the Spanish Society of Liver Transplant. Both organizations have the mission of stimulating both data analyses and the design and development of scientific studies. In this sense, the 2007 Report of the SLTR includes a section presenting the results of liver transplant from donors over seventy years old, the results on patient and graft survival are quite good although it is important to consider other several characteristics of donor and patient when making the decision of accepting or not accepting a liver for transplantation and matching donor and recipient as well as possible.

The SLTR includes information from all the liver transplants made in Spain and registers the main characteristics about donors, recipients and surgical procedures and also the evolution of graft and patient across the time. This information is updated every year by each liver transplant unit and by the Spanish Transplant Organization.

We have information on every liver transplant carried
out by Spanish centers since 1984 and this information is also included in the European Liver Transplant Registry [6]. The 2007 Report on patients and grafts reports around 15,000 transplants, which is 99% of the total number of liver transplants carried out in Spain (91% of these are first transplants). Five of these centers have the greatest activity, as they have performed more than 6,000 liver transplants, which is 40% of the global Spanish activity.

If we analyze the liver pathology of patients on the waiting list for liver transplant, the most frequent diagnosis in adults is alcoholic cirrhosis (30.6%), followed by hepatitis C virus cirrhosis and hepatocellular carcinoma with 25.8% and 14.6%, respectively. In children, the main indication for liver transplant is cholestatic disease (in 30% of the candidates) followed by metabolic diseases, the indication in 10% of the children on waiting list.

According to the analyses of data from the SLTR, the median patient survival is 18 years and the patient with the maximum survival is one of the first Spanish recipients, a woman who was transplanted 23 years ago.

Survival of patients at 1 and at 10 years after liver transplant has increased in time (Fig. 6) and, in the SLTR 2007 Report, was 84.5% and 60.9% respectively (Table 1), similar to data registered in most other European countries, as is shown in the report of the European Liver Transplant Registry [6].

In the survival analyses of this kind of results it is important to distinguish the proportion of patients that we consider as super-urgent patients, who are those patients diagnosed with fulminant hepatitis and those who need a re-transplant in the following week, because these patients’ life expectancy is worse. In 2008, we registered 85 cases, of which 64 were finally transplanted, with a median waiting list time of 1 day due to the fact that we consider this situation a national priority [2]. When we analyze the results of a multivariable analysis constructed with data from SLTR, we can see that the survival for both patients and grafts is lower due to different factors associated with these kind of process such as characteristics of the donor, worse ABO compatibility donor–recipient, number of transplants, worse previous situation of the recipient or longer ischemia time [5].

Considering liver transplants in children, Spanish liver transplant units perform around 70 liver transplants on child recipients every year, which is about 6% of the annual national activity. They are performed mainly in four hospitals and two of them are specifically pediatric centers that represent 67% of activity involving children.

One of the intervention areas designed to confront the growing need of organs for transplantation is increasing other modalities of liver transplant. In this sense, in 2008 we registered 78 cases of these categories including: 28

Table 1
Patient survival after a liver transplant. Data from the Spanish Liver Transplant Registry (1984–2007)

<table>
<thead>
<tr>
<th>Survival</th>
<th>1 month</th>
<th>3 months</th>
<th>1 year</th>
<th>3 years</th>
<th>5 years</th>
<th>10 years</th>
<th>15 years</th>
<th>20 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patients (13,437)</td>
<td>93.4%</td>
<td>89.7%</td>
<td>84.5%</td>
<td>76.7%</td>
<td>71.6%</td>
<td>60.9%</td>
<td>53.6%</td>
<td>46.1%</td>
</tr>
</tbody>
</table>
liver transplants from living donors, 14 liver transplants from donations after cardiac death (DCD donors), 14 cases of domino liver transplants and 22 split liver transplants.

2.1. Liver transplants from living donors

Since the first one carried out in 1993, 222 liver transplants from living donors have been performed in Spain (1.4% of the global activity during this period of time) leading to a mean number of 23 per year although the maximum activity was registered in 2002, with 41 cases. Nowadays this modality is only carried out by five of the Spanish liver transplant units. According to the results of the SLTR, survival in children after one year is 76.8% and 76.7% after five years (Table 2), higher rates than those registered in adult recipients (79.3% and 64% respectively) (Figs. 7 and 8).

2.2. DCD donors

Since 1995, 89 liver transplants from DCD donors have been performed (0.55% out of the global activity) mainly in three hospitals with 14 procedures performed in 2008. According to SLTR data, the survival rate of these patients at one and five years is 51% and 37.1% although rates for the very last years are higher.

2.3. Split liver transplant

Since 1991 until the present 187 liver transplants from DCD have been performed (1.2% out of the global activity) mainly in six hospitals with 22 procedures carried out in 2008. The results from SLTR show survival rates for these patients at one and five years of 64.9% and 59.1% respectively.

2.4. Domino liver transplant

The first domino liver transplant was performed in 1999. Since then, 100 have been performed (0.62% out of the global activity) in six of the liver transplant units with 14 procedures in the year 2008. According to SLTR, the one-year and five-year survival rate of these patients is 90.7% and 66.2% (Table 3).

Table 2
Five-year patient survival in children after a liver transplant according to the type of donation. Data from the Spanish Liver Transplant Registry (1984–2007)

<table>
<thead>
<tr>
<th>Patient</th>
<th>Survival</th>
<th>1 month</th>
<th>3 months</th>
<th>1 year</th>
<th>5 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deceased donor</td>
<td>85.6%</td>
<td>83.1%</td>
<td>78.6%</td>
<td>72.7%</td>
<td></td>
</tr>
<tr>
<td>Living donor</td>
<td>88.1%</td>
<td>82.8%</td>
<td>76.8%</td>
<td>76.7%</td>
<td></td>
</tr>
</tbody>
</table>

Table 3
Five-year patient survival in adults after a liver transplant according to the type of donation. Data from the Spanish Liver Transplant Registry (1984–2007)

<table>
<thead>
<tr>
<th>Patient</th>
<th>Survival</th>
<th>1 month</th>
<th>3 months</th>
<th>1 year</th>
<th>5 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deceased donor</td>
<td>92.3%</td>
<td>88.1%</td>
<td>81.3%</td>
<td>66%</td>
<td></td>
</tr>
<tr>
<td>Living donor</td>
<td>89.7%</td>
<td>84.1%</td>
<td>79.3%</td>
<td>64%</td>
<td></td>
</tr>
<tr>
<td>Domino donor</td>
<td>96.2%</td>
<td>96.2%</td>
<td>90.7%</td>
<td>66.2%</td>
<td></td>
</tr>
</tbody>
</table>


3. Conclusion

After reviewing the main characteristics of the evolution of liver transplant in Spain, we analyze the strong points of our system such as the high organ donor rate and, as a consequence of this, the high liver transplant activity. However, facing the future, the main improvement area is that of increasing the pool of donors trying to reduce the imbalance between the number of transplants and the number of people that could benefit from a liver transplant by increasing the other modalities of liver transplant.

Conflict of interest

The authors have no actual or potential conflict of interest relevant to this paper.
References


