The status of cadaveric organ donation for liver transplantation in Saudi Arabia

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ABSTRACT

Objective: Over the past 2 decades, liver transplantation has became the standard treatment of end stage liver disease. Organ shortage has been the main hindrance against the progress of liver transplantation in the Kingdom of Saudi Arabia. This paper reports the status of organ donation for liver transplantation in the Kingdom of Saudi Arabia and highlights the problems and the suggested solutions in relation to organ shortage.

Methods: All donors reported to the liver transplant program at the King Fahad National Guard Hospital, Riyadh, Kingdom of Saudi Arabia, from the Saudi Center of Organ Transplantation from January 1994 through to June 1998 was retrospectively analyzed. Clinical and laboratory data were evaluated to decide on the suitability of organs for liver transplantation.

Results: Out of 216 donor offers only 100 were harvested and utilized (46%). Out of the remaining 116, 8 donors were declined based on bad clinical and laboratory data and the remaining 36 donors' livers were harvested but not used based on abnormal liver histology. This resulted in discarding more than 50% of the offered donors. The main reasons were related to poor donor maintenance and logistical delay.

Conclusion: The number and quality of organs offered for liver transplantation in the Kingdom of Saudi Arabia over the past 6 years has been deteriorating with a negative impact on the liver transplant programs. Adopting new strategies is required to support the donor program in the Kingdom of Saudi Arabia. It is proposed that establishment of donor promotion offices in major hospitals can change the dismal picture of organ donation in the Kingdom of Saudi Arabia even at the current consent rate by better utilization of the available donors.

Keywords: Liver transplantation, donor.

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Organ transplantation has made big strides over the past 5 years as a result of refined surgical techniques, new immunosuppressive drugs, and improved organ preservation solutions. Despite these major breakthroughs, organ shortage in the face of increasing demand continues to limit its usefulness as the ultimate solution for end stage organ failure patients. Statistics from the United State of America (USA) and Europe continue to indicate an ever-increasing gap between organ demand and organ supply.[1] At the year 2000, nearly 70,000 patients in the USA are waiting for organ transplant.[2] Organ shortage has been the real hindrance to the progress of organ transplantation in the Kingdom of Saudi Arabia (KSA).[3] The statistics of the Saudi Center for Organ Transplantation (SCOT) indicates that, on an average, only 5% of the need for liver transplantation was met annually over the past 5 years. The situation with end stage renal failure is not better. Currently, 6694 patients are on dialysis, 3970 patients are on the waiting list for renal transplantation and only an average of 223 patients are transplanted annually.[4] This dismal picture is the result of so many factors operating within the dynamics of the field of organ transplantation. Identifying these factors is the first

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step towards improving the problem of organ shortage especially in liver transplantation where the patients cannot be sustained on artificial means of life support such as dialysis. We looked at the donor situation in KSA as it applies to liver transplantation from 1994 to 1998. A detailed analysis of donors offered for liver transplantation over 4 ½ years is presented to include the number of donor offers to the Liver Transplant Program at King Fahad National Guard Hospital (KFNGH), Riyadh, KSA, the number of transplants and the reasons for not utilizing all donor offers. Recommendations on how better utilization of donated organs could be achieved are discussed. This to our knowledge is the first paper addressing the organ shortage in KSA as it applies to liver transplantation.

Methods. The liver transplant program at KFNGH, KSA was launched in January 1994. Until July 1998, a total of 100 liver transplant procedures were performed on 92 patients. As reported[5] the one and 3 year actuarial survival rate was 89% and 67%. During that period of time, all the donor offers by the SCOT were retrospectively analyzed. All potential donors were declared brain dead in accordance with the protocols of the SCOT. Consent for organ donation was obtained from the next of kin prior to donor offer. Once a donor is offered by the SCOT, the Liver Transplant Team at KFNGH, evaluated the clinical and laboratory data of the potential donor. This data was also verified with the referring intensive care unit (ICU). They were then entered into a form, which is subsequently transferred into a (Excel, Microsoft) computer data sheet. This database forms the basis of this report.

Results. There were a total of 216 donor offers from February 1994 until July 1998. One hundred and ninety two were males and 24 were females. Age ranged between 16 months and 67 years with an average of 29.8 years. The percentage of Saudi nationals was 28% (60 out of 216), the rest were other nationalities. The majority came from the Indian subcontinent. The leading cause of death was head injury in 151 potential donors (70%). Next was cerebrovascular accident in 35 potential donors (16%). Out of these 216 donor offers, 100 livers were harvested and utilized for 92 patients. Eight livers were used for retransplantation making the total number of liver transplant procedures 100. The ICU stay in 216 donors is shown in **Table 1**. Fifty-six donors (25.9%) stayed more than 7 days in the ICU. Only 19 were utilized. Out of remaining 116 donor offers, 80 were declined and a decision not to go for harvesting was made. **Table 2** illustrates the reason for declining these 80 offers. In 12 donors (15%) no suitable recipient was available due to incompatible blood group in 5, size mismatch in 6 and the unavailability of the recipient in one case. The remaining 136 donor offers were accepted and the harvesting team went for retrieval. Once a liver was brought a decision not to use it was based on gross inspection and liver biopsy. **Table 3** illustrates the causes of non-utilization of the 36 harvested organs. The leading cause of not utilizing retrieved livers was macrovesicular steatosis, which was more than 60% in 9 livers. The remaining 6 livers had steatosis of 30-60% with associated risk factors such hepatocyte degeneration or necrosis. The 2nd leading cause for non-utilization of retrieved organs was diseased liver (9 donors). Schistosomiasis was found in 2 livers, cirrhosis in 2, tuberculosis, fibrocystic disease and primary sclerosing cholangitis, one each. The remaining 100 organs were used.

Discussion. The benefits of liver transplantation for patients with end stage liver disease have been proven over the past 2 decades. In KSA, based on the experience over the past few years, liver transplantation was proved to be feasible and successful.[3] The need for liver transplantation is unquestionably clear. The main limiting factor has been organ shortage. This shortage occurs paradoxically in the face of plenty of donors all over the KSA. With the current population of the KSA, at least 1000 donors are available annually, however, only an average of 350 are reported. So it seems logical that the first effort in increasing the donor pool is to increase reporting. Reasons for not reporting donors by different ICUs in KSA include: indifference, absence of legislation enforcing reporting of donors, lack of adequate support by the SCOT and religious beliefs against the concept of brain death among some health worker in the ICUs. Care of the donor has been a major contributing factor leading to the non-utilization of more than 50% of the donors mainly due to hemodynamic instability, high liver enzymes and hypernatremia (**Table 2**). This is mainly related to lack of knowledge amongst health worker on how to care for donors in some of the ICUs as well as lack of equipment and drugs. The other important factor is the unaccepted delay from the time of diagnosis to the time of organ retrieval, such delay can leads to loss of the donor or deterioration in the quality of organ retrieved. The main reason for this delay is the multifaceted logistical delay in obtaining the consent from relatives. Marginal organs due to lengthy ICU stay, hemodynamic instability and hypernatremia have a deleterious effect on the graft function and on the subsequent mortality and morbidity of the recipient.[6,7] Although one can argue that a marginal donor could be utilized for very sick patients, it is important to weigh this concept against the reputation of the new evolving transplant programs and the questionable benefit of liver transplantation

Table 1 - Donor stay in the intensive care unit.

Duration	N of donors	(%)
Less than 3 days	79	(36.6)
Between 3 - 7 days	81	(37.5)
Between 8 - 14 days	49	(22.7)
More than 14 days	7	(3.2)
Total	**216**	**(100)**

N - number

Table 2 - Causes of declining donors' offers for liver transplantation (80 donors).

Cause	N	(%)
Hemodynamic instability	22	(28)
High liver enzymes	15	(19)
No suitable recipients	12	(15)
Hypernatremia	9	(11)
Sepsis	9	(11)
Consent withdrawn	8	(10)
No transportation	3	(3.6)
Old age	1	(1.2)
Offer given to another center	1	(1.2)
Total	**80**	**(100)**

N - number

Table 3 - Livers retrieved and not used for transplantation (36 donors).

Reasons for discarding livers	N	(%)
Steatosis	15	(42)
Disease liver	9	(25)
Hepatocyte necrosis	7	(19)
Technical causes (retrieval injuries)	2	(5.6)
Tuberculosis abdomen	2	(5.6)
Unsuitable due to original injury	1	(2.8)
Total	**36**	**(100)**

N - number

in such situations. This overall picture stems undoubtedly from an inefficient infrastructure to support organ donation. Currently the organization in charge of organ donation (SCOT) has failed to increase the number of donors and hence organ transplantation in KSA. It seems, it is time to look for a different strategy to alleviate the organ shortage in KSA. The experience of others has taught us that solving organ shortage requires taking aggressive measures to identify, report and maintain donors. Such a measures will be taken if a donor supportive infrastructure network is available. Such network will consist of satellite donor promotion offices scattered all over KSA operated by trained coordinators and physicians who will support all aspects of organ donation under the supervision of a central agency. This mimics the Spanish model. In Spain, procurement of organs for transplantation is a service of the hospital itself that is controlled and carried out by the physicians and nurses. As shown by Lopez-Navidad et al,[8,9] the best way to identify potential donors and monitor donation rates is to establish in every acute care hospital a monitoring system that is overseen by specially trained doctors and nurses. This approach has resulted in the highest number of donors per million population in the world. In 1998, Spain surpassed 30 donors per million population in comparison to other western countries where the number of donor per million population is less than half that of Spain.[10] This rate of donation resulted in the performance of 22.7 liver transplant per million compared to 11 in the United Kingdom, 11.5 in France and 8.7 in Germany. The rate of procurement of organs from cadaveric donors has stagnated in all countries except Spain. In 1999 in Spain, the number of cadaveric organ donors was 33.5 per million population, as compared with 21 per million in the USA and 14 per million in the European Union.[11,12] The success in Spain is the result of many factors. One of the most important is the availability of a physician coordinator in the donating hospital who helps in the diagnosis, management and the logistics of consenting the family. This person is paid for this extra work beside his regular job. In KSA with a 20% consent rate and at least 350 donor per year, it seems that at least 50 donors should be utilized for liver donation. This number could be increased to more than 150 if most brain death cases are reported. Improving donor maintenance will open the door to utilizing split liver techniques and therefore expands the available donor pool. Such procedures cannot be carried out on marginal livers. Regional donor offices are urgently needed to help in the alleviation of organ shortage in KSA. Once formed, they will need tremendous support from the SCOT. This is the first step in the direction of improving the donor situation. Other facets of organ donation have to be tackled including religious and public aspects out only when a good

infrastructure for organ donation is well established.

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