

Case Report

Caring for a Patient with Cardiac Transplantation: A Case Report

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ABSTRACT

Surgical technique of cardiac transplantation was first described in 1960, since the first successful heart transplantation in a human by Christian Barnard in 1967, heart transplantation has evolved from its experimental stage to an established treatment option for patients in end-stage heart failure. While historically most patients undergoing orthotopic heart transplantation suffered from end-stage ischemic or dilated cardiomyopathy, the proportion of patients with congenital heart disease has increased. Congenital heart disease (CHD) is common affecting 0.4-1% of the population. According to the 30th adult heart transplant report, over 110,486 heart transplants were conducted in over 407 centers since 1982 through June 30, 2012. Nurses play a pivotal role in early identification and collaborative management to rehabilitate the patients. A case study is presented in this article. The patient's clinical presentation, diagnostic measures and management presented along with case report focusing on nursing management.

Keywords: cardiac transplantation, case study, collaborative and nursing management.

INTRODUCTION

A heart transplant is an operation in which a failing, diseased heart is replaced with a healthier, donor heart. Heart transplant is a treatment that's usually reserved for people who have tried medications, lifestyle changes or other surgeries, but their conditions haven't improved sufficiently. [1]

Definition

Heart transplantation, also called cardiac transplantation, is the replacement of a patient's diseased or injured heart with a healthy donor heart. [2]

Incidence

According to the 30th adult heart transplant report, over 110,486 heart transplants were conducted in over 407 centers since 1982 through June 30, 2012. June, 2009, the survival rates were: 1 year: 88.0% (males), 86.2% (females), 3 years:

79.3% (males), 77.2% (females), 5 years: 73.2% (males), 69.0% (females). [3,4]

Contraindications:

Patients who have any of the following conditions may not be eligible for heart transplantation:

- Pulmonary artery systemic pressure >60 mm Hg, mean transpulmonary gradient >15 mm Hg, and/or peripheral vascular resistance >5 Wood units on maximal vasodilator therapy.
- Active peptic ulcer disease
- Active diverticulitis
- Morbid obesity (body mass index >35 kg/m²)
- Severe peripheral vascular disease
- Recent stroke (unless associated with left ventricular assist device).
- Acute pulmonary embolism (<6 wk)
- Active neoplasm (must be malignancy-

- free for at least 5 yr)
- Current alcohol or drug abuse and Ongoing tobacco use
- Irreversible severe pulmonary disease, with FEV₁ <1 L or FVC <50%
- Severe psychiatric or cognitive impairment
- Lack of family or social support
- Advanced age (65 or older)
- Inability or unwillingness to follow a lifelong care plan after a transplant. [7]

Indications of Heart Transplant

Book Picture	Patient Picture
<ul style="list-style-type: none"> • Refractory heart failure requiring continuous inotropic support • Cardiogenic shock requiring mechanical assistance (e.g. ventilator, intra-aortic balloon pump, ventricular assist device, total artificial heart) with, at worst, reversible end-organ damage • Congestive heart failure, New York Heart Association (NYHA) Class III or IV symptoms, with objective evidence of impaired functional capacity (peak oxygen consumption <14 ml/kg/min), despite optimal medical therapy • Refractory angina, despite maximal medical therapy, and not amenable to revascularization • Refractory life-threatening ventricular arrhythmias, despite maximal antiarrhythmic therapy by all appropriate conventional medical and surgical modalities (multiple firings from an ICD for documented VT and VF). • Congenital heart disease with progressive ventricular failure that is not amenable to conventional surgical repair. • Severe hypertrophic or restrictive cardiomyopathy, with NYHA Class IV symptoms. • Cardiac tumors confined to the myocardium, with a low likelihood of metastasis at time of transplantation • Coronary artery disease • Valvular heart disease • Failure of a previous heart transplant • Hereditary conditions. • Viral infections of the heart. • Damaged heart valves and muscles. (Alcohol, pregnancy, and certain medicines can damage the heart valves and muscles). [5, 6] 	<p>Congestive heart failure Ejection Fraction - 30%, Right bundle branch block Congenital heart disease with left ventricular hypertrophy with class IV (NYHA).</p>

Types:

There are two very different surgical approaches to heart transplantation:

- Orthotopic Approach.** The orthotopic approach requires replacing the recipient heart with the donor heart.
- Heterotopic Approach.** Heterotopic transplantation, also called "piggyback" transplantation, is accomplished by leaving the recipient's heart in place and connecting the donor heart to the right side of the chest. [8]

CASE REPORT

A twenty two year Mr. X got admitted on 20th April 2016 in cardiology

deluxe ward with history of Cyanotic spell, Shortness of breath NYHA grade III, Chest pain radiating in nature to left shoulder and neck, Retrosternal pain (4 episode with perspiration and throbbing in nature last for 2-3 minutes), palpitation, excessive perspiration, episode of pink frothy sputum of 2- 5 ml /day. There is family history of diabetes mellitus to patient mother.

He was known case of Cyanotic congenital heart disease, DORV (double outlet right ventricle), Tricuspid stenosis, tricuspid regurgitation, pulmonary stenosis on treatment from local hospital from birth. He has complaint of cyanosis by birth, squatting episodes and shortness of breath at age of 2-3 years. During school and college period of life, often suffered with cold and

fever managed with doctor prescribed palliative management. Others like shortness of breath on exertion of work, while playing and brisk walk, managed by sitting or taking rest. From 2 years on medication TAB. INDERAL 20MG BD. Severity of complaint started from 2014,

with ejection fraction 30% and awaited for the transplant with ongoing medical treatment and follow up at cardiac hospital. During this period patient has even developed hypothyroidism and on medication TAB. Thyronorm 40mg OD × 8 months.

Investigations

Book picture	Patient picture
<ul style="list-style-type: none"> Blood tests: With differential, platelet count, prothrombin time (PT), activated partial Thromboplastin time (aPTT), and a complete chemistry profile (including liver panel, lipid profile, and urinalysis) and serology test Chest X-rays: enlarged cardiac shadow, reflecting chamber dilation/hypertrophy and reflecting increased pulmonary pressure. Electrocardiogram: Ventricular or atrial hypertrophy, axis deviation, ischemia, and damage patterns may be present. Echocardiography : to determine the cardiac ejection fraction and to monitor the cardiac function of patients on the transplantation waiting list Cardiac catheterization: Used to determine if the disease process is reversible or treatable by more conventional therapy computed tomography of heart (CT scan): Measures cardiac volume during both systole and diastole, measures ejection fraction, and estimates wall motion Cardiac biopsy : to determine the extent and activity of the disease process Cardiac marker: e.g. Troponin level, BNP (Brain natriuretic peptide test): indicate of myocardial injury Kidney function test: Elevation of both BUN and creatinine is indicative of renal failure. trial blood gas analysis: Left ventricular failure is characterized by mild respiratory alkalosis (early) or hypoxemia with an increased Pco₂ Blood grouping and a panel reactive Antibodies (PRA) test: For evaluation and therapy before completing the evaluation for transplantation Virus: Including hepatitis viruses, human immunodeficiency virus (HIV), Epstein-Barr virus (EBV), and cytomegalovirus (CMV); used to determine past exposure and currently active disease Fungus and tuberculosis (TB): Used to determine past exposure and to predict reactivation. [8] 	<ul style="list-style-type: none"> Blood profile: complete blood count , coagulation profile, kidney function test, liver function test, urine analysis and serology Chest x-ray: Cardiomegaly ECG: Right atrial abnormality Inferior infract, possible lateral infract Left ventricular hypertrophy Anteroseptal ST-T abnormality suggest myocardial infract. Echocardiograph Double outlet right ventricle Large inlet VSD, BD shunt Tricuspid stenotic/ moderate tricuspid regurgitation Right ventricle hypoplastic Severe pulmonary stenosis Ejection fraction 30% Cardiac Catheterization: Double outlet right ventricle Large inlet VSD Severe pulmonary stenosis Tiny collaterals uninterrupted superior vena cava Cardiac marker Troponin I : 750ng/ml Blood grouping: A positive Antibody test (CD4/CD8 flow cytometry test was done) BNP test: 440ng/ml <p>POST-SURGERY</p> <ul style="list-style-type: none"> Endomyocardial biopsy : Mild rejection (1B) CT-chest: Bilateral lower pleural effusion ABG analysis Cytomegalovirus Real time PCR: Negative Fungal stain: Aseptial hyphae fungal elements are seen

The patient has undergone orthotopic cardiac transplantation on 20/05/2016. Followed by surgery on 1st pod patient was on observation at cardiac monitoring, ventilator support and other accessories like, mediastinal I & II and Rt pleural drainage, Atrioventricular 2 RA & 2 RV at VOO mode and rate 110, 14 French Foley catheter, surgical dressing at sternal region and on medication support like, Ivf. GTN 0.1 ml/hrs, Ivf. Adrenaline 10 ml/hrs,

Ivf. Dobutamine 6 ml/hrs, Ivf. Milrinone 8 ml/ hrs, Inj. Isoprenaline 0.1 ml/hrs, inj. Fentanyl 4 ml/hrs, inj insulin 10ml/hr for 320 mg/dl GRBS and 2 pint platelet count and 1 pint of whole blood transfusion given. On 2nd pod: Ventilator extubate and pacing off, on medication like Tab cellcept 1gm PO BD, Tab Tacrolimus PO BD and Tab Prednisolone 15mg PO OD onwards. On 3rd pod: PA sheath removed, on 6th pod: 2nd mediastinal drain removed. On 7th pod CVP

removed and peripheral line inserted. On 8th pod mediastinal I removed. On 13th pod, Endomyocardial biopsy done. On 14th pod pacing wire removed and shifted to ward. On 21st pod, patient re-intubated, atrial line re-inserted and shifted to OT for wound debridement and pericardial drainage and kept mediastinal II Robovac and left pleural drain and shifted to ICU. On 27th pod, Mediastinal II and Rt. Pleural drainage removed. On 28th pod patient having complaint of shortness of breath, pedal pitting edema with grade II, left pleural drain site pain. patient on medications like, Ivf dobutamine 5 ml/hour, Ivf lasix 0.3 ml/hour, Ivf Fentanyl 4 ml/hour, Ivf insulin 2 ml/hour, On 29th day high grade fever 103° f, managed with tepid sponge and inj paracetamol 1 gm iv bd. On 30th day patient was shifted to deluxe ward followed by 45th stay of hospitalization patient was discharged from hospital with follow up, medications and cardiac rehabilitation instructions.

Surgical Techniques:

Medial sternotomy done, pericardium marsupialised and patient heparinised. Went on partial bypass with ascending aortic and bicaval cannulation. Patient cooled at 28 degree centigrade. Aorta cross clamped and cold blood cardioplegia given to achieve diastolic arrest of the heart. Recipient heart was excised leaving behind a part of RA and the posterior wall of LA with draining pulmonary vein in situ. Donor heart was fashioned for biatrial technique. Donor heart LA was anatomised to the recipient part of LA using 4-0 prolene, continuous suture. Pulmonary artery of the donor was anatomised to the recipient pulmonary artery using 5-0 prolene continuous sutures. Aortic anatomises was done similarly 4-0 prolene continuous sutures. Rewarming started, aortic cross clamped released, heart was in a systole, dual chamber pacing started which was later converted to ventricular pacing, and patient was fully rewarmed to 36 degree centigrade. Patient came off bypass at 2nd attempted with

adrenaline, Milrinone and dobutamine supports. Protamine started, chest closed in layers with two mediastinal drains, Two RA and 2 RV pacing wire in situ. At the end of the procedure the swab and instrument count was counted.

Complications:

1. Infectious Complications

- Cytomegalovirus (recipient seropositive)
- Cytomegalovirus (recipient seronegative and donor seropositive)
- Herpes simplex virus
- Epstein-Barr virus (recipient seronegative and donor seropositive)
- Toxoplasma gondii (donor or recipient seropositive)

2. Diabetes Mellitus

3. Hypertension

4. Renal Dysfunction

5. Osteoporosis

6. Hyperlipidemia

7. Gout

8. Malignancy

9. Retransplantation

10. Bleeding

11. Pressure on the heart caused by fluid in the space surrounding the heart (pericardial tamponade)

12. Irregular heart beats

13. Reduced cardiac output

14. Develop coronary artery disease 1-5 years after the transplant.

15. Coronary arteries induce angina. [7]

Nursing Diagnosis

Nursing management of a patient with heart transplant is presented using nursing process approach. [9,10]

- 1. Decreased cardiac output related to alteration in rate, rhythm and electrical conduction as evidenced by bradycardia, hypotension and ankle edema.**

Expected outcome: Patient will maintain adequate tissue perfusion

- Monitored vital, temp = 103F, HR= 72 b/min, RR= 26 breath/min and BP= 90/60 mm of Hg
- Monitor for cardiac dysrhythmias and conduction
- Promote bed rest and activity

limitation

- Elevated head of bed i.e. semi fowler or fowler position
- Monitor fluid and electrolyte (i.e. intake/output= 3250 ml/1324), Na=124 mmol/l, K+=5.4 mmol/l)
- Administer cardiac medication as per doctor order,
 - ❑ Inj dobutamine 5 ml/hr
 - ❑ Inj lasix 40 mg/hr
 - ❑ Tab aldactone 25mg PO OD
- Administer 6l/min oxygen as per doctor order.

Evaluation: Patient has maintained stable sign of improved input/output, stable heart rate and performs ADLs without in capacitating dyspnoea.

2. Hyperthermia related to stimulation of the thermoregulatory centre by endogenous pyrogens as evidenced by temperature over 103 F, warm to touch, increased total count.

Expected outcome: Patient will maintain normal body temperature

- Assess for signs and symptoms of hyperthermia (i.e. temp = 103*f, warm body, change of facial colour)
- Adjust and monitor environmental factor like room temperature and bed linens
- Apply tepid sponge bath 4th hourly.
- Encourage patient to increase fluid intake(adequate juice and hot soups)
- Provide high caloric diet as per doctor order (i.e. 1200Kcal/day)
- Started intravenous normal saline 50ml/hour
- Administered antipyretics as per doctor order inj. paracetamol 1gm iv BD

Evaluation: Patient has reduced fever on 2nd day as evidenced by obtained normal body temperature

3. Impaired gas exchange related to ventilation-perfusion imbalance as evidenced by dyspnoea, atrial saturation (hypoxemia), ABG respiratory acidosis (PH=7.30, PO₂ = 41.5, pco₂ = 48.7)

- Expected outcome: Patient will

maintain arterial oxygen saturation greater than 90% on pulse oximetry.

- Asses vital and respiratory pattern (RR=26 breath/min, spo₂ 90% on 6 lo₂/min)
- Auscultate for breath sound every fourth hourly, wheeze on expiration and dullness at left pleural of lung
- Encourage patient for diaphragmatic breathing and application of chest splinting
- Assist patient using spirometry able to raise two balls at a time
- Help patient progressively increase in ambulation 15-20 minutes twice daily.
- Provide comfortable position i.e. fowler, sitting and right lateral.
- Administer oxygen 6 lo₂ /min as per doctor order
- Obtain ABG, (respiratory acidosis), correction of inj sodium bicarbonate 20 meq.
- Administer antibiotic inj. Micafungin 100mg IV OD

Evaluation: Patient has demonstrated some extend of lung function as evidenced by maintenance of spo₂ 98% with 2 lo₂/min.

4. Acute pleural chest pain related to surgical incision as evidenced by presence of ICD accessories, tender at left pleural chest drainage site and unpleasant facial expression.

Expected outcome: Patient will report relief of pain by demonstrating pleasant facial expression.

- Evaluate chest pain (Wong baker scale 8/10), and no leakage of drainage.
- Monitor the effectiveness of oxygen therapy
- Maintain quite and calm environment and provide comfortable position.
- Reload immediately to the complaint of pain to finding out the various strategies to overcome.
- Performed surgical dressing at sternum and change the ICD

dressing

- Administer analgesic as per doctor order inj diclofenac 75mg SOS

Evaluation: Patient has relieved from pain some extent as evidenced by pleasant facial expression, i.e. 4/10

5. Impaired skin integrity related to surgical incision impeded capillary flow as evidenced by frequent wound debridement procedure capillary refill takes prolong period, sacrum ulcer, peripheral line and dry skin.

Expected outcome: Patient will maintain normal skin integrity

- Assess the patient level of discomfort (redness in sacral region, redness at left pleural region)
- Identify the sign of itching and scratching (scaly lower oedematous extremities and irritation of ICD site resulting sensation of itching)
- Clean the skin area with normal saline or normal water
- Assess for edema i.e. pitting edema grade II
- Encourage for mobilization 15-30 mins twice a day
- Application of Vaseline moisturizer cream.

Evaluation: Patient has maintained normal skin integrity as evidenced by reduced edema and smooth skin integrity

6. Imbalance nutrition less than body requirement related to lack of food intake as evidenced by loss of appetite, changes in nutritional status and fluid intake post surgery and weight loss.

Expected outcome: Maintain normal nutritional dietary balance

- Monitor for sensation of nausea and vomiting
- Weighing the patient daily, lost 5 kgs of weight after hospitalization.
- Monitor the caloric and nutritional intake i.e. 1200 Kcal/day
- Monitor albumin, total protein, Haemoglobin level = 8.8gm/dl.
- Provided oral care before meal
- Provide additional nourishment

within limits of prescribed diet calorie.

- Refer for diet teaching and planning menu.

Evaluation: Patient has maintained nutritional habit as evidenced by improved appetite

7. Activity intolerance related to complete bed rest, decreased cardiac output as evidenced by depend upon caregiver to meet ADLS and significant changes in heart rate and blood pressure.

Expected outcome: Patient will improve activity level as evidenced by uses of energy conservation technique

- Encourage adequate rest before means, other ADLS, exercise session
- Provide bedside bed commode as indicated
- Encourage physical activity consistent with the patient
- Encourage verbalization of feeling regarding limitation
- Provide emotional support and positive attitude regarding abilities
- Teach range of motion and strengthening exercise like flexion, extension, internal rotation etc.
- Administer the 6 l₂/min oxygen supplement as per doctor order

Evaluation: Patient has improved some extent of activity by performing ADLS with minimal support.

8. Anxiety related to fear of dying, indicating major changes in health status as evidenced by frequent questioning regarding diagnostic procedures and knowledge deficit about coping with distress.

Expected outcome: Report decrease anxiety and increase sense of self control.

- Acknowledge the awareness of patient anxiety about the future plan, medication and lifestyle changes.
- Reduce unnecessary external stimuli around patient
- Provide quite and calm environment with relaxation technique
- Encourage patient to verbalization of

feeling like: comfort, pain and doubts.

- Encourage family to stay with patient during visiting hours like 10-15 minutes
- Provide factual information about diagnosis, treatment and prognosis.

Evaluation: Patient has decreased anxiety level and increase self control.

9. Ineffective therapeutic regimen related to stress of illness and hospitalization as evidenced by emotional inability and inaccurate understanding of current situation and plan for treatment.

Expected outcome: Patient will use, describe and initiate effective coping strategies

- Assess for symptoms of ineffective coping i.e. mood swing, distress etc
- Assess for resources and support system available
- Provide opportunities for patient to express fear and anxiety
- Encourage the patient to identify their own coping strength and abilities
- Identify the community resources and support group especially family members and youth support.

Evaluation: Patient has demonstrated, initiates effective coping strategies

10. Deficit knowledge (Cardiac procedure) related to unfamiliarity with diagnostic or therapeutic procedures as evidenced by verbalization of misconception.

Expected outcome: Identify relationship of ongoing treatment and initiate necessary lifestyle and behavioral changes

- Discuss normal heart function. Include information regarding patient's variance from normal function.
- Encourage developing a regular home exercise program.
- Discuss importance of being active as possible without becoming exhausted and of rest between activities.
- Discuss importance of sodium

limitation and encourage reading of labels on food and drug package

- Refer to dietitian for counseling specific to individual dietary customs
- Review medication purpose and side effects and provide both oral and written instruction.
- Instruct and receive return demonstration of ability to take daily pulse.
- Review signs and symptoms that require immediate medical attention: shortness of breath, increased fatigue, cough, fever and hemoptysis.

Evaluation: Patient has identified relationship of ongoing treatment and initiate in necessary lifestyle and behavioral changes.

CONCLUSION

Cardiac transplantation has evolved into the treatment of choice for many people with severe heart failure who have severe symptoms despite maximum medical therapy. Survival among cardiac transplant recipients has improved as a result of improvements in treatments that suppress the immune system and prevent infection. Therefore prompt therapy and nurse care goes hand to achieve best outcome. Nursing care rendered needs to be comprehensive and complete. The nurse needs to ensure that adequate education is provided to caregiver for ongoing care even at home.

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