ABSTRACT

Cadaver Transplantation \(^1\) means an organ or tissue transplanted from a deceased and usually unrelated donor. The emerging field of regenerative medicine is allowing scientists and engineers to create organs to be re-grown from the person's own cells (stem cells, or cells extracted from the failing organs). Organs that can be transplanted are the heart, kidneys, liver, lungs, pancreas, intestine, and thymus. Tissues include bones, tendons (both referred to as musculoskeletal grafts), cornea, skin, heart valves, nerves and veins. Worldwide, the kidneys are the most commonly transplanted organs, followed by the liver and then the heart. Cornea and musculoskeletal grafts are the most commonly transplanted tissues; these outnumber organ transplants by more than tenfold. Organ donors may be living, brain dead, or dead via circulatory death. Tissue may be recovered from donors who die of circulatory death, as well as of brain death.

KEYWORDS: cadaver, transplantation, donor, organ, brain dead.

INTRODUCTION

Chronic diseases are replacing the infectious diseases as the major cause of morbidity and mortality worldwide. Incidence and prevalence rates of end-stage chronic organ failure (CHF), chronic lung disease (CLD), chronic liver disease or chronic kidney disease (CKD) are rising due to population, epidemiological and health transitions. The burden of chronic respiratory diseases in India is on the rise. The estimated population with chronic viral hepatitis in India is 400-500 million, and is projected to be the third leading cause of deaths worldwide by 2020. The quality of life for patients with chronic organ failure is even poorer than that for many common cancers. There is a gradual decrease in health status and daily
functioning in patients with end stage organ failure and timing of death remains uncertain. The cost burden on patients also increases with duration of disease.

Organ transplantation is the only cure to such patients. Though transplantation has been grossly inadequate in terms of actual numbers, due to a shortage of resources and organs. There are thousands of patients waiting for organ transplantation. Organ transplantation remains only a dream for the vast majority of these patients. The bottleneck is the availability of organs.

For example, only about three quarters of the patients obtain potential related donors and not all are willing to donate. This has led to organ trading and organ trafficking. The problem of organ shortage and organ trafficking can be solved by promoting cadaveric organ transplantation.

Unlike most countries where cadaveric transplantation programme is very successful, in India less than 2% of transplantations are based on brain-dead –heart-breaking cadaver donors.

Since the passing of the legislation in India, entitled, 'Transplantation of Human Organ (THO) Act' in 1994, it has been possible to undertake multi-organ transplant activity from brain dead donors. The required pre-requisite for success of the cadaver program depend on various factors and these include:

- Positive attitude of public towards organ donation.
- Consent by relatives for organ donation in event of brain death.
- Successful brain Death identification and certification.
- Adequate hospital infra-structural and support logistics.
- Successful retrieval and transplantation of organs and auditing long term graft outcomes.

### PROMOTING CADAVER TRANSPLANTATION

Organ donors are healthy people, who have suffered an irreversible brain injury or a brain hemorrhage resulting in brain death. The head injury due to road traffic accidents can account for almost 50% of brain deaths.

Road accidents have earned India a dubious distinction. With over 130,000 deaths annually, the country has overtaken China and now has the worst road traffic accident rate worldwide. According to the WHO, this is the second most important cause of death in the age group of 5
to 29 years. Maharashtra (12.4%) and Andhra Pradesh (12.1%) have the maximum accidents in the country. If such patients can be shifted to nearest hospital and diagnosed with brain death at the earliest possible time, their organs can bring light into the lives of many patients. By donating organs after death, we can save or improve as many as 50 lives.

![Fig. 1](image_url)

**Fig. 1**

**BRAIN DEATH**

Before 1968, the determination of the moment of death was done by the cessation of respiratory and cardiac functions which are entirely necessary to maintain the unity of a living being. In 1968, a committee at Harvard Medical School, chaired by Sir. Henry Beecher suggested revising the definition of death in a way that would make some patients with devastating neurologic injury suitable for organ transplantation under the dead donor rule. Brain death is a death with certitude, namely the complete and irreversible cessation of all cerebral activity, the person was going to die in any case.

1. Patient should be comatose and on ventilatory support.
2. Functional, reversible causes of a non-functioning brainstem should have been ruled out namely.
   a. Shock/ Hypotension.
   b. Hypothermia-temperature <32°C.
   c. Drugs known to alter neurologic, neuromuscular function and electroencephalographic testing like anaesthetic agents, neuroparalytic drugs, methaqualone, barbiturates,
benzodiazepines, high dose bretylium, amitryptiline, meprobamate, trichloroethylene, alcohols.

d. Brain stem encephalitis.
e. Guillain- Barre’ syndrome.
f. Encephalopathy associated with hepatic failure, uraemia and hyperosmolar coma.
g. Severe hypophosphatemia.

3. The cause of irreversible structural brain damage should be known.
a. Severe head injury.
b. Hypertensive intracerebral hemorrhage.
c. Aneurismal subarachnoid hemorrhage.
d. Hypoxic-ischemic brain insults.
e. Fulminant hepatic failure are potential causes of irreversible loss of brain function.

4. Absent brain stem reflexes
b. Absence of corneal reflexes.
c. Absence of vestibulo-ocular reflex.
d. Absence of cranial nerve response to pain.
e. Absence of gag and cough reflexes.

5. Certification of brain death is by the committee of doctors consisting of:
a. Medical Superintendent of the Hospital
b. An independent Registered Medical Practitioner nominated by the Medical Superintendent.
c. A Neurologist or Neurosurgeon nominated by Medical Superintendent.
d. The doctor on-duty treating the patient, brain death has to be confirmed twice with an interval of 6 hours, before official declaration is done as per the India THO act, 1995(Form No.8).
WHEN AND WHICH ORGANS CAN BE DONATED?
A patient becomes eligible for this type of donation when they are declared brain dead. Brain death may result in legal death, but still with the heart beating, and with mechanical ventilation all other vital organs may be kept completely alive and functional, providing optimal opportunities for organ transplantation.

Most organ donation for organ transplantation is done in the setting of brain death. In some nations (for instance, Belgium, Poland, Portugal and France) every brain death is automatically an organ donor.[4] In India consent from family members or next-of-kin is required for organ donation. The non-living donor is kept on ventilator support until the organs have been surgically removed.

The length of time depends on what organs are recovered. The average length of time is four to six hours. If a brain-dead individual is not an organ donor, ventilator and drug support is discontinued and cardiac death is allowed to occur.[5]

Donation after brain death allows many different organs to be transplanted, including heart, lungs, kidneys, pancreas, liver and small intestine; Tissues include bones, tendons, cornea, skin, heart valves and veins. Worldwide, the kidneys are most commonly transplanted organs, followed closely by liver and then the heart. If someone is waiting for organ transplantation and suitable donor is not available, he/she will be placed on a waiting list to receive cadaver transplantation.[6]
ROLE OF CADAVER TRANSPLANTS AND GRIEF COUNSELLORS
Transplant coordinators position themselves between patient and relatives on one hand and treating doctor’s team and cadaver transplantation team on the other hand. The transplant coordinators approach the relatives in the waiting room and begin counseling by expressing sympathy and hinting that good may come from this tragedy.

Transplant coordinators are responsible for identifying potential organ donors and managing the whole donation process from brain death. The process of organ donation and procurement include: donor management, determination of brain death; the obtaining of consent from the near relatives of the patient for organ donation; organ retrieval, preparation, preservation, packaging and final transport to the transplant hospital by coordinating with the organ harvesting team and organ transplantation team.
Fig. 4

Coordinators should promote donation and supervise the teamwork of the whole process. They should be aware of all legal criteria and be responsible for the custody of the documents concerning donor evaluation, brain death determination and donor consent.

After removal of organs, how long can we wait?

After removal of organs in good condition from “beating-heart donors or brain death donors, the time within which organs have to be transplanted depending on the quality of harvesting, state of organs, preservation and transport are as follows[7]

a. Heart and lungs last 4-6 hours.

b. Liver lasts for 12-40 hours.

c. Pancreas lasts for 12-24 hours and

d. Kidneys last for 48-72 hours.

Procedure to become an organ donor

Anyone can register for organ donation and can wish which organs to be donated. It is also important to inform your family that you want to be a donor. Registration for organ donation alone shall not empower doctors to remove your organs as a donor. This can happen only when you are declared brain death and next of kin gives consent for organ donation. Hence please register for organ donation, carry your donor card always with you and let your wishes be known to your relatives.
GENERAL INFORMATION TO BE GIVEN ON DONOR CARD

Name: __________________________

Father name: __________________________

Address: __________________________

Cell No: __________________________

Relation __________________________ Name: __________________________

Mobile No: __________________________

(Let your relatives know your wishes)

I __________________________

S/O, D/O __________________________

Wish to donate the following organs after my brain death

kidney, liver, heart, pancreas and lungs.

Donor Sign __________________________ Date __________________________

Witness Name __________________________ Sign __________________________

(Always carry this card with you)

CONCLUSION

Unless we have an effective cadaver transplantation programme, we will stay rooted to where we are now. This can be overcome by the public awareness of brain death and cadaver transplantation through all available means. It is believed that stronger infrastructure with a counseling staff and adequate training is required to certify brain death that is indeed vital to increase the availability of organs for transplant. Centralized approaches to organ procurement tend to be most effective. Increase in cadaveric donor organ transplants may be achieved through a combination of improved organ procurement, education of transplant teams, better preservation techniques and the creation of a single waiting list. The Human Organ Transplantation Act should be modified to plug the loop holes and to make ‘presumed consent’ – unless otherwise explicitly stated as the operating mode for organ removal from a brain dead cadaver. Finally an organization should be framed to ensure the safety, quality and transparency of all the procedures performed. Several schemes should be developed to streamline various issues of declaration of brain death, infrastructure development, training of transplant coordinators and public awareness.
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