



Consequences of Organ Transplant in Donors and Recipients

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Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

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ABSTRACT

Organ Transplant has developed marvelously at a rapid pace and has become a major lifeguard. It has increased the survival rate of patients but certain complications are worth not ignorance. They should be treated as soon as possible for betterment of lifestyle, which otherwise may land up in life threatening conditions. A combined multiorgan transplant may offer a lower rate of graft rejection and lesser dependence on immunosuppressants. After transplant course can be followed by a few complications that can be early, late, and severe. Nevertheless, keeping a watch, regular follow ups and managing can determine the post operative cause of graft rejection. However, there has been a major increase in the demand for potential organs which is unable to met with the limited supply of donors. This hassle has left more patients in the country helpless. The shortage of existing organ crisis has deprived a lot of people from leading a better life and that gave rise to life time dependence on costly medical procedures like dialysis. Implementation of certain procedures of awareness and educational approach to people, about donating more organs on their consent, rewarding a gift of life to the people in need. This review has jotted down a few complications, that can arise post operative from the donor and recipient point of view, alongside the benefits associated with it. There's no doubt Organ Transplant is a boon and a curse, but it has increased the life style of patients, family and friends.

Keywords: *Organ transplant; benefits; drawbacks; physical, psychological; social; metabolic.*

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1. INTRODUCTION

Organ Transplant is defined as “ When an individual deliberately donates an organ or a part of his/her organ, labelled as donor to be taken out either legally or by his/ her consent while the donor is either brain dead / alive or deceased with the assent of the next of kin [1]. This beneficence has helped the legatee with their vital organ transplantation who are called as recipients. The legislative framework for Brain death and Organ Donation in India was established in the year 1994, under the “Transplantation of Human Organ Act [2]”. Despite of the medical progress that India made in the recent years, there was always and will be a shortage of organs in the upcoming future. Though potential Cadaveric Donors are filling in the vacancies of available donors, they are still insufficient to meet the current needs. An alternative approach lies in the living donors, preferably from close relatives, siblings, families and friends. Living Organ Donation is inevitably associated with peril but the process is synchronized with the prize of the dangers involved [3]. This event has raised many ethical, social and moral issues because of the progress made in this field. The risk of Organ Donation from the Donors and the recipients can be physical, psychological, social, metabolic that can bring about some devastating and fatal complications in their lives.

1.1 Background

The first successful living donor transplant in India was carried out in 1971 in CMC Vellore [4]. It was the first ever renal transplant in India. The first deceased organ donation was unsuccessful and was carried out in the year 1995 but finally succeeded in the year 1998, transplant being that of a liver. Despite of the innumerable advantages of a liver transplant, there has been evidence suggesting that the recipients undergoing live organ surgeries have withstand this process pertaining to psychological, metabolic and physical concerns. Vital Organs from a deceased Donor has presumed legally

and ethically on the “ Dead Donor Rule “- which requires the benefactor to be declared dead before the organs are procured. The vital organs can be taken from patients who are on a ventilator support, prior to treatment withdrawal, stating “presumed consent” and providing righteous appreciation to the family of the donor [5].

1.2 Objective

The aim of this article is to get a conceptual study on the experience, complications and benefits gained from the organ transplantation from the donor and recipient point of view. The primary objective being to promote awareness about the complications (early or late), be it physical, psychological, social and metabolic. Medications includes primarily Immunosuppressants, which is taken basically for decreased rejection of Organs [6].

1.3 Main Text

Organ Transplantation is worth inspiring a lot of people who are in a desperate need for transplant. Despite its assets and liabilities, India has somehow managed to flexibly approach the demand of organs. With the advancement of technology, there are two main types of Donation- Organ and Tissue.

Organ Donation includes lungs , Kidneys, Heart, Liver , Intestines , pancreas etc.

Tissue Donation includes Corneas, bones, skin, heart valves, soft tissues, tendons and ligaments. 1 Donor = 8 life saving organs=that can improve 75 lives.

1.4 Types of Organ Transplant-

- 1) Autograft
- 2) Allograft
- 3) Isograft
- 4) Xenograft
- 5) Split Transplant
- 6) Domino Transplant.

Table 1. Types of transplant

Type	definition
Autograft	Transplant of tissues from his/her own body from one point to the other.
Allograft	Transplant of tissue /Organ in same species , but genetically non identical.
Isograft	Transplant of Organ / Tissues in genetically identical individuals.
Xenograft	Transplant between two different species.
Split Transplant	Split of Organs between two Recipients.
Domino Transplant	Donors organ is potential and can be transplanted into the recipient

[7]. To overcome the problems of organ supply and organ demand, certain procedures and strategies are followed which includes:

- A) Transplant using Extended Criteria Grafts and donation after cardiac death.
- B) Use of ex vivo machine perfusion of graft preservation of low quality [8]
- C) Pre treatments of Recipients(using ischemic preconditioning) and donors (using mild hypothermia).

In order to match with the recipients , some determinants should be kept in check of both the parties. Compatibility plays a major role in accepting the graft. Test should be done for any inconvenience later on for eg – Crossmatch, Blood type and HLA/tissue Typing. Cross matching includes mixing of the blood of both donors and recipient. The result is considered to be positive if the host cells react against the donors blood cells, whereas it is considered compatible if no reaction takes place [9]. Paired Exchange has evolved to be majorly life supporting as it connects and pairs with suitable match in case of incompatible donor – recipient. Blood Typing includes donation of blood.

Table 2. Blood donation

Blood Type	Donate to
Type O (commonest)	Type O, A, B, AB
Type A(next common)	Type A, AB
Type B	Type B, AB
Type AB(rarest)	Type AB

Blood type O is the universal donor
Blood type AB is the universal recipient.

HLA is an antigen, made up of proteins, Human Leukocyte Antigen. After transplant the person can develop Antibodies against the HLA antigen. The stronger the Antibody production, higher the risk to get rejected.

There are certain benefits and risks of donation, which goes as follows.

2. BENEFITS

Donor- Every person is a potential donor until and unless he/she is suffering from any life sustaining diseases. The benefits of being a donor may be few but worth consideration. Setting a goal of Organ Donation gives a chance to gift a life to a person. A donor can save not only one but multiple lives of people. A vast diversity of lives can be saved if their organs

have the perfect match with the recipient. A donor can provide the researchers an asset to investigate about new or rare diseases. He / She can save the lives of their closed ones or can give an opportunity to get relieved from indigence and stress In case of transplant from a family member , it improves the quality of life for both of them as the formerly ill person can contribute a larger life span and spend more quality time with family.

Recipient – A recipient is almost bona fide on the brighter side of the transplantation. The main benefit of being a recipient is getting recovered from the precedent conditions and living a normal life. A recipient from a successful renal transplant is usually relieved from dialysis and their energy gets restored back to normal . Although the recipient is put on medications to prevent the graft rejection by his/her immune system, this is a genuine gift of life [10].

3. DRAWBACKS/RISK INVOLVED

3.1 Donor

Living Organ donation are found in very small numbers in order to cope up with the increasing demand of organ requirements. Although it does, it comes with certain complications as well. The donor is kept on life support until the organ is procured and fully ready to be transplanted. This can lead to emotional stress to the family of the donor. Donating an organ can lead to a state of post operative short or long term wound pain and discomfort, in a degree that the donor can start relying of painkillers.

3.2 Physically

He might be in great affliction during the procedure of the tests involved. He / She can be faltered after the operation if medications are not taken properly or there can be an organ failure in now unpaired organs.

3.3 Psychologically

The person can suffer from mental stress preceding to depression – the person may worry about their future being dependant on a part of organ or unpaired organs.

3.4 Emotionally

the donor may be upset after the surgery, or issues can arise in the relationship between the

donor and the recipient, donor being indebted to something. There can be family pressures that can cause harm to the health of the donor.

There can be surgical complications or the person may be medically unfit or allergic to the general anaesthesia, leading to hypersensitivity reactions. Almost all major operations do contain some amount of threat to life, death in certain cases [11]. The following complications can arise during or after the surgery:

- 1) Blood clot in veins
- 2) HSR Reactions to the anaesthesia
- 3) Wound Complications and late wound heal
- 4) Scars and keloid
- 5) Intra wound bleed and infections
- 6) Chest complications
- 7) Urinary retention / Urinary infections
- 8) Risk of blocking of bowels and bladder with blood clots or formation of stones.

There can be metabolic issues arising out of transplantation – they can be post-transplant diabetes, dyslipidemia, obesity, weight gain, nonalcoholic fatty liver disease, and hypertension. Already existing metabolic conditions can worsen with immunosuppressants, pain killers and other medications [12].

Recipients: Although the transplantations provides a bona fide opportunity for the treatment of vital end organ failure, certain complications like graft rejection, drug toxicity, infections can result from immunosuppressants. An evitable

immune response by the recipient is evident during a solid Organ Transplant. The amount of rejection imposed on the transplanted organ depends on the genetic disparity between the host and the donor, which is the HLA proteins, recognized by the recipients' immune system as the foreign body, the type of tissue transplanted and the conditions of the immune system of the recipient. The transplant rejection is mainly to reduce the incompatibility.

The immunosuppressants plays a major role in preventing graft rejection by the host immune system, but major complications include malignancy and infections can attack the host on long term dependency of immunosuppressants.

Infections are spread from the following sources:

- A) Environmental
- B) Person to person contact – Cold flu [7]

Malignancy can take place due to decreased T cell levels, which makes the body susceptible to neoplasm – mainly Lymphoma, Kaposi's Sarcoma and Skin tumours associated with viral infections and lung , breast, and colon cancer when not associated with the viral infections.

Physically, the conditions may worsen after certain years when the body becomes resistant to the drugs .Graft versus Host rejection plays a major role in eliminating the transplanted organ. There can be Delayed Graft Function – where the function of the graft can be delayed for a few days or weeks after transplantation.

Table 3. Transplant rejection

Type	Time	Pathological Findings	Mechanism	Treatment
Hyper -acute rejection	Mins to hrs	Thrombosis, Necrosis	HSR 2 Reaction	None-Irreversible Graft Loss
Acute Vascular Rejection	5-30 days	Vasculitis	Ab and complement Activation	Immuno-suppressants increased
Acute Cellular Rejection	5-30 days	Cellular Infiltrate	Type 4 HSR Reaction	Immuno Suppressants increases
Chronic Allograft Failure	>30 Days	Fibrosis , Scarring	Immune and non immune mechanism	Minimize drug toxicity Control Hypertension and hyperLipidemia.

Table 4. Infections

Bacterial	Viral	Fungal
Urinary Tract Infections	CMV Varicella Zoster Herpes Simples Type 1 &2	Candida Pneumocystis Carinii

There can be a high risk of death during surgery. Blood supply to the organ being poor or severe rejection can cause failure of the surgery. Donating exposes an unhealthy person to the risk of pain, hernia, bleeding, blood clots, wound complications etc.

Kidney transplant can lead to certain long term complications like increased BP, reduced kidney functions, UTI, increased proteins in urine, Intestinal Obstructions and Testicular Swelling [13].

Liver transplant leads to pain, discomfort, pneumonia, bleeding, clot formation, bile leakage, narrowing of bile duct, abnormal and insufficient growth of the transplanted liver.

Psychologically the person can suffer from stress as it becomes strenuous sometimes to accept the fact that the part or the organ as a whole has stopped working and now he /she needs to be dependent on a donor organ. Psychiatrists have a lot to deal with mental stress, anxiety, acute mania depression of the patients pertaining to issues arising on the surgery and the expected outcomes, organ rejection etc. Long waiting periods for a suitable donor can lead to psychological distress similar to that of the complications resulting from surgery procedures and medications. The person can be psychologically ill before the surgery. Evaluations to be made to make sure there isn't any hindrance during the surgery. Various tests like Rorschach, Minnesota Multiphasic Personality inventory(MMPI), to be carried out to carry out the personality check and the mental state exam [14].

Society issues have always been a threat to the conditions of the people. The outcomes are still confidential and much less demands are fed with the limited supply of organs. Considering Xenograft an option, is under investigation. The using of perfectly embedded organs can give the solution to many ethical problems.

Neurologically:

Liver transplant can lead to Osmotic demyelination, Hepatic Encephalopathy Kidney transplant can lead to Diabetic neuropathy, Uremic Encephalopathy Heart transplant can lead to Cardio embolic Shock Lung transplant can lead to Phrenic Neuropathy. Vascular Complications includes haemorrhage, thrombosis, embolism and stroke.

Biliary complications includes bile leak and stenosis

Metabolic problems can sometimes be serious and can cause threat to life. Diabetes can exacerbate after transplant. High cholesterol can form a clot in the blood vessels and damage the donated organ. High BP can result from the medications and can lead to other systemic damage. Gout can result from the increased levels of Uric Acid in blood and cause an inflammation of the joints. GI problems especially gastric lesions can result from taking of steroids, as it inhibits PGs synthesis thereby exposes the stomach wall with the acidic enzymes of the stomach and intestines [15-26]

Although therapeutic drug monitoring is done to prevent jeopardizing of the organ transplant, sometimes failure becomes unanticipated.

Immunosuppressive drugs – The class of drugs that suppresses the function of a healthy immune system. These are also called as Anti-Rejection Drugs [7]. These are as follows:-

Corticosteroids- Hydrocortisone, prednisolone, Methylprednisolone

Calcineurin Inhibitors – Cyclosporin and Tacrolimus

Antiproliferative and Cytotoxic Agents- Azathioprine, Methotrexate, Cyclophosphamide

Mtor inhibitors- Sirolimus, temsirolimus

Biologics –

TNF – α – inhibitors – Etanercept, infliximab

IL-1 Inhibitors – Anakinra.

Abs- Daclizumab, basiliximab, Muromonab CD3

Side Effects of medications

- 1) Thrombocytopenia
- 2) Neutropenia
- 3) Increased risk of opportunistic infections
- 4) Nephrotoxicity
- 5) Hepatotoxicity
- 6) Lymphoma
- 7) Nausea/ Vomiting
- 8) Diarrhoea

4. CONCLUSION

Organ Donation is indeed a unique invention but has some restriction in the society pertaining to the vast organ demands and limited supply of organs [16]. There is a need to prompt and carefully examine the policies at an institutional levels regarding availability of potential organ donors as and when needed. This review

articles emphasizes on the risk and benefits of the donors and recipients and their lookouts. This review also tells about the immunosuppressants to be taken and their side effects. The complications can be early, late, severe, but negligence can lead to worsening of the conditions and probable lead to death in certain cases. Complications arises due to several reasons- thrombosis, stenosis, ischemia reperfusion injury, infection , immunological injury etc. Meticulous approach [17] to the pertaining conditions can save a thousand of lives.

CONSENT

It is not applicable.

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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