



Early Mobilization is the Key towards Early Functional Independence in a Patient Undergone Aortic Valve Replacement: A Case Study

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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Case Study

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ABSTRACT

Heart disease due to valvular anomaly has increased prevalence along with increasing age. Rheumatic heart disease is a condition in which the heart valves have been permanently damaged post rheumatic fever. We report a patient with Aortic valve replacement using TTK CH 25 prosthetic valve who underwent post-operative physiotherapy which comprises 2 weeks of phase I cardiac rehabilitation, a home exercise program after discharge, and follow-up after 2 weeks. During follow up patient has a high level of independence, improvement in quality of life, lung function, and symptoms. This case report aims to highlight the significance of prompt diagnosis; treatment and most importantly rehabilitation incorporating early mobilization to get the patient back to his functional state. A scheduled exercise program benefits the patient and also minimizes complications after surgery.

Keywords: *Aortic valve replacement; rheumatic heart disease; rheumatic aortic stenosis; phase 1 cardiac rehabilitation; early mobilization; functional independence.*

1. INTRODUCTION

Rheumatic valve infection is prevalent in developing countries. According to World Health Organisation, it results from an insult to the heart valves by one or several episodes of rheumatic fever, an autoimmune inflammatory infection in the throat due to Group A streptococci [1]. Rheumatic fever (RF) commonly affects school-aged children and is preceded by a Group A streptococcus infection that causes a slew of symptoms. Poverty, hunger, congestion, inadequate housing, and a lack of healthcare resources are all risk factors for streptococcal infection, highlighting the significant prevalence in underdeveloped nations. Except for heart valvular damage, which is the hallmark of RHD, other indications of RF disappear entirely. The most common cause of heart failure in children and young people is post-rheumatic valvulopathies [2]. This predominantly, later in life leads to heart valves damage with the mitral valve being the most common followed by the aortic valve. Standard aortic valve replacement (SAVR) is the classic commonly used approach for aortic valve surgery and is performed through a median sternotomy with a cardiopulmonary bypass with excellent outcomes [3].

Because of the evolving disease trend and the anticipated rise in healthcare burden for the patient who undergoes heart valve surgery, a well-established after-care service is needed to look after the patient's post-surgical issues. Physical and psychological problems, as well as the difficulty in getting to work, are among them. Post-surgical complications like physical, mental, or social might delay the recovery process and negatively impact health-related quality of life leading to increased risk of mortality and morbidity, re-admission, and overall increase healthcare cost [4]. Taken together, early mobilization which is an application of physical activity within the first two to five days of critical illness or injury, works as an effective countermeasure the effects of bed rest, may prevent a decrease in aerobic capacity, and patients undergoing early mobilization might walk a longer distance during the 6MWT as a result of the prevention of dysfunction due to bed rest and making patient more functional independent [5].

2. PATIENT INFORMATION

A 26-year-old male student came in medicine OPD with a complaint of breathlessness on

exertion (New York heart association grade II) which was on and off in course and dizziness. It was gradual in onset and progressive in nature. Dyspnea aggravates while performing any physical activity which results in fatigue and palpitations and relieved at rest. He then underwent various investigations including Chest X-ray, electrocardiography, and Echocardiography. A patient diagnosed with RHD with severe Aortic stenosis with mild tricuspid regurgitation. So the patient has advised admission to the Cardiovascular and thoracic surgery (CVTS) unit for Aortic valve replacement surgery. All routine investigations and monitoring were done then he was operated on 14/05/2021 for Aortic valve replacement surgery using TTK CH 25 prosthetic valve. On the post-operative day (POD) 1, the patient reported a complaint of pain at the incision site, cough, and difficulty breathing for which he was referred for Physiotherapy.

2. Clinical Finding

The patient was visited by the physiotherapist on POD 1, the patient was conscious, cooperative, and well oriented to time, place, and person. On inspection he was on 4L O₂/min via nasal prongs, central line, peripheral line and mid sternal drain were in situ. On the anterior aspect of the chest, median sternotomy incision dressing is present. On systemic cardiovascular examination, pulse rate was 119 beats/min with regular rate and rhythm, blood pressure - 121/82 mm Hg, on auscultation S1 and S2 sounds heard along with click sound. On respiratory system examination, respiratory rate was 23 breaths /min with regular rhythm and diminished chest wall movement noted on the left side. On auscultation, air entry was diminished bilaterally in lower zones and occasional crepitation was present.

2.1 Timeline

Table 1. Timeline of the patient

Date of admission:	10 /05/2021
Date of Aortic valve replacement surgery:	14/05/2021
Date of Physiotherapy Rehabilitation:	15/05/2021
Date of discharge:	28/05/2021
Date of follow up:	20/06/2021

3. DIAGNOSTIC ASSESSMENT

The routine blood reports and urine examination did not reveal any abnormality. Pre-operative echocardiography revealed severe aortic stenosis, mild tricuspid regurgitation secondary to rheumatic heart disease. Intra-operative findings revealed severe calcified aortic valve leaflets and mild tricuspid regurgitation. Post-operative posterior-anterior view Chest X-ray shows cardiomegaly, sternal sutures, and prosthetic heart valve. (Fig: 1)

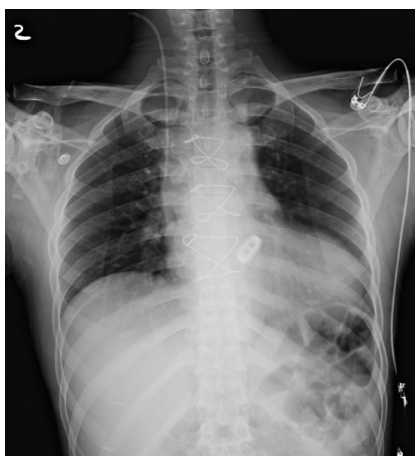


Fig. 1. Post-operative posterior-anterior view Chest X-ray shows cardiomegaly, sternal sutures, and prosthetic heart valve noted

3.1 Therapeutic Intervention

Post-operatively physiotherapy sessions were commenced twice a day with each session of 20 to 30 minutes along with medical management. Physical therapy intervention follow-up assessments were focused on the patient's stated impairments and functional limits. The inpatient, individually tailored cardiac rehabilitation regimen begins in the hospital and continues in a supervised setting after discharge, eventually moving to a home-based program. Evaluation and patient education were done. The patient was introduced to inpatient cardiac rehabilitation and role of physical therapy and the importance of adherence to exercise regime.

On POD 1 to 3, the Patient was on 4-liter oxygen via face mask on CVTS ICU, nebulization followed by chest physiotherapy in modified postural drainage position was given for airway clearance. Postural training, splinted coughing, deep breathing exercises, and in-bed mobility exercises were given with proper sternal precautions. Incentive spirometer, a device that facilitates sustained maximal inspiration with incorporated visual indicators of performance (inspiratory effort) was initiated 3 to 4 times a day and he was able to perform up to 600 cc with less than 1 second holds. Sitting was practiced by the patient for 15-30 minutes 2-4 times a day. Leg exercises, reclining upright chair and limited ADLs were performed.

On POD 4, the patient was shifted to the CVTS ward and he was maintaining saturation on room air. Edge of bed standing and walking initiated with minimal assistance along with previous exercises with increased repetitions was done. On POD 6 ambulation along the hallway up to 5 minutes as tolerated by the patient for 3-4 times a day was done with regular vitals monitoring. Standing leg exercises. On POD 8 and 9, the patient was able to practice independent ambulation in the hallway. Teaching the patient use of Borg's scale for perceived exertion and appropriate parameters with activity was done. Monitoring of vitals in sitting and standing before activity, immediately after the following activity, and 5 minutes after activity was continued.

Hall ambulation was practiced for 10 minutes 3-4 times a day on POD 10 to 14 along with previous exercises. The patient was able to perform incentive spirometer more than 900 cc Standing trunk and arm exercises and thoracic mobility exercises and stair climbing were initiated. The patient was educated about wound cleaning and dressing along with sternal precautions. He was trained about a home exercise program and monitoring of vitals and symptom recognition and appropriate activity guidelines. Along with this, he was provided with written information on outpatient cardiac rehabilitation and home exercise program.

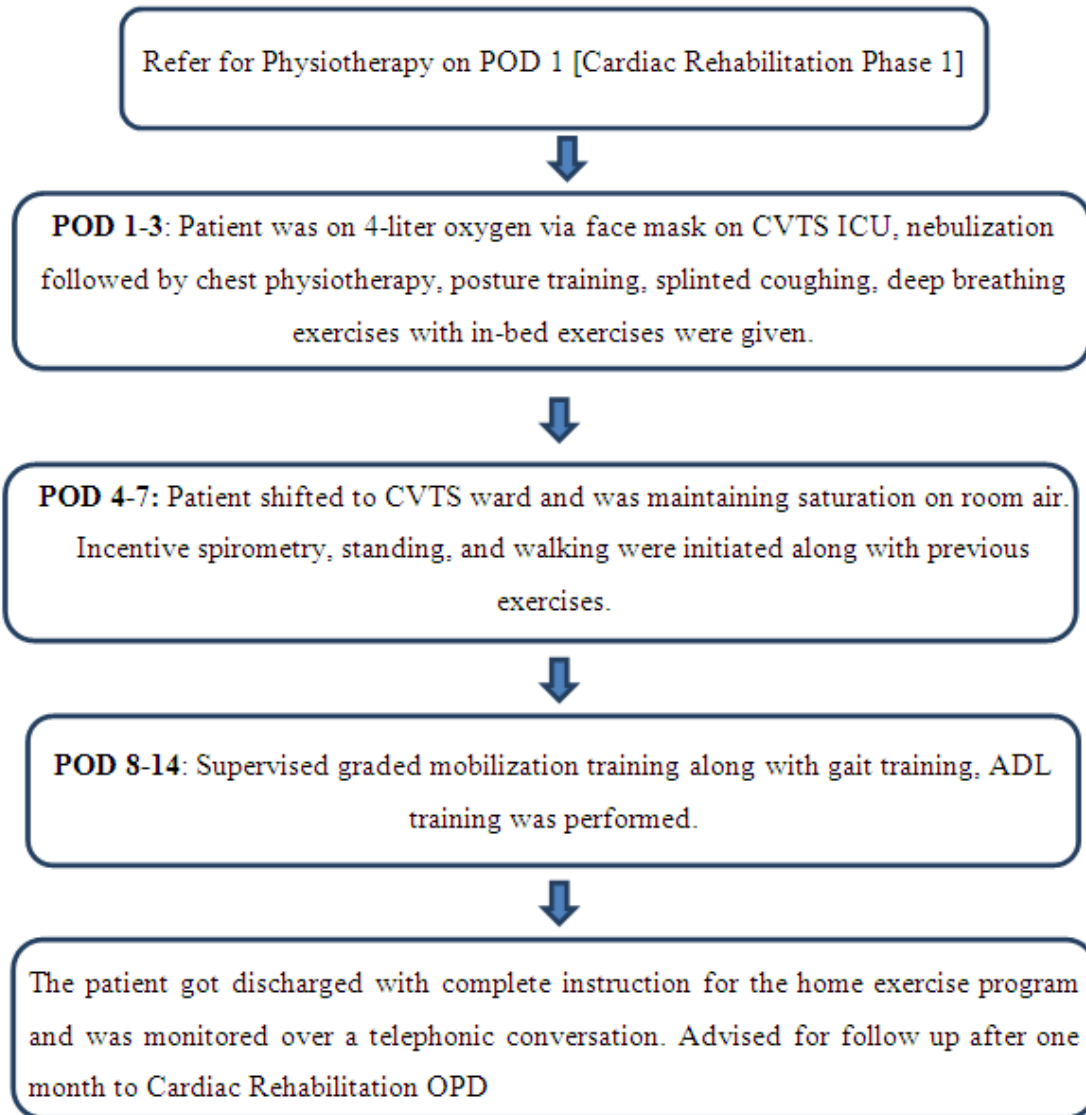


Fig. 2. Block diagram of Cardiac Rehabilitation OPD

Table 2. Shows outcome measures

Outcome measures	Pre-Rehabilitation	At the time of discharge	Follow up
New York Heart Association Functional Classification grade	Grade IV	Grade II	Grade I
Spirometric measurement	600cc	1200cc	1200cc
Kansas City Cardiomyopathy Questionnaire (KCCQ).	28 (Poor to fair)	67 (fair to good)	82 (good to excellent)

3.2 Follow Up and Outcome

At the end of 2 weeks of cardiac rehabilitation, the patient was able to perform all activities of daily living and doesn't complain of any pain or breathlessness. There was improvement seen 82

(good to excellent) measured using KCCQ which is a self-administered, 23-item questionnaire that quantifies physical limitations, symptom stability, symptoms, self-efficacy, social interference, and HRQoL in such patients. Follow up after 2 weeks he was well motivated and was willing to

continue physiotherapy. He visited the Physiotherapy OPD frequently and was introduced to a home exercise program.

4. DISCUSSION

Rheumatic heart disease-causing symptoms either pre-operatively or post-operatively adversely decline a patient's quality of life irrespective of a choice of treatment either repair or replacement. The clinical guideline for such patients emphasizing the importance of rehabilitation post valvular operation is still rare [5,6]. The goal of cardiac rehabilitation is to improve an individual's exercise capacity, exercise efficiency, exercise tolerance, self-management, and improve quality of life. In the aspect of rehabilitation, we started phase-1 Cardiac rehabilitation on POD 1 in the hospital and continue after discharge in a supervised setting eventually transitioning to a home-based program along with follow-up every 2 weeks [7].

This case study is mainly focused on early rehabilitation and the prevention of complications. In this case, our management focused in line with the previous studies which states that cardiac rehabilitation increases exercise capacity and quality of life, and facilitates return to work, with minimal risk of significant adverse effects. Initiation of early physiotherapy post-operatively soon led to improvement in the patient's activities of daily living [8,9]. Several studies on this aspect are reflected including Evaluation of functional capacity post valvular operation also shows positive changes in ejection fraction and decline of New York Heart Association dyspnea grades [9,10]. Cardiac rehabilitation is a tried-and-true treatment for people who have had heart surgery. The current single case study adds to the existing evidence on the efficacy of cardiac rehabilitation in improving the patient's overall condition post Aortic valve replacement in young adults. Outcome measures revealed an improvement in the patient's overall quality of life as well as lung capacity. Thus, tailored phase I cardiac rehabilitation can be used effectively in patients who have had aortic valve replacement surgeries.

5. CONCLUSION

This case report aims to highlight the significance of prompt diagnosis; treatment and most importantly rehabilitation to get the patient back to his functional state. A scheduled exercise

program benefits the patient and also minimizes complications after surgery.

CONSENT

A proper informed consent was taken from the patient prior.

ETHICAL APPROVAL

As per international standard or university standard written ethical approval has been collected and preserved by the author(s).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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