

How Deceased Donor Transplantation Is Impacting a Decline in Commercial Transplantation—the Tamil Nadu Experience

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India with a population of 1.2 billion has a renal transplantation rate of 3.25 per million population. The major cause of chronic kidney disease is hypertension and diabetes. The crude and age-adjusted incidence rates of end-stage renal disease are estimated to be 151 and 232 per million population, respectively, in India. There was a remarkable lack of knowledge in the public about deceased organ donation until a decade ago. However, the role played by the media and nongovernmental organizations in partnership with the government has emphasized and implemented deceased donor transplantation in certain states in India—to mention particularly, the Tamil Nadu model. In the last 2 years, deceased organ donation has reached 1.3 per million population in Tamil Nadu, thereby effectively eliminating commercial transplantation. There is no religious bar for organ donation. A central transplant coordinator appointed by the government oversees legitimate and transparent allocation of deceased organs both in the public and private facilities as per the transplant waiting list. This model also takes care of the poor sections of society by conducting donation and transplantation through government-run public facilities free of cost. In the last 2 years, deceased donor transplantation has been performed through this network procuring organs such as the heart, heart valves, lung, liver, kidneys, cornea, and skin. The infrastructural lack of immunological surveillance—including donor-specific antibody monitoring, human leukocyte antigen typing, and panel reactive antibody except in a few tertiary care centers—prevents allocation according to the immunological status of the recipient. This private-public partnership promoting deceased donor transplantation has effectively eliminated commercialization in transplantation in the state of Tamil Nadu with a population of 72 million which is a model for other regions of South Asia and developing countries.

Keywords: Deceased donor, Commercialization, HLA.

(*Transplantation* 2012;93: 757–760)

The crude and age-adjusted incidence rates of end-stage renal disease are estimated to be 151 and 232 per million population, respectively, in India (1). Chronic kidney disease in India is predominantly due to diabetes mellitus and hyper-

tension (www.ckdri.org). The demand for organs grossly outnumbers the supply and hence there are challenges for these unmet requirements of organs. The rate of renal transplantation performed yearly in India translates to 3.25 per million population (1). It is estimated that currently India's deceased donation rate is 0.08 per million population per year (2, 3). The majority of the 1.2 billion Indians live in villages and small towns where diagnoses of chronic kidney disease through laboratory tools vary in the 35 different states of the country. Renal transplantation, as the best form of renal replacement therapy, is provided in the major industrial and financial cities in India and there is a wide disparity among the different states in the rate of renal transplantation. The continuous ambulatory peritoneal dialysis program, which was initiated in 1991, provides renal replacement therapy in the distant corners of India as a home-based therapy, and currently, there are 7000 prevalent patients (4). Among the 7400 hemodialysis machines, the majority are located in the metropolitan cities of Delhi, Mumbai, Kolkata, and Chennai. Lack of electricity and power in the villages and small towns are major barriers for setting up hemodialysis units. There is a critical gap and an unmet need for transplantation to the different population who live in villages and small cities. Less than 10% of patients are able to gain access to renal replacement

The authors declare no funding or conflicts of interest.

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Received 1 June 2011. Revision requested 15 July 2011.

Accepted 15 November 2011.

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ISSN 0041-1337/12/9308-757

DOI: 10.1097/TP.0b013e3182469b91

therapy from which less than 3% are on long-term renal replacement therapy (5).

Since the promulgation of the Transplantation of Human Organs Act of 1994, efforts were made by nongovernment organizations (NGOs) in partnership with the State Governments in expanding the deceased donor transplantation program along with the ongoing live donation program. Organizing a nationwide deceased donation program in India will always be a logistic challenge. Contrary to many other studies, cultural, social, educational issues, language barrier, and religious concerns do not play a role in the decision for or against donation (6–8).

AN OVERVIEW OF DECEASED DONOR TRANSPLANTATION IN TAMIL NADU

Deceased donor transplantation is predominantly practiced in the states of Tamil Nadu, Andhra Pradesh, Gujarat, and Maharashtra. Yearly, 164,000 people die of road traffic accidents in India of which nearly 70% are declared brain dead. A 4-year single-center experience of 89 donors and 160 deceased donor transplantations from road traffic accidents and cerebrovascular accidents was reported from Gujarat with a mean follow-up of 2.35 ± 1.24 years with patient and graft survival rates of 77.5% and 89.3% (5). A previous study by our group from a single-center experience showed a patient survival of 79.58%, 76.7%, and 74.8% and death censored graft survival was 92.4%, 87.9%, and 87.9% at 1, 2, and 3 years, respectively (9). Currently, the state of Tamil Nadu generates close to seven deceased donors a month which works out to a rate of 1.2 per million population of the state per year. Although this is low compared with international standards, it is nearly ten times that of the rate for India as a whole. This figure emphasizes the vast strides that have been made in deceased donor donation in Tamil Nadu and also indicates that much more remains to be done. The key factor for the success of the Tamil Nadu program has been the coming together of state government policy and the involvement of the private sector and NGOs. There has been teamwork at every stage—identification of brain death, maintenance, counseling families that have lost a loved one, and organ retrieval. The importance of counseling families in grief by trained people cannot be overemphasized.

Further, the Indian defense forces, through their network of hospitals, have successfully implemented programs for deceased donor transplantation and 45,000 Indian army personnel have pledged their organs in case of accidental brain death. In addition, MOHAN Foundation, an NGO, following a memorandum of understanding with the Government General Hospital, Chennai, in February 2010 engaged energetically with the government through their manpower in promoting deceased donor transplantation. The stakeholders including the media played a major role to make the total framework easier to understand regarding deceased donation. Their motto was “Deceased donor transplantation saves lives, can eliminate illegal organ trade.”

DATA ACHIEVED BY THE TAMIL NADU MODEL

The average waiting period of kidney transplantation varies between 3 months and 1 year in Tamil Nadu at the

current donation rate. A total of 27 hospitals participated in deceased donor transplantation during the last 2 years, 26 in kidney transplantation, 6 in liver transplantation, 4 in heart transplantation, and 1 in lung transplantation. The percentage of utilization of organs is 95% for kidneys, 85% for livers, and 19% for heart. The underutilization of kidney and liver is attributed to unsuitability of the organs while heart recipients are rare to find although there are four hospitals involved in heart transplantation in the state. The peak activity in the state was during the month of July 2010 when 14 deceased donors progressed to donation.

As per the gender, 82% of the donors were male and 18% were female probably due to the large number of males involved in road traffic accidents. The donor age distribution was in the range of 21 to 50 years, and 84% of the donors were reported as road traffic accidents or head injuries whereas 14% were due to intracranial bleed. As per the blood group, O donors were 35%, B donors 37%, A donors 22%, and AB donors 6%.

There are currently 46 approved hospitals for renal transplantation in the state with smaller numbers for corneal (13), heart (12), liver (8), lungs (3), and other organs (1).

THE TAMIL NADU MODEL

The hospitals are advised to setup a counseling service for individuals involved in organ transplant and a transplant coordinator is appointed to coordinate all aspects of transplantation on behalf of the hospital regardless of government or private status. Media publicity of transplantation is avoided until the discharge of the patient. To this effect, medical representatives are advised not to give out details of the recipient to the media and to follow the ethics of the medical profession. The hospitals are required to post the approximate cost range of the transplant surgery along with the total number of varied organ transplantation on the hospital Web site and the government Web site (www.tnos.org).

The transplant coordinator is available 24/7 for purposes of organ sharing communication as in developed countries. There is no annual fee except an entry fee of Rs.10,000 (USD 250), which is collected by the government. Each hospital creates a waiting list of patients awaiting transplantation for each organ and this is frequently updated, and the telephone numbers and contact address of the prospective recipient are kept in the hospital. One of the essential pieces of information to be provided in the form is the date on which dialysis was started. Whenever there is a change, for example, if the recipient opts out or expires, the matter should be communicated to the central organ sharing agency. The recipient can only be registered with one transplant hospital at a time. However, the individual is free to shift to another transplant hospital by informing the central convener and his or her original date of registration is maintained in the registry.

The Tamil Nadu model involves allocation of one kidney, liver, and heart automatically to the hospital where the deceased donor organs are harvested—deemed “local organs”; this would allow hospitals with trauma programs to automatically become the centers that do the most transplants. The second kidney, the liver, and the heart (if the

hospital where harvesting has taken place only does renal transplantation) become “shared organs” and will be allocated to patients in other hospitals by the convener. The local organs are to be allocated strictly after prioritization of one’s hospital list that has been sent to the convener. If for any reason the heart cannot be used, heart valves can be used and will be allocated by the convener. If donation takes place in a nontransplant hospital, both kidneys become “shared kidneys.” It is to be noted that this is a public-private partnership system. The private hospitals are supporting the donation of organs with immense pressure on them as they have a huge waiting list which is now a part of the government registry. When the deceased donor program started in Tamil Nadu in 1995, the majority of the organs were harvested from private hospitals and were used locally—especially kidneys and rarely heart. Hence, the government policy which was framed has given some leverage to the private facility, where the organs were harvested, to use for their wait-listed patients from the central list. However, this practice will change over the course of time and the organs will be distributed as per the waiting list despite the site of harvest.

The deceased donor family is kept posted of the organ utilization procedure and they are assisted with all formalities including police liaison in road traffic accidents and such medicolegal cases. Nearly four fifth of the deceased donor transplants in the state of Tamil Nadu are from road traffic accident victims and hence fall under the umbrella of medicolegal cases. A postmortem examination can be performed if necessary after the organ retrieval as per the new law passed by the government. The postmortem can be performed in the premises of the organ retrieval hospital and hence save substantial time and worry for the donor family.

The cost incurred for donor maintenance can be reimbursed in the case of private hospitals by the recipient hospital which is private to a ceiling amount of Rs 75,000 (USD 1650). A full recipient report should be mandatorily sent to the central convener of the transplant program, by an online form at <http://dmrhs.org> within 48 hr of discharge of the patient and a monthly statement of the transplants performed and periodic reports of long-term clinical results of the transplantation surgeries. Recipients should have been on dialysis for a minimum period of 2 months at the time of registration and there should be a verifiable proof of this.

If there are no recipients available, either in the government or private hospitals, the organ can be shared for private hospitals or government hospitals outside the state of Tamil Nadu. In the case of liver, heart or lung allocation, the priority will be given to severely ill patients. A liver recipient should have been registered for more than 24 hr to qualify for deceased donation.

The anchor for the coordination is the convener, Dr. J Amaloparvanathan, a vascular surgeon from Madras Medical College and General Hospital. A transplant advisory committee is also set up involving members of the health ministry, NGOs, private, and government medical college hospitals in the state. This committee is available for consultation and help in decision making. The combined effort has resulted in the harvesting of 124 deceased donors in the state of Tamil Nadu during the 2 years ending September 2010 (Table 1). This record is highly credible although it is lower than what is possible with the existing physical infrastructure because five hospitals in the state ac-

TABLE 1. Organs retrieved in the Tamil Nadu program

	Year 1 (Oct 2008–2009)	Year 2 (Oct 2009–2010)	Total
Donors	42	82	124
Heart	13	12	25
Lung	2	0	2
Liver	36	74	110
Kidney	84	152	236
Total major organs	135	238	373
Heart valve	32	110	142
Cornea	56	144	200
Skin	1	0	1
Total organs	224	492	716

counted for more than four fifth of the donors. An average of three major organs was taken from one deceased donor.

DECEASED DONATION AND BRAIN DEATH

Deceased donation should be done with altruistic motives and in a generous charitable manner as a willing contribution to society. It is necessary that deceased donation be governed by transparency on all fronts to ensure that the sentiments of the donor’s relatives are adequately respected. Hence, it is considered necessary that a certain degree of accountability is also insisted upon. We have a deliberate tilt toward poor patients in government hospitals because the government has a duty toward the poor and the needy. The organs do not belong to any particular hospital just because the patient dies in that hospital. The organs belong to the society at large and the government has a duty to see that the organs are equitably distributed.

To certify brain death, four doctors should sign the legal certificate. They include the medical practitioner in charge of the hospital, a medical practitioner and a neurologist nominated by the hospital and approved by the appropriate government authority, and the medical practitioner treating the patient.

The doctors should carry out the first and second medical examinations with a time gap of a minimum of 6 hr between the two examinations before brain death is confirmed.

The medical fraternity in India has been under the scanner for all the wrong reasons during the last decade. More so in the field related to kidney donation. Deceased donation is looked more as a “kidney program”—and one of the fears often expressed has been that brain death should not be made to happen—hence these precautionary measures by the government. It may act as deterrent from this happening but it does make the task of the coordinators difficult. Despite that the program has made a good start and has also laid out procedural guidelines in the form of government orders to simplify some of the procedures.

ELIMINATING COMMERCIALIZATION

A number of kidney scams surfaced with the most recent in 2007. In response to this, the Government of Tamil Nadu decided to clamp down the commercialization of live kidney transplants and promote deceased donor organ transplantation

in the state. As a result of a public-private partnership workshop in 2007, which involved medical professionals and bureaucrats, many recommendations were made and the government set guidelines and promulgated orders to lay down a set of norms that would supplement the Transplantation of Human Organs Act, 1994 through which organs could be allotted in a fair manner to potential recipients who await organ transplantation. However, it was the example of a doctor couple donating the heart of their young son who died in a road traffic accident to save the life of a young girl that garnered wide publicity and made an emotional connection with the people of South India at large. Following this, there were some more deceased organ donations which were highly publicized by the print and visual media which created a momentum for organ donation.

HLA TYPING AND ANTI-HLA ANTIBODY DETECTION

Human leukocyte antigen (HLA) typing, anti HLA antibody screening, and cross matching have played a key role in ensuring a successful renal transplant program. However, best practice changes with emerging evidence and the passage of time, and it is imperative that testing platforms, protocols followed, and algorithms and guidelines drawn accommodate these relevant changes. One of the major deterrents for deceased donor transplantation in small towns is nonavailability of a laboratory that provides Center for Disease Control and Prevention (CDC) cross matching.

In the setting of renal transplantation, circulating preformed anti-HLA antibodies can cause rejection and it is crucial that clinically significant antibodies are identified by the laboratory. The first standardized method for detecting anti-HLA antibodies was the CDC test. A donor-specific antibody identified on this platform was a contraindication to transplantation (2). However, more sensitive platforms such as the ELISA, Flowcytometry, and the Luminex have enhanced sensitivity of the assays greatly (10). With the introduction of these assays, it is crucial that the clinical relevance of the antibodies detected be defined and that the presence of nondetrimental antibodies not be a block for a possible safe transplant.

In the Indian setting, where only minimal guidelines for laboratory evaluation pretransplant exist, and facilities are not centralized, a wide variety of protocols are followed which range from those performing only a standard basic CDC crossmatch to those using CDC, CDC with enhancement, and solid phase assays with comparison to historic sera—the latter contributing to clinical decision making mainly in the setting of the sensitized patient. The problems with the current system of organ allocation are many. HLA matching is not a criterion. There is no centralized policy on categorization or definition of sensitized recipients, follow-up after any sensitizing event such as a transfusion, or on the policy of organ allocation to this group of patients. Panel reactive antibodies are now easily accessible in the country, and as per British Society for Histocompatibility and Immunogenetics guidelines 2010, laboratories should have the capability of identifying antibody specificities in their sensitized patients so that donors who may be crossmatch negative can be identified and allocated appropriately (3).

It would be ideal to establish a clinical laboratory network or working group, which could set guidelines for immunological monitoring—both pre- and posttransplant—and work out fea-

sible options to deal with difficult groups of patients such as the highly sensitized. This would also enable establishment of minimal standards for testing in both the sensitized and unsensitized recipients and ensure uniformity of practice and patient safety, leading to enhancement of the quality of patient care.

CONCLUSION

In summary, the challenges of deceased donor transplantation include the following:

1. Immunology, CMV testing (infection), prior sensitization, cardiac and cancer assessment, and infection assessment.
2. Cost of immunosuppressive medications including induction therapy, surveillance for infection, long-term technique, and patient survival.
3. Lack of awareness of organ donation in other states in India which could follow the Tamil Nadu model, thus eliminating commercialization.
4. Lack of certification of hospitals by central government authorizing agency for transplantation. We believe that the Tamil Nadu program has addressed many of these issues and has demonstrated that deceased donor transplantation can be successfully performed as long as full transparency and a rigid adherence to established protocols are maintained. This model can be followed in other rapidly growing developing countries such as mainland China, Indonesia, and other South Asian countries. Of particular relevance is the fact that this program is a public-private partnership. Our focus in the coming months will be to continue to expand the donor pool and to set up a centralized transplant immunology testing facility to provide round the clock, high-quality and reproducible results.

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