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CASE REPORT: REHABILITATION OF A PATIENT WITH CORONARY ARTERY BYPASS GRAFT (CABG) WITH AXILLO FEMORAL BYPASS

Mahesh V. Hegde¹, Ajith S.¹, M. Gopala Krishnan², Mohamed Faisal C.K.¹

¹Nitte Institute of Physiotherapy, NITTE University, Mangalore, India.

²Department of Cardio Thoracic Surgery, KSHEMA, NITTE University, Mangalore, India.

E-mail of Corresponding Author: ajithsoman@rediffmail.com

ABSTRACT

Background and purpose: The coexistence of coronary artery disease (CAD) and peripheral artery disease is as frequent as 37% to 78%. Even though the coexistence of carotid artery stenosis or abdominal aortic aneurysm with CAD is a more common clinical situation, the prevalence of severe aorta iliac occlusive disease (AIOD) has been reported as 4% and 15% in different series of patients undergoing coronary artery bypass operation[1]. The purpose of this case study is to describe the precautions and physiotherapy interventions in a patient with coronary artery bypass grafting with axillo femoral bypass. **Case Description:** A 58 year old male patient with coronary artery single vessel grafting with axillofemoral bypass grafting was referred from post operative day 1 to day12 for physiotherapy. Twelve sessions of physiotherapy was continued till the discharge which included breathing Exercises, upper and lower limb exercises, airway clearance techniques and patient advice.

Outcomes: Heart rate (HR), Respiratory rate (RR), Rate of perceived exertion, 6 minute walk test and spirometry were tested. **Discussion:** A significant increase in the heart rate and respiratory rate after the treatment in comparison to pretreatment measures. These parameters decreased significantly after 5 minutes and approached pre treatment values. The patient reported gradual reduction of dyspnea and was able to reassume functional activities. This was objectively supported by increased six minute walking distance and spirometric values. Physiotherapy management in a patient with coronary artery by-pass grafting with axillo femoral bypass resulted in significant increase in heart rate and respiratory rate with in physiological limits. Monitoring the vital signs is recommended in order to observe response to physiotherapeutic interventions. Hence supervision of moderate intensity exercise is very important to notice the increase in the cardiac respiratory endurance.

Keywords: Coronary artery by-pass grafting, peripheral artery disease, axillo femoral bypass grafting and Rehabilitation.

INTRODUCTION

Peripheral vascular disease (PVD) involves damage to or blockage in the blood vessels distant from your heart—the peripheral arteries and veins. Diseases of the arteries may lead to Arterial blockage including peripheral artery disease or PAD Aortic aneurysms, Buerger's Disease, Raynaud's Phenomenon, The coexistence of

coronary artery disease (CAD) and peripheral artery disease is as frequent as 37% to 78%. Although aortoiliac occlusive disease (AIOD) remains a common cause of lower extremity ischemia, the preferred mode of surgery is axillofemoral bypass surgery, Even though the coexistence of carotid artery stenosis or abdominal aortic aneurysm with CAD is a more common

clinical situation, the prevalence of severe aorta iliac occlusive disease (AIOD) has been reported as 4% and 15% in different series of patients undergoing coronary artery bypass operation. Peripheral Artery Disease (PAD) is the result of systemic atherosclerosis. The underlying disease process that affects the blood vessels is common to patients with coronary artery disease (CAD), stroke and diabetes mellitus. For example, many people undergoing coronary angiography have previously unrecognized PAD [2]. The overall prevalence rate was 3.2% in South India. Known diabetic subjects had a higher prevalence of PVD (7.8%) compared with newly diagnosed diabetic subjects (3.5%). PVD was uncommon until middle-age and then the prevalence rate increased dramatically. Of the 90 subjects who had coronary artery disease (CAD), only 6 had PVD, and the positive predictive value of the ABI for CAD was only 30% [3]. The purpose of this case study is to describe the precautions during physiotherapy interventions in a patient with Coronary artery bypass grafting with axillo femoral bypass.

Health care professionals working in rehabilitation or medical fitness programs need to understand the common coexistence of CAD, cerebrovascular disease and PAD, how exercise therapy can benefit program participants with PAD, and how they can develop exercise programs specifically designed for those with PAD, incorporating strategies for modifying the exercise prescription in the presence of existing co-morbidities such as CAD.

METHOD

Case presentation

A 58 year old man was admitted with a history of bilateral calf and foot pain since a month. Pain increased on walking and was relieved by rest. History of rest pain the left great toe since a month, which was sudden in onset and progressive in nature was reported.

Patient was non diabetic, asthmatic and a known hypertensive since 5 years and on medication tab

amlodipine 5 mg BD, also a known smoker with 1 pack / day for 33 years. He has consumed alcohol every day since 30 years.

On General physical examination patient was conscious, cooperative and moderately built and nourished with BP 162/90 mm of Hg and Pulse rate 80bpm. On systemic lower limb examination blackish discoloration was present in nail bed of great toe, hyperesthesia present, ulcer of 0.5 X 0.5 cms in 4th toe and tenderness present. Peripheral pulses were absent bilaterally in dorsal pedalis, anterior and posterior tibial and peroneal arteries. The pulses were present in femoral arteries bilaterally.

Coronary and peripheral angiogram was done. Coronary angiogram revealed single vessel disease with 90% occlusion in Left Anterior descending artery. In Peripheral angiogram abdominal aorta was diffusely atheromatous 100 % occluded at the bifurcation on left side, left common iliac , external iliac artery is 100% occluded reformed at superficial femoral artery by collaterals. Right common iliac artery had 95% stenosis with normal distal vessel flow.

Echo revealed normal Left ventricular function with left ventricular ejection fraction 60% with mild Left ventricular hypertrophy and pericardial effusion.

After 25 days of conservative treatment patient was operated for CABG and bilateral axillofemoral bypass grafting. For the Axillofemoral bypass an incision was made in Infraclavicular region anastomosed to the axillary artery, right incision in the groin and thigh on left side. Tunneling was done graft was passed through subcutaneous tissue and it was anastomised to right iliac and femoral artery. Doppler done on table revealing bilateral dorsal pedis artery, posterior tibial and anterior tibial artery patent. Patient was referred for physical therapy from the day of operation.

Physical Therapy Program

Physiotherapy Management started Post operative Day 0, we had given positioning the patient in head end inclined to 45 degrees. Active Ankle and toe exercise. Patient's Vesicular breath sounds were decreased, hence relaxed deep breathing exercises and incentive spirometry are taught. Care was taken for sternal precautions included supporting the incision area during bronchial drainage techniques and coughing, avoiding active trunk flexion and rotation while transferring from supine to sitting, and non weight bearing of upper extremities during sitting in order to prevent sternal instability. POD1 we started assisted upper limb exercises in addition to PODO. High sitting at the edge of the couch, sitting to standing training, Walking around the bed around 11 meters were started on POD2 and all the above mentioned exercise also given. We increased the duration of walking in Coronary Care Unit (CCU) on POD3 in addition to all the above mentioned exercises. We made the patient to high sitting at the edge of the couch, sitting to standing training, walking around the hospital corridor on POD4. On POD5 we encouraged to sit independently, increasing the distance walking around the hospital corridor around 25 meters. POD6 Active Upper limb and Neck exercises. Forced expiratory maneuver with sternal precautions. Encouraged to sit independently. Increasing the distance walking around the hospital corridor around 30 meters. On POD7 Patient encountered intermittent claudication while walking. The same exercise regime was continued in POD8 & 9. We increased the distance walking around 75 meters on POD 10. We emphasized on increasing the claudication distance and the patient tolerated the exercises well on POD11. Patient could walk 112 meters without getting the claudication and could demonstrate the easiness in the customary activities of daily living on POD12

DATA COLLECTION

Before the treatment, the patient was evaluated at the bedside by the physiotherapist in order to set the treatment goals and plan the individualized physical therapy program; the evaluation included medical history, mental status, cardiopulmonary parameters, medication, gross range of motion, and functional level. Patient was Conscious, oriented and demonstrated abilities to obey commands, the vitals were normal, on auscultation the vesicular breath sounds decreased.

Dyspnea was 19 in 6 to 20 point scale.

MMT and ROM-Could not assess because of excess pain at the graft site. Pain VAS-8/10, over right groin and left thigh and sensations in LL- Decreased.

Functional Capacity

Ambulation with walker- could not perform on post operative day.

6MWT- 6 Minute walking distance on 5th post operative day.

Psychological Considerations

Learning style - Auditory and kinesthetic.

Demonstrated willingness for the recovery.

During ankle brachial index test Systemic pressure in right Posterior tibial artery was 84mm Hg and right brachial artery systolic pressure was 152 mmHg. Anklebrachial pressure index was $84/152=0.5$, which indicates moderate arterial occlusion.

In 6 Minute walk test and Claudication pain scale: Improvement in a linear pattern was shown in the 6MWT and claudication pain scale. Gradually the distance increased from 25, 75 and 112 meters and claudication pain scale reduced from 4, 2 and 1 on 5th 10th and 12th day respectively.

RESULT

The Heart rate, respiratory rate were compared for the quality of recovery. There were no differences between hemodynamic variables obtained before, after the treatment and after five minutes after the treatment.(Table 1) The difference between recovery time at the end of the test and after the treatment was almost equal.

The physiotherapy outcome variables such as 6MWT [7] and Borg's scale [8] showed improvement in the walking distance sequentially from 5th, 10th and 12th day post operatively and decrease in the perception of difficulty in breathing. (Fig 1 and Fig 2) (Table 2)

DISCUSSION

In this study we have provided peripheral artery rehabilitation for twelve days after the surgery and found improvement in the hemodynamic variables such as heart rate and respiratory rate. Whether they have leg symptoms or not, people with Peripheral Artery Disease (PAD) and intermittent claudication (IC) have significant functional impairment with regard to ambulatory activity. However, there are benefits to exercising into mild to moderate claudication pain with little risk to the leg or cardiovascular system. In fact, exercising to the point of discomfort from IC may be an important aspect of an exercise training protocol for participants with IC, as it may contribute to the physiological adaptive changes needed for training effect. Unfortunately, on few instances our patient felt pain when ambulating and he had to cut back on activities that cause discomfort, resulting in further deconditioning, worsening cardiovascular (CV) risk factors, loss of leg strength and eventually disability.

Prospective studies and meta-analyses have consistently shown that supervised exercise training for participants with IC increases their walking distances, quality of life and overall functional capacity. The functional benefits of exercise training become obvious at four to eight weeks and continue to improve over 12 to 24 (or more) weeks. Functional benefits are greatest when the exercise sessions last 30 minutes or longer, the sessions take place at least three times per week, the exercise modality used is walking to near-maximal pain and the program lasts six months or longer [4].

The mechanisms leading to exercise-induced improvements are not completely known, but may

include changes in the way that oxygen is used by exercising the muscle, improved endothelial function, reduced cardiovascular disease risk factors and improved gait as well as increased blood supply [5].

Although exercise training is safe and effective for most patients with PAD and IC, there are other conditions that could be aggravated by exercise include, but are not limited to, severe joint disease, uncontrolled diabetes and uncontrolled hypertension.

It is important for the physical therapist to perform a functional evaluation including an exercise treadmill when possible prior to the patient's beginning an exercise program. This provides information regarding the claudication threshold, as well as heart rate, respiratory rate and blood pressure response, for the exercise prescription. It can also be a useful screening tool for previously unrecognized exercise-induced symptoms and signs such as arrhythmias or ischemic wave changes. However, the usefulness of exercise testing to detect abnormal cardiac responses may be limited by leg pain before reaching a heart rate or blood pressure at which abnormal cardiac responses may occur. Paradoxically, after a PAD patient goes through exercise training, cardiac symptoms may be uncovered since patients often have improved walking capacity. Many centers use a treadmill exercise testing protocol at an initial fixed speed of 2.0 mph, gradually increasing the grade by either 2 or 3.5 percent every 2 to 3 minutes, depending on the patient's estimated exercise capacity [6]. Other programs observe the patient during initial treadmill exercise at 2 mph and 0 percent inclines for claudication threshold and severity, adjusting the incline until moderate (3-4 out of 5 on the claudication scale) claudication occurs, and then this observation is used to set initial exercise prescription. The time at which the patient first begins to feel claudication symptoms is defined as the initial claudication time (also called pain-free walking time) and the time at which he/she must stop exercise is

designated as maximal walking duration. The work load which brings on claudication is considered the initial training work load. The claudication pain scale[9] often used in clinical trials is as follows: 1=no pain, 2=onset of claudication pain, 3=mild pain, 4=moderate pain and 5= severe pain.

Patients should also be monitored for cardiovascular symptoms, blood pressure and heart rhythm during this exercise evaluation; unexpected findings should be reported to their physician. The 6-minute walk test can also be used for baseline functional assessment, but it is less useful than treadmill testing for exercise prescription.

Finally, the pre-exercise assessment includes a careful evaluation of the lower extremity skin and feet, along with instruction regarding proper shoes to avoid skin irritation, breakdown and extra precautions on tight clothing and belt that might constrict the graft. Patients with PAD are at significantly increased risk for non-healing skin ulcers, and careful foot and skin reassessment is extremely important, especially for those with diabetes. Hence these are the precautions the patients are expected to take as they get discharge from the hospital.

CONCLUSION

By obtaining the subjective and objective data the patient cooperated well with the physical therapist and good heart rate recovery was obtained. It was noticed that patient had greater motivation in the supervised exercise regime over only the instruction or suggestion. Nevertheless, we should not rule out that the intervention might potentially contribute to symptom mitigation and restoration of functional capacity. The results found in this case study warrant future studies including a higher number of participants.

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Table 1. Heart rate and Respiratory rate before, after and after 5 minutes of treatment

Days of PT	Heart rate before the treatment	Heart rate after the treatment	Heart rate after 5 minutes of treatment	Respiratory rate before the treatment	Respiratory rate after the treatment	Respiratory rate after 5 minutes of treatment
Day1	103	109	104	22	25	22
Day2	87	101	86	20	25	21
Day3	92	97	92	21	25	21
Day4	88	93	89	21	24	21
Day5	87	92	87	20	24	20
Day6	87	91	87	21	26	20
Day7	89	93	88	22	27	22
Day8	82	85	83	23	28	23
Day9	87	92	88	20	25	20
Day10	89	94	88	21	26	21
Day11	87	93	87	20	24	20
Day12	85	89	86	19	24	20

Table 2. Physiotherapy outcome measures 6MWT and Borg’s scale

PHYSIOTHERAPY OUTCOME MEASURES

1. 6MWT
2. Borg’s Scale

Outcome measures	Day5	Day10	Day12	
6MWT	25mts	72mts	112mts	6 7 Very Very Light 8 9Light 10 11Fairly Light 12 13Somewhat Hard 14 15Hard 16 17Very Hard 18 19Very Very Hard 20
Borg’s scale (6 to 20 point)	15	11	9	

Fig.1. Bar Diagram showing the increment in distance travelled

6MWT

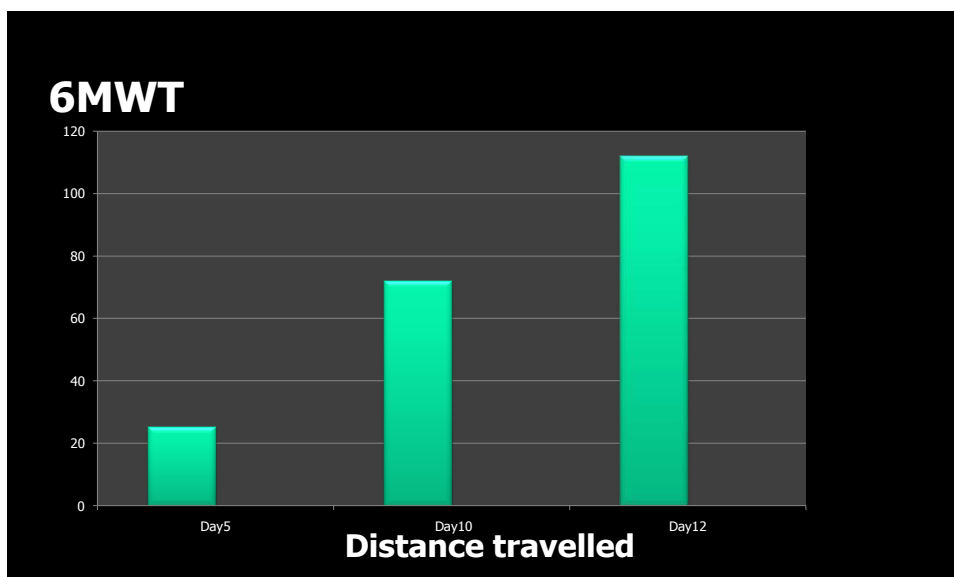


Fig.2. Bar Diagram showing the Borg's rate of perceived exertion

Borg's Scale

