The History of Liver Transplantation in Turkey

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Abstract

Liver transplantation is the definitive treatment for end-stage liver diseases. The first successful liver transplant was performed in the United States by Thomas Starzl in 1967. The first successful solid-organ transplant in Turkey was a living-related kidney transplant performed by Dr. Haberal in 1975. After much effort by Dr. Haberal, the Turkish parliament enacted a law about organ transplantation in 1979. After clinical and experimental studies, the first liver transplant in Turkey was performed by Dr. Haberal in 1988. The first successful partial living-donor liver transplant in children in Turkey was performed by the same team on March 15, 1990. On April 24, 1990, the first living-donor liver transplant was performed on a child in Turkey using a left lateral segment by Dr. Haberal and coworkers. On May 16, 1992, Dr. Haberal performed a simultaneous living-donor liver and kidney transplantation to an adult from the same donor. There currently are 30 liver transplantation centers in Turkey. According to data from the Ministry of Health, there presently are 2065 patients in Turkey who are waiting for a liver transplantation. From January 2002 to June 2013, there were 6091 liver transplants performed in Turkey (4020 living-donor [66%] and 2071 deceased-donor liver transplants [34%]). From January 2011 to June 2013, there were 2514 patients who had liver transplants in Turkey, and 437 patients (17%) died. The number of liver transplants per year in Turkey reached 1000 transplants in 2012 and more than 1150 transplants in 2013 (15.1/million/y). Therefore, Turkey has one of the highest volumes of liver transplantation per population worldwide, with 90% survival within 1 year after transplantation.

Key words: End-stage liver disease, International, Treatment

Introduction

The origin of solid-organ transplantation in humans may be associated with the first human kidney transplant.1 Subsequently, the first successful kidney transplant was performed between identical twins,2,3 and the first successful deceased-donor liver transplant was performed in 1967.4 After these successful operations, organ transplantation progressed rapidly and became the definitive treatment for end-stage organ diseases.

The experience with solid-organ transplantation in Turkey began in 1968. The first kidney and 2 heart transplants performed in Istanbul and Ankara were unsuccessful. These attempts had been made 1 year after the first successful heart transplantation in the world and were a response to media popularity. However, experience was lacking for this complex surgery.

In the early 1970s, experimental studies about liver transplantation were performed on pigs and dogs by Dr. Haberal and colleagues.5 These studies supplemented the technical skills of the team and encouraged progress in organ transplantation. Dr. Haberal went to Colorado as an early transplant fellow of Dr. Starzl in 1974. After his education, Dr. Haberal returned to Turkey and, like other fellows of Dr. Starzl from other countries, pioneered transplant surgery in his home country.
Clinical Transplantation in Turkey

The first successful solid-organ transplantation in Turkey was a living-related kidney transplant from mother to son, performed by Dr. Haberal and his team at Hacettepe University on November 3, 1975.6 During this early period of transplantation, there were no legal regulations in Turkey for cadaver organ procurement. All transplants were from living donors and done with written informed consent. The first deceased-donor kidney transplant in Turkey was performed by Dr. Haberal with an organ provided by Eurotransplant on October 10, 1978.6

After much effort by Dr. Haberal toward legal regulations about organ transplantation, the first Turkish law about procuring, storing, grafting, and transplanting organs and tissues was enacted in June 1979 (Table 1). This law (which may have been the second or third law worldwide about transplantation), included restrictions for organ trade and publicity, requirements for living donors, and a protocol for diagnosing and declaring brain death (Table 1).7 Additions were made to the law 3 years later about organ procurement during disasters and timing in forensic cases (Table 1).7

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<th>Table 1. Selected Articles From Turkish Laws About Procuring, Storing, Grafting, and Transplanting Organs and Tissue*</th>
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<td>Law</td>
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<tr>
<td>Turkish Transplantation Law No. 2238 (June 3, 1979)</td>
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<td>Turkish Transplantation Law No. 2594 (January 21, 1982)</td>
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In July 1979, the first domestic deceased-donor kidney transplant was performed by Dr. Haberal at Hacettepe University.6 Dr. Haberal’s catch phrase was, “One cadaver saves the lives of 4 humans.” The equation was simple. There were limited hemodialysis machines in Turkey, and a patient who had end-stage kidney disease could enter a hemodialysis program only after the death of a hemodialysis patient. Therefore, the 2 kidneys of each deceased donor freed 2 patients from the hemodialysis program and enabled 2 other patients who had end-stage kidney disease to enter the hemodialysis program.

The relation between religious rules and transplantation is important worldwide. Transplantation is a medical treatment and an important social issue. Dr. Haberal made an application to the Religious Affairs Supreme Council about the concordance of organ transplantation with Islamic rules. The council declared in 1980 that there were no restrictions about organ transplantation in the Quran, and that organ transplantation was allowed by Islam. This declaration was important for Islamic people worldwide.

During the early period of transplantation in Turkey, international and domestic transportation was limited and caused long cold ischemia times. In 1 patient who had prolonged cold ischemia time (111 hours), graft survival was > 25 years. After the experience with prolonged cold ischemia time was published, the acceptable cold ischemia time increased from 12 to 24 hours, then to 48, and to 72 hours.9,10

Transplant Organizations

In 1983, the Turkish Transplantation and Burn Foundation began to publish the first domestic transplant journal, Dialysis, Transplantation, and Burn. In 1984, the Middle East Dialysis and Organ Transplant Foundation was founded by Dr. Haberal and colleagues. This was an important step for transplantation in the region and miraculously brought together transplant professionals from Iran and Iraq during their 8-year war. The first congress of this foundation was held in Istanbul in 1985. In 1987, the foundation was changed to a society (Middle East Society for Organ Transplantation [MESOT]), and 3 years later, MESOT became an affiliate member of The Transplantation Society. After 26 years, MESOT has become an important international transplant
society. The MESOT is remarkable because it continues to function despite international conflicts in the Middle East.

In 1990, the Turkish Transplantation Society was founded. This society became an affiliate member of The Transplantation Society and MESOT and organized several international congresses.

Liver Transplantation

On December 8, 1988, the first liver transplantation in Turkey, an adult orthotopic cadaveric liver transplant, was performed by Dr. Haberal and coworkers at Turkish Transplantation and Burn Foundation Hospital in Ankara. The first successful partial living-donor liver transplantation in children in Turkey was performed by the same team on March 15, 1990. On April 24, 1990, the first living-donor liver transplantation in Turkey was performed on a child, using a left lateral segment by Dr. Haberal and coworkers. Dr. Haberal performed the same operation for an adult with a left lobe 1 month later. Most transplant professionals criticized Dr. Haberal for performing living-donor liver transplantations because of potential donor morbidity and mortality, but this operation, including use of the right liver lobe, has become a common procedure performed by many transplant surgeons. On May 16, 1992, Dr. Haberal performed a simultaneous living-donor liver and kidney transplant to an adult from the same donor.

Current Transplantation Surgery in Turkey

In 2001, the Turkish Ministry of Health established the National Coordination Center for allocation of deceased-donor organs. The National Coordination Center divided Turkey into 6 regions, and later divided the country into 9 regions according to population and transportation facilities (Figure 1). Every region had a distribution mechanism for the allocation of deceased-donor organs within the region. When there was no suitable recipient for the deceased-donor organs, the National Coordination Center distributed the organ to another region.

When liver transplantation in Turkey was started 25 years ago at 1 center in Ankara, Turkey had a population of 53 million people. Currently, the population of Turkey has more than 76 million people. From January 2002 to June 2013, there were 6091 liver transplants performed in Turkey (4020 living-donor [66%] and 2071 deceased-donor [34%] liver transplants). From January 2011 to June 2013, there were 2514 liver recipients in Turkey, and 437 patients (17%) died. The number of liver transplants per year in Turkey reached 1000 transplants in 2012 and more than 1150 transplants in 2013 (15.1/million/y). In 2010, Turkey was the third country worldwide, after the United States and The Netherlands, in number of solid-organ transplantations per million people per year. Turkey has among the highest volumes of liver transplantations per population worldwide, with 90% survival within 1 year after transplantation. However, the frequency of cadaveric organ procurement in Turkey is among the lowest worldwide (5 organs/million people), and 35% of liver transplantations in Turkey are from deceased donors. According to data from the Ministry of Health, there presently are 2065 patients in Turkey awaiting a liver transplant.

There are 30 active transplant centers located in 13 out of 81 cities in Turkey (Figure 1). Liver transplant centers mostly are located at state universities and state education hospitals (Table 2). However, most liver transplants (50%) in Turkey are

| Table 2. International Scientific Publications About Liver Transplant From Turkey* |
|----------------------------------|-----------------|-----------------|
| Center Type                      | No. of Centers  | No. of Publications |
| Hospitals                        |                 |                  |
| State university                 | 33              | 350              |
| State education                  | 13              | 26               |
| Foundation university            | 7               | 208              |
| Private                          | 6               | 27               |
| International collaborative studies | 4         | 4               |
| Total                            | 63              | 615              |

*Literature search performed on PubMed in September 2013. Data are reported as number of transplant centers or publications. Source: PubMed.
performed at private hospitals. Recent restrictions limit new transplant centers from opening because of transplant center inflation. Istanbul is the leading city in liver transplant numbers. However, the most active transplant center is İnönü University at Malatya, with a frequency of liver transplantation twice the average of other regions in Turkey, and which has begun construction of a special hospital dedicated to liver transplants.

We performed a literature search using PubMed to evaluate the scientific publications from Turkey with the key words “liver transplantation” and “Turkey.” In September 2013, there were 615 publications, including 4 international collaborative studies (Table 2). Twenty-four of the 30 centers (80%) had publications about liver transplantation, and 537 of 611 liver transplantation studies (88%) were from these 24 centers. Although private hospitals were responsible for 50% of the transplants performed in Turkey, only 6 private hospitals had publications (Table 2).

In 2013, Dr. Haberal founded 2 organizations, the World Academy of Medical, Biomedical, and Ethical Sciences; and the International Haberal Transplantation and Educational Foundation. These organizations may help further develop liver transplantation in Turkey.

References