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Review Article

REVIEW ON ORGAN TRANSPLANTATION: A SOCIAL MEDICAL NEED

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ABSTRACT

Organ transplantation is the procedure of replacing diseased organs, parts of organs or tissues by healthy organs or tissues. An organ transplant is a surgical operation where a failing or damaged organ in the human body is removed and replaced with a new one. The emerging field of Regenerative medicine is allowing scientists and engineers to create organs to be re-grown from the patient's own cells. Various different types of organ can be transplanted and it will prove a survival tonic for patient life. The transplant services team coordinates and work in a proper direction for successful transplantation. There is a lack of awareness among people with regards to deceased organ donation, the concept of brain death and the process of organ transplantation. Strong need for developing a centralized organ-sharing network among hospitals for better coordination, timely utilization and avoiding organ wastage.

Keywords: Organ Transplantation, Transplant Services, Organ Donation, Auto Transplantation

INTRODUCTION

Organ transplantation is the procedure of replacing diseased organs, parts of organs or tissues by healthy organs or tissues. The transplanted organ or tissue can be obtained from the patient himself (autograft), from another human donor (allograft) or from an animal (xenograft). Transplanted organs may be artificial or natural, whole (such as kidney, heart and liver) or partial (such as heart valves, skin and bone) [1].

An organ transplant is a surgical operation where a failing or damaged organ in the human body is removed and replaced with a new one. An organ is a mass of specialized cells and tissues that work together to perform a function in the body. The heart is an example of an organ. It is made up of tissues and cells that all work together to perform the function of pumping blood through the human body. Any part of the body that performs a specialized function is an organ. Therefore eyes are organs because their specialized function is to see, skin is an organ because its function is to protect and regulate the body, and the liver is an organ that functions to remove waste from the blood. A graft is similar to a transplant. It is the process of removing tissue from one part of a person's body (or another person's body) and surgically reimplanting it to replace or compensate for damaged tissue. Grafting is different from transplantation because it does not remove and replace an entire organ, but rather only a portion. Not all organs are transplanted. The term "organ transplant" typically refers to transplants of the solid organs: heart, lungs, kidneys, liver, pancreas and intestines. Animal and artificial organs may also serve as transplantable organs. Other types of transplants that are less invasive or may require specialized procedures, include: Skin transplants or grafts, Corneal transplants (corneas are the outer layer of the eye) & Bone marrow transplants [2].

Organ transplantation is the transfer of an organ (heart, liver, etc.) from one body to another or from a donor-site on the patient's own body, for the purpose of replacing the recipient's damaged or absent organ. The emerging field of Regenerative medicine is allowing scientists and engineers to create organs to be re-grown from the patient's own cells (stem cells, or cells extracted from the failing organs). Organs that can be transplanted are the heart, kidneys, eyes, liver, lungs, pancreas, intestine and thymus. Tissues include bones, tendons (both referred to as musculoskeletal grafts), cornea, skin, heart valves and veins. Worldwide, the kidneys are the most commonly transplanted organs, followed closely by the liver and then the heart. The cornea and musculoskeletal grafts are the most commonly transplanted tissues; these out number organ transplants by more than tenfold [4].

Organ donors may be living, or brain dead. Tissue may be recovered from donors who are cardiac dead-up to 24 h past the cessation of heartbeat. Unlike organs, most tissues (with the exception of corneas) can be preserved and stored for up to five years, meaning they can be banked [4].

Types of transplantation

1) Autograft and autotransplantation

Autotransplantation is the transplantation of organs/tissues or even protein from one part of the body to another in the same individual. It is the transplant of tissue to the same person. Sometimes this is done with surplus tissue, or tissue that can regenerate, or tissues more desperately needed elsewhere (examples include skin grafts, vein extraction for Coronary Artery Bypass Graft [CABG], etc.) [3]. Sometimes an autograft is done to remove the tissue and then treat it or the person, before returning it; examples include stem cell autograft and storing blood in advance of surgery. In a rotation plasty a distal joint is use to replace a more proximal one, typically a foot and ankle joint is used to replace a knee joint.

2) Autologous blood donation

In blood banking terminology, autologous blood donation refers to a blood donation marked for use by a donor typically for a scheduled surgery. Some advantages of autologous blood donation are; the blood type will always match, even with a rare blood type. When only autologous blood is used during surgery the risk of exposure to infectious diseases like HIV or Hepatitis from infected blood is eliminated. Lastly, the risk of allergic reaction is reduced [5].

Autotransplantation has disadvantages of high cost, due to individual processing, record keeping and management. In most cases, the blood is discarded if not in use instead of being added to the general supply. Autologous blood is not routinely tested for infectious diseases such as HIV antibodies. There is also a risk that in an emergency or if more blood is required than has been set aside in advance, a patient could still be exposed to donor blood instead of autologous blood. Autologous donation is not also suitable for patients who are medically unable to or not advised to give blood, such as cardiac patients, infants and small children.

3) Bone autograft

In orthopedic medicine, bone graft can be sourced from patients' own bone in order to fill space and produce an osteogenic response in a bone defect. However due to the donor-site morbidity associated with autograft, other methods such as bone allograft, morphogenetic proteins and other synthetic graft materials are often used as alternatives. Autograft have long been considered the 'gold standard' in oral surgery and dentistry because it offered the best regeneration result. Later the introduction of morphogenic-enhanced bone graft substitute has shown similar success rates and quality on regeneration, however, there price is still very high [5].

4) Xenograft and xenotransplantation

Xenotransplantation is the transplant of living cells, tissues and organs from one species to another. Such cells, tissues and organs are called xenografts [6]. An example is porcine heart valve transplants, which are quite common and successful. Another example is attempted piscine-primate (fish to non-human primate) transplant of islet (i.e. pancreatic or insular tissue) tissue. The latter research study was intended to pave the way for potential human use, if successful. However, xenotransplantation is often an extremely dangerous type of transplant with few successful cases because of the increased risk of non-compatibility, rejection and disease carried in the tissue [7].

Immunological barriers arise due to responses of the recipient's immune system. The response which is generally more extreme than in allotransplantation ultimately results in rejection of the xenograft and can in some cases result in immediate death of the recipient. Some of the rejection types are hyperacute, acute vascular rejection, cellular rejection and chronic rejection [6].

5) Allograft and allotransplantation

An allograft is a transplant of cell, organ or tissue between two genetically non-identical members of the same species. The transplant is called allograft or allogeneic transplant or homograft. Most human tissue and organ transplants are allografts. Due to the genetic difference between the organ and the recipient, the recipient's immune system will identify the organ as foreign and attempt to destroy it, causing transplant rejection [5]. Allografts include anterior cruciate ligament (ACL) repair, joint reconstruction in the knee or ankle, meniscal replacement, ridge augmentation in dental procedures, shoulder repair, spinal fusion, urological procedures, liver transplant, skin, transplant, intestinal transplant, coneal transplant, heart transplant, bone marrow transplant etc. Allograft may be used to replace damaged heart valves and skin however, they are frequently used in orthopedic surgery to replace tendons or bones [5].

i) Isograft

Isograft is the subset of allografts in which organs or tissues are transplanted from a donor to a genetically identical recipient (such as an identical twin). Iso grafts are differentiated from other types of transplants because while they are anatomically identical to allografts, they do not trigger an immune response. In bone marrow transplantation, the term for a genetically identical graft is syngeneic whereas the equivalent of an autograft is termed autotransplantation. Transplant rejection between two such individuals virtually never occurs. As monozygotic twins have same histocompatibility complex, there is very rarely any rejection of transplanted tissue by the adapted immune system. There is virtually no graft-versus-host disease. This forms the basis for why the preferred choice of a physician considering an organ donor will be a monozygotic twin [5].

ii) Split transplants

Sometimes a deceased donor organ, usually a liver, may be divided between two recipients, especially an adult and a child. This is not usually a preferred option because the transplantation of a whole organ is usually more successful [8].

iii) Domino transplants

This operation is usually performed on patients with cystic fibrosis because both lungs need to be replaced and it is a technically easier operation to replace the heart and lungs at the same time [9]. As the recipient's native heart is usually healthy, it can be transplanted into someone else needing a heart transplant. That term is also used for a special form of liver transplant in which the recipient suffers from familial amyloidotic polyneuropathy, a disease where the liver slowly produces a protein that damages other organs. This patient's liver can be transplanted into an older patient who is likely to die from other causes before a problem arises [9].

Types of organ donor

Organ donors may be living, or brain dead. Brain dead means the donor must have received an injury (either traumatic or pathological) to the part of the brain that controls heartbeat and breathing [4].

1) Living

In living donors, the donor remains alive and donates a renewable tissue, cell, or fluid (e. g. blood, skin), or donates an organ or part of an organ in which the remaining organ can regenerate or take on the workload of the rest of the organ (primarily single kidney donation, partial donation of liver, small bowel). Regenerative medicine may one day allow for laboratory-grown organs, using patient's own cells (stem cells, or healthy cells extracted from the failing organs) [10].

2) Deceased

Deceased (formerly cadaveric) are donors who have been declared brain-dead and whose organs are kept viable by ventilators or other mechanical mechanisms until they can be excised for transplantation. Apart from brain-stem dead donors, who have formed the majority of deceased donors for the last twenty years, there is increasing use of donation after cardiac death donors (formerly non-heart beating donors) to increase the pool of donors as demand for transplants continues to grow. These organs have inferior outcomes to organs from a brain-dead donor; however given the scarcity of suitable organs and the number of people who die waiting, any potentially suitable organ must be considered [11].

Reasons for donation

i. Living related donors

Living related donors donate to family members or friends in whom they have an emotional investment. The risk of surgery is offset by the psychological benefit of not losing someone related to them or not seeing them suffer the ill effects of waiting on a list [8].

ii. Paired exchange

A paired-exchange is a technique of matching willing living donors to compatible recipients using sero typing [11]. For example a spouse may be willing to donate a kidney to their partner but cannot since there is no biological match. The willing spouse's kidney is donated to a matching recipient who also has an incompatible but willing spouse. The second donor must match the first recipient to complete the pair exchange.

iii. Compensated donation

In compensated donation, donors get money or other compensation in exchange for their organs. This practice is common in some parts of the world, whether legal or not, and is the major factors driving medical tourism. In the United States, The National Organ Transplant Act of 1984 made organ sales illegal [12]. In the United Kingdom, the Human Organ Transplants Act 1989 first made organ sales illegal, and has been superseded by the Human Tissue Act 2004 [13]. Compensation for donors also increases the risk of introducing diseased organ to recipients because these donors often yield from poorer population unable to receive health care regularly and organ dealers may evade disease screening processes. The majority of such deals include payment and no follow–up care for the donor [14].

Facts about organ donation

Organ donation takes healthy organs and tissues from one person for transplantation into another. Experts say that the organs from one donor can save or help as many as 50 people. Organs you can donate include.

- Internal organs: Kidneys, heart, liver, pancreas, intestines, lungs
- Skin
- Bone and bone marrow
- Cornea

Most organ and tissue donations occur after the donor has died. But some organs and tissues can be donated while the donor is alive.

People of all ages and background can be organ donors. If you are under age 18, your parent or guardian must give you permission to become a donor. If you are 18 or older you can show you want to be a donor by signing a donor card. You should also let your family know your wishes [15].

Organs that can be transplanted

- Heart
- Intestine
- Kidney
- Liver
- Lung
- Pancreas [16]

Heart transplantation

A heart transplant removes a damaged or diseased heart and replaces it with a healthy one. The healthy heart comes from a donor who has died. It is the last resort for people with heart failure when all other treatments have failed. The heart failure might have been caused by coronary heart disease, damaged heart valves or heart muscles, congenital heart defects, or viral infections of the heart.

Although heart transplant surgery is a life-saving measure, it has many risks. Careful monitoring, treatment, and regular medical care can prevent or help manage some of these risks.

After the surgery, most heart transplant patients can return to their normal levels of activity. However, fewer than 30 percent return to work for many different reasons [17].

Kidney transplantation

A kidney transplant is an operation that places a healthy kidney in your body. The transplanted kidney takes over the work of the two kidneys that failed, so you no longer need dialysis.

During a transplant, the surgeon places the new kidney in your lower abdomen and connects the artery and vein of the new kidney to your artery and vein. Often, the new kidney will start making urine as soon as your blood starts flowing through it. But sometimes it takes a few weeks to start working.

Many transplanted kidneys come from donors who have died. Some come from a living family member. The wait for a new kidney can be long.

If you have a transplant, you must take drugs for the rest of your life, to keep your body from rejecting the new kidney [18].

Liver transplantation

Your liver is the largest organ inside your body. It helps your body digest food, store energy, and remove poisons. You cannot live without a liver that works. If your liver fails, your doctor may put you on a waiting list for a liver transplant. Doctors do liver transplants when other treatment cannot keep a damaged liver working.

During a liver transplantation, the surgeon removes the diseased liver and replaces it with a healthy one. Most transplant livers come from a donor who has died. Sometimes there is a living donor. This is when a healthy person donates part of his or her liver for a specific patient.

The most common reason for a transplant in adults is cirrhosis. This is scarring of the liver, caused by injury or long-term disease. The most common reason in children is biliary atresia, a disease of the bile ducts.

If you have a transplant, you must take drugs the rest of your life to help keep your body from rejecting the new liver [19].

Lung transplantation

A lung transplant removes a person's diseased lung and replaces it with a healthy one. The healthy lung comes from a donor who has died. Some people get one lung during a transplant. Other people get two.

Lung transplants are used for people who are likely to die from lung disease within 1 to 2 y. Their conditions are so severe that other treatments, such as medicines or breathing devices, no longer work. Lung transplants most often are used to treat people who have severe

- COPD
- Cystic fibrosis
- Idiopathic pulmonary fibrosis
- Alpha-1 antitrypsin deficiency
- Pulmonary hypertension

Complications of lung transplantation include rejection of the transplanted lung and infection [20].

Pancreas transplantation

The pancreas is a gland behind your stomach and in front of your spine. It produces the juices that help break down food and the hormones that help control blood sugar levels. A pancreas transplant is surgery to place a healthy pancreas from a donor into a person with a diseased pancreas. It is mostly done for people with severe type 1 diabetes. It can allow them to give up insulin shots. An experimental procedure called islet cell transplantation transplants only the parts of the pancreas that make insulin.

People who have transplants must take drugs to keep their body from rejecting the new pancreas for the rest of their lives. They must also have regular follow-up care. Because of the risks, it is not a common treatment for type 1 diabetes [21].

Bone marrow transplantation

Bone marrow is the spongy tissue inside some of your bones, such as your hip and thigh bones. It contains immature cells, called stem cells. The stem cells can develop into red blood cells, which carry oxygen throughout the body, white blood cells, which fight infections, and platelets, which help the blood to clot.

A bone marrow transplant is a procedure that replaces a person's faulty bone marrow stem cells. Doctors use these transplants to treat people with certain diseases, such as

- Leukemia
- Severe blood diseases such as thalassemias, aplastic anemia, and sickle cell anemia
- Multiple myeloma
- Certain immune deficiency diseases

Before you have a transplant, you need to get high doses of chemotherapy and possibly radiation. This destroys the faulty stem cells in your bone marrow. It also suppresses your body's immune system so that it won't attack the new stem cells after the transplant.

In some cases, you can donate your own bone marrow stem cells in advance. The cells are saved and then used later on. Or you can get cells from a donor. The donor might be a family member or unrelated person.

Bone marrow transplantation has serious risks. Some complications can be life-threatening. But for some people, it is the best hope for a cure or a longer life [22].

Islet cell transplantation

Islets are cells found in clusters throughout the pancreas. They are made up of several types of cells. One of these is beta cells, which make insulin. Insulin is a hormone that helps the body use glucose for energy. Islet cell transplantation transfers cells from an organ donor into the body of another person. It is an experimental treatment for type 1 diabetes. In type 1 diabetes, the beta cells of the pancreas no longer make insulin. A person who has type 1 diabetes must take insulin daily to live. Transplanted islet cells, however, can take over the work of the destroyed cells. The beta cells in these islets will begin to make and release insulin. Researchers hope islet transplantation will help people with type 1 diabetes live without daily insulin injections [23].

Post transplant medications

- Azathioprine
- Basiliximab
- Cyclosporine
- Daclizumab
- Muromonab-CD3
- Mycophenolic Acid
- Mycophenolate Mofetil
- Prednisone
- Sirolimus
- Tacrolimus [24]

Types of immunosuppressants

Post-transplant immunosuppression almost always includes a combination of drugs and approaches based on a patient's individual situation, organ transplanted and current developments in the field. Depending on these factors, approaches could include:

1. Induction immunosuppression

This approach includes all medications given immediately after transplantation in intensified doses for the purpose of preventing acute rejection. Although the drugs may be continued after discharge for the first 30 d after transplant, they are not used long-term for immunosuppressive maintenance. Associated medications can include Methylprednisolone, Atgam, Thymoglobulin, OKT3, Basiliximab or Daclizumab.

2. Maintenance immunosuppression

Maintenance includes all immunosuppressive medications given before, during or after transplant with the intention to maintain them long-term. For example, Prednisone, Cyclosporine, Tacrolimus, Mycophenolate Mofetil, Azathioprine or Rapamycin. In addition, maintenance immunosuppression does not include any immunosuppressive medications given to treat rejection episodes, or for induction.

3. Anti-rejection immunosuppression

This approach includes all immunosuppressive medications given for the purpose of treating an acute rejection episode during the initial post-transplant period or during a specific follow-up period, usually up to 30 d after the diagnosis of acute rejection. Associated medications can include Methylprednisolone, Atgam, OKT3, Thymoglobulin, Basiliximab or Daclizumab [25].

Switching immunosuppressants

Some transplant patients switch immunosuppressants for one or more of the following reasons:

- **Lack of efficacy**

Effectiveness of certain drugs can vary greatly in patients based on gender, past medical history, current treatment regimen and type of transplant.

- **Positive and negative physical and psychological effects**

There are both common side effects that many patients experience, as well as serious side effects, depending on individual patient intolerance.

- **Short and long term health risks**

Every patient's treatment regimen must be examined to determine how switching immunosuppressant therapy may instigate additional health concerns or risks.

- **Financial costs**

Because it is very important that your transplant team monitor your progress and side effects while taking any medication, changing immunosuppressants may result in added cost due to an increased number of office visits.

Although there have been a number of clinical trials evaluating the effects of switching immunosuppressant's, it is often difficult to draw any conclusions from these studies because of the difference in sample size, variation in patients, variety of treatment regimens and much more.

In any instance of switching immunosuppressant therapy, doctors must take the patient's entire treatment history into account. It is important that you talk with your doctor about in detail about your medications and any concerns that you may have [26].

Transplant rejection

Transplant rejection is a process in which a transplant recipient's immune system attacks the transplanted organ or tissue.

Causes

Your body's immune system usually protects you from substances that may be harmful, such as germs, poisons, and sometimes cancer cells.

These harmful substances have proteins called antigens coating their surfaces. As soon as these antigens enter the body, the immune system recognizes that they are not from that person's body and that they are "foreign," and attacks them.

When a person receives an organ from someone else during transplant surgery, that person's immune system may recognize that it is foreign. This is because the person's immune system detects that the antigens on the cells of the organ are different or not "matched." Mismatched organs, or organs that are not matched closely enough, can trigger a blood transfusion reaction or transplant rejection.

To help prevent this reaction, doctors type, or match both the organ donor and the person who is receiving the organ. The more similar the antigens are between the donor and recipient, the less likely that the organ will be rejected.

Tissue typing ensures that the organ or tissue is as similar as possible to the tissues of the recipient. The match is usually not perfect. No two people, except identical twins, have identical tissue antigens.

Doctors use medicines to suppress the recipient's immune system. The goal is to prevent the immune system from attacking the newly transplanted organ when the organ is not closely matched. If these medicines are not used, the body will almost always launch an immune response and destroy the foreign tissue.

There are some exceptions, though. Cornea transplants are rarely rejected because the cornea has no blood supply. Also, transplants from one identical twin to another are almost never rejected.

Types of rejection

- Hyper acute rejection occurs a few minutes after the transplant when the antigens are completely unmatched. The tissue must be

removed right away so the recipient does not die. This type of rejection is seen when a recipient is given the wrong type of blood. For example, when a person is given type A blood when he or she is type B.

- Acute rejection may occur any time from the first week after the transplant to 3 mo afterward. All recipients have some amount of acute rejection.

- Chronic rejection can take place over many years. The body's constant immune response against the new organ slowly damages the transplanted tissues or organ.

Symptoms

- The organ's function may start to decrease

- General discomfort, uneasiness, or ill feeling

- Pain or swelling in the area of the organ (rare)

- Fever (rare)

- Flu-like symptoms, including chills, body aches, nausea, cough, and shortness of breath

The symptoms depend on the transplanted organ or tissue. For example, patients who reject a kidney may have less urine, and patients who reject a heart may have symptoms of heart failure.

Exams and tests

The doctor will examine the area over and around the transplanted organ. The area feels tender to you (especially with a kidney transplant).

Signs that the organ is not working properly include:

- High blood sugar (pancreas transplant)

- Less urine released (kidney transplant)

- Shortness of breath and less ability to exercise (heart transplant)

- Yellow skin color and easy bleeding (liver transplant)

A biopsy of the transplanted organ can confirm that it is being rejected. A routine biopsy is often performed to detect rejection early, before symptoms develop.

When organ rejection is suspected, one or more of the following tests may be done before the organ biopsy.

- Abdominal CT scan

- Chest x-ray

- Heart echocardiography

- Kidney arteriography

- Kidney ultrasound

Lab tests of kidney or liver function

Treatment

The goal of treatment is to make sure the transplanted organ or tissue works properly, and to suppress your immune system response. Suppressing the immune response may prevent transplant rejection.

Medicines will likely be used to suppress the immune response. Dosage depends on your condition and may be very high while the tissue is being rejected. After you no longer have signs of rejection, the dosage will likely be lowered [27].

Transplant services

Transplantation is a procedure that is done to replace one of your organs with a healthy one from someone else. The surgery is only one part of a complex, long-term process.

Several experts will help you prepare for the procedure, and make sure you are comfortable before, during, and after surgery.

Solid organ transplants

- Auto islet cell transplant is done after a person has their pancreas removed due to chronic pancreatitis. The procedure takes insulin-producing cells from the pancreas and returns them to the patient's body.

- Corneal transplant replaces a damaged or diseased cornea. The cornea is the clear tissue on the front of the eye that helps focus light on the retina. It is the part of the eye on which a contact lens rests.

- Heart transplant is an option for someone with congestive heart failure that has not responded to medical treatment.

- Intestinal transplant is an option for patients with short bowel or short gut syndrome or advanced liver disease, or who must receive all nutrients through a feeding line. See: Total parenteral nutrition (TPN)

- Kidney transplant is an option for someone with chronic kidney failure. It may be done with a kidney-pancreas transplant.

- Liver transplant may be the only option for someone with liver disease that has led to liver failure.

- Lung transplant may replace one or both lungs. It may be the only option for someone with lung disease who has not gotten better using other medicines and therapies, and is expected to survive for less than 2 y.

Blood/bone marrow transplants (Stem cell transplants)

You may need a stem cell transplant if you have a disease that damages the cells in bone marrow, or if you received high doses of chemotherapy or radiation.

Depending on the type of transplant, your procedure may be called a bone marrow transplant, a cord blood transplant, or a peripheral blood stem cell transplant. All three use stem cells, which are immature cells that give rise to all blood cells. Stem cell transplants are similar to blood transfusions and generally do not need surgery.

There are two different types of transplants:

- Autologous transplants use your own blood cells or bone marrow.

- Allogeneic transplants use a donor's blood cells or bone marrow. A syngeneic allogenic transplant uses cells or bone marrow from the patient's identical twin [28].

The transplant services team

The transplant services team includes carefully selected experts, including:

- Surgeons who specialize in performing organ transplants

- Medical doctors

- Radiologists and medical imaging technologists

- Nurses

- Infectious disease experts

- Physical therapists

- Psychiatrists, psychologists, and other counselors

- Social workers

- Nutritionists and dietitians [28].

Many people will be working to make your transplant as successful as possible. This is your transplant team. It is important that you

know the people on your team and what they will be doing to help you through your transplant. You need to feel comfortable talking to them and asking them questions. Each team member is an expert in a different area of transplantation [29].

Role of team members involved in organ transplantation

Transplant coordinator

There are two different types of transplant coordinators: procurement and clinical.

Procurement coordinators are responsible for the management and evaluation of the deceased donor, as well as the recovery and allocation of the donor's organs and/or tissues for transplantation.

Clinical coordinators are responsible for the recipient's evaluation, treatment, and followup care [29].

Transplant surgeon

Transplant surgeons are the doctors who perform transplant surgeries. They have received special training to perform transplants [29].

Transplant physician

Transplant physicians are the doctors at the transplant center who manage your medical care, tests and medications. They do not perform surgery. Transplant physicians work closely with the clinical coordinator to coordinate your care before and after transplant [29].

Transplant unit staff nurses

Transplant unit staff nurses work closely with you while you are in the hospital. They take care of you and explain your tests, medications, follow-up care, etc. Some units will assign you a primary care nurse who will coordinate your care while you are on the unit [29].

Financial coordinator

A financial coordinator is a professional who helps you with financial matters and hospital billing related to your transplant. The financial coordinator works with other members of the transplant team, insurers and administrative personnel to coordinate the financial aspects of your care before, during and after your transplant. He/she helps you determine how you can best pay for your transplant [29].

Social worker

A social worker is a professional who can help you and your families understands and cope with a variety of problems associated with your illness. The social worker may also handle some of the duties of the financial coordinator [29].

Family doctor, specialist or primary care physician

Your family doctor, specialist or primary care physician can coordinate medical care with your transplant team, especially if you have to travel a long distance to have your transplant [29].

Before a transplant

You will have a complete medical exam to identify and treat all medical problems, such as kidney and heart disease.

The transplant team will evaluate you and review your medical history to determine if you meet the criteria for organ transplantation. Most types of organ transplants have guidelines detailing what type of patient is most likely to benefit from a transplant and will be able to manage the challenging process.

If the transplant team believes you are a good candidate for a transplant, you will be put on a national waiting list. Your place on a waiting list is based on a number of factors, which depend on the type of transplant you are receiving.

Once you are on the waiting list, the search for a matching donor begins. Types of donors depend on your specific transplant, but include:

- A living related donor is related to you, such as a parent, sibling, or child.
- A living unrelated donor is a person, such as a friend or spouse.
- A deceased donor is someone who has recently died. The heart, liver, kidneys, lungs, intestines, and pancreas can be recovered from an organ donor.

After donating an organ, living donors can live a normal, healthy life.

You should identify family, friends, or other caregivers who can offer help and support during and after the transplant process.

You will also want to prepare your home to make it comfortable for when you return after being released from the hospital [28].

After a transplant

How long you stay in the hospital depends on the type of transplant that you have. During your time in the hospital, you will be seen daily by the transplant services team.

Your transplant services coordinators will arrange for your discharge. They will discuss with you plans for care at home, transportation to clinic visits, and housing, if needed.

You will be told how to take care of yourself after the transplant. This will include information about:

- Medications
- How often you need to visit the doctor or clinic
- What daily activities are allowed or off-limits

After leaving the hospital, you will return home.

You will have periodic follow-ups with the transplant team, as well as with your primary care doctor and any other specialists that may be recommended. The transplant services team will be available to answer any questions that you may have [28].

Macro trends and statistics of organ donation and transplantation in India

India's first organ transplant was conducted in the 1970s (It was a kidney transplant) India has made a few strides forward since but a lot more needs to be done:

• The number of transplants done annually has been gradually rising. Currently around 5,000 kidneys, 1000 livers and around 15 hearts are transplanted annually.

• There is a poor Organ Donation Rate–0.26 per million in India, compared to some of the better performing countries such as America's 26, Spain's 35.3, and Croatia's 36.5 per million respectively.

With a 1 per million-donation rate, India would have 1,100 organ donors or 2,200 kidneys, 1,000 hearts, 1,100 Livers, 1,100 Pancreas and 2,200 Eyes. This should take care of almost all current demands for organs. At a 2 per million-donation rate there would be 2,200 organ donors and the above fig. would double. Then there would be no necessity to undertake living kidney donations.

Quantifying the problem-There is a need of roughly 200,000 kidneys, 50,000 hearts and 50,000 livers for transplantation each year [30].

Brief overview of the current scenario and future outlook

• There is a lack of awareness among people with regards to deceased organ donation, the concept of brain death and the process of organ transplantation.

• NGOs and a few State Governments have taken significant steps to create awareness.

• There is a lack of clarity within the medical fraternity with regards to the rules and procedures related to organ transplantation.

• Absence of a centralized agency to maintain a registry of donors as well as recipients, and ensure maximum utilization of organs, as well as their fair and equitable allocation.

• Strong need for developing a centralized organ-sharing network among hospitals for better coordination, timely utilization and avoiding organ wastage [30].

Procedure for donating and transplanting organs

Any organ donation process must involve the following steps5 before the actual transplant can occur:

a. Panel of 4 doctors need to declare the brain death twice in a span of 6 h. Two of these doctors must be from a panel approved by the government. This panel includes:

i. Registered Medical Practitioner in charge of the Hospital where brain stem death has occurred.

ii. Registered Medical Practitioner nominated from the panel of names sent by the hospitals and approved by the Appropriate Authority.

iii. Neurologist/Neuro-Surgeon (where Neurologist/Neurosurgeon is not available, any Surgeon or Physician and Anaesthetist or Intensivist, nominated by Medical Administrator In-charge from the panel of names sent by the hospital and approved by the Appropriate Authority shall be included.

iv. Registered medical practitioner treating the aforesaid deceased person. The same is recorded on Form 10 of the THO Act 2014. The family's consent is obtained on Form 8.

b. Healthy organs are transplanted from the body of the patient as soon as possible.

i. Heart and lungs are the most sensitive organs, and must be transplanted within four to six hours of retrieval.

ii. Liver and pancreas must be transplanted within 12 h and kidneys within 24 h of retrieval.

iii. In the interim, all organs are stored at 4 °C (in a special preservative solution stored in an ice-filled chamber) to help with preservation.

c. No payment is made to the donor family, and the recipient is not charged for the organs per se. They of course have to pay the transplantation costs of the hospital. All billing for the donor family stops from the time that they give consent for organ donation.

d. In special medico legal cases, to declare a person dead and to proceed with organ donation, a post-mortem is required. Therefore, there is an additional requirement of a police representative and a forensic person to examine and approve of the process [30].

CONFLICT OF INTERESTS

Declared none

REFERENCES

1. Steinberg Avraham. Organ transplantation and definition of the moment of death Department of Pediatrics, Shaare Zedek Medical Center Jerusalem, Israel; 1967. p. 1-13.
2. Ethics of Organ Transplantation Center for Bioethics February; 2004. p. 1-5.
3. Gutkind L. The world of organ transplant. Many Sleepless Nights; 1990. p. 1752-78.
4. Whetstine L, Streat S, Darwin M, Crippen D. Pro/con ethics debate: when is dead really dead? Critical Care 2005;9:538–42.
5. Hood AF, Gorgia B, Lisa FB, Evan RF, Geoge WS. Acute graft vs. host disease development following autologous and syngeneic bone marrow transplantation. Arch Dermatol 1987;123:745–50.
6. Cooper DKC, Lanza RP. Xeno: The promise of transplanting animal organs into humans. Oxford University Press:: Oxford; 2000. p. 1752-78.
7. Bols PE, Aerts JM, Langbeen A, Goovaerts IG, Leroy JL. Xenotransplantation in immunodeficient mice to study ovarian follicular development in domestic animals. Theriogenology 2010;73:740–7.
8. Ejere, Chikwendu Vincent, Okanya CL, Laureta Chinagorom. Organ transplantation and its physiological implications–a review. Department of zoology and environmental biology. Anim Res Int 2013;10:1752–78.
9. Ericzon BG, Larsson M, Wilczek HE. Damino liver transplantation: risks and benefits. Transplant Proc 2008;40:1130–1.
10. Gruessner R, Benedetti E. Living donor organ transplantation. McGraw-Hill Incorporated: New York; 2008. p. 1752-78.
11. Ross LF, Rubin DT, Siegler M, Josephson MA, Thristlewaite JR, Woodle ES. Ethics of a paired kidney exchange program. N Engl J Med 1997;336:1752–5.
12. Rothman DJ. Ethical and social consequences of selling a kidney. J Am Med Assoc 2002;288:1640–1.
13. Shimazono Y. The state of the international organ trade; a provisional picture based on integration of available information. Bull W H O 2007;85:901–80.
14. Ibrahim HN, Foley R Tan L, Rogers T, Bailey RF, Guo H, Gross CR, *et al*. Long term consequences of kidney donation. N Engl J Med 2009;360:459–46.
15. https://www.nlm.nih.gov/medlineplus/organdonation.html. [Last accessed on 31 Oct 2015].
16. https://www.nlm.nih.gov/medlineplus/organtransplantation.html. [Last accessed on 02 Nov 2015].
17. https://www.nlm.nih.gov/medlineplus/hearttransplantation.html. [Last accessed on 03 Nov 2015].
18. https://www.nlm.nih.gov/medlineplus/kidneytransplantation.html. [Last accessed on 04 Nov 2015].
19. https://www.nlm.nih.gov/medlineplus/livertransplantation.html. [Last accessed on 05 Nov 2015].
20. https://www.nlm.nih.gov/medlineplus/lungtransplantation.html. [Last accessed on 06 Nov 2015].
21. https://www.nlm.nih.gov/medlineplus/pancreastransplantation.html. [Last accessed on 07 Nov 2015].
22. https://www.nlm.nih.gov/medlineplus/bonemarrowtransplantation.html. [Last accessed on 09 Nov 2015].
23. https://www.nlm.nih.gov/medlineplus/isletcelltransplantation.html. [Last accessed on 10 Nov 2015].
24. http://www.transplantliving.org/after-the-transplant/medications/post-transplant-medications/. [Last accessed on 17 Nov 2015].
25. http://www.transplantliving.org/after-the-transplant/medications/types-of-immunosuppressants/. [Last accessed on 18 Nov 2015].
26. http://www.transplantliving.org/after-the-transplant/medications/switching-immunosuppressants/. [Last accessed on 18 Nov 2015].
27. https://www.nlm.nih.gov/medlineplus/ency/article/000815.htm. [Last accessed on 19 Nov 2015].
28. https://www.nlm.nih.gov/medlineplus/ency/article/007457.htm. [Last accessed on 19 Nov 2015].
29. Partnering with your transplant team the patient's guide to transplantation. U. S. Department of Health and Human Services Health Resources and Services Administration; 2008. p. 1-118.
30. A study of the deceased organ donation environment in Delhi/NCR; 2013;1-6. Available from: www.organindia.org. [Last accessed on 19 Nov 2015].