



ORIGINAL RESEARCH PAPER

Physiotherapy

EFFECT OF EARLY PHYSIOTHERAPY IN CORONARY ARTERY BYPASS GRAFT SURGERY: A CASE REPORT

KEY WORDS: Physiotherapy, Coronary artery bypass graft, Cardiac surgery, Chest physiotherapy, Limb physiotherapy, Mobilization

Dr. Shweta Kishor Nahar*

(BPT, MPT), Clinical Physiotherapist, Hiranandani Hospital: A Fortis Network, Vashi, Navi Mumbai. *Corresponding Author

ABSTRACT

A 66 year old male has undergone CABG surgery. The present case study focuses on physiotherapy management in the form of chest physiotherapy, limb physiotherapy and mobilization in ICU set up. The early physiotherapy intervention provides vital role in improvement of quality of life of patients after elective CABG surgery.

INTRODUCTION:

Coronary artery bypass graft surgery (CABG) is a procedure used to treat coronary artery disease. Coronary artery disease (CAD) is the narrowing of the coronary arteries caused by a build-up of fatty material within the walls of the arteries. The traditional "open heart" procedure is commonly done and often preferred in many situations; less invasive techniques such as "Off-pump" procedure have been developed to bypass blocked coronary arteries.^[1]

The pain and discomfort following CABG is very common. The early physiotherapy intervention provides vital role in improvement of quality of life of patients after elective CABG surgery. The present case study focuses the early physiotherapy management after post operative CABG surgery.

CASE REPORT:

A 66 year old male patient with a chief complaint of exertional chest pain since 20 days got admitted for CABG surgery. Patient is a known case of diabetes mellitus since 2008 and ischemic heart disease (IHD). Patient underwent treadmill test (TMT) on 12th December 2020. The stress test was positive for exercise induced myocardial ischemia at 5.8 METs and 105% of maximal predicted heart rate. His trans-radial coronary angiography (CAG) was done on 12th December 2020. The left anterior descending (LAD) is a type III vessel shows proximal two tandem lesion 90% severity each mid segment 70% stenosis.

Early D1 is a large caliber vessel shows proximal 90% stenosis. The left circumflex artery (CLX) shows proximal 70% stenosis and the right coronary artery (RCA) of dominant vessel shows proximal 80% stenosis. The angiography findings revealed IHD with critical TVD and had advised for early CABG procedure. The Colour Doppler examination of carotid arteries dated 14th December 2020 showed multiple atherosclerotic fatty and calcified plaques at bilateral carotid bulb and proximal internal carotid arteries with mild left proximal internal carotid artery stenosis of 30% to 40%.

Patient underwent Off-pump CABG with 3 grafts surgery on 15th December 2020. After operative procedure patient was shifted to Surgical Intensive Care Unit (SICU) in stable hemodynamic condition with minimal inotropic support. Patient was extubated on the same day. His early physiotherapy management was started on 16th December 2020, post operative day 1.

Physiotherapy management:

The pre-operative cardiac rehabilitation was given to the patient prior to CABG surgery in the form of Chest Physiotherapy. Patient has advised for breathing exercises and incentive spirometry in order to improve the efficiency of ventilation, to decrease the work of breathing, and to improve gas exchange and oxygenation and also to prevent

postoperative pulmonary complications. The breathing exercises comprised of diaphragmatic breathing, costal breathing and thoracic expansion exercises. Patient was able to perform incentive spirometry upto 1500 cc per operative.

The post-operative cardiac rehabilitation comprised of Chest physiotherapy, Limb physiotherapy and Mobilization from early intensive care until discharge period of a 1 week hospital stay. (Table 1)

Table 1: Post operative physiotherapy management in CABG surgery (POD 0-POD 5)

Post Operative Day	Physiotherapy interventions		
	Chest PT	Limb PT	Mobilization
POD 0	Use of chest binder Breathing exercises Splinted coughing with expectoration Incentive spirometry (250 cc/ml)	Active assisted ROM exercises for upper and lower extremities	
POD 1	Use of chest binder Breathing exercises Splinted coughing Incentive spirometry (250 cc/ml)	Active ROM exercises for upper and lower extremities	Bed mobility: Edge of bed (EOB) sitting
POD 2	Use of chest binder Breathing exercises Incentive spirometry (500 cc/ml)	Active ROM exercises for upper and lower extremities Strengthening exercises for upper and lower extremities	Out of bed mobilization: EOB sitting, standing, chair sitting
POD 3	Use of chest binder Breathing exercises Incentive spirometry (500 cc/ml)	Active ROM exercises for upper and lower extremities Strengthening exercises for upper and lower extremities	Out of bed mobilization: EOB sitting, standing, chair sitting Ambulation: Walking 2 rounds with minimal support

POD 4	Use of chest binder Breathing exercises Incentive spirometry (750 cc/ml)	Active ROM exercises for upper and lower extremities Strengthening exercises for upper and lower extremities	Out of bed mobilization: EOB sitting, standing, chair sitting Ambulation: Walking 4 rounds independently
POD 5	Use of chest binder Breathing exercises Incentive spirometry (1000 cc/ml)	Active ROM exercises for upper and lower extremities Strengthening exercises for upper and lower extremities	Out of bed mobilization: EOB sitting, standing, chair sitting Ambulation: Walking 5 rounds independently Stair climbing: 2 flights of stair

Chest physiotherapy:

Chest physiotherapy includes breathing exercises, various coughing techniques and assistive devices.

1. Use of chest belt/binder: This is mainly for sternal precaution. It provides continuous and firm support without inhibiting free breathing. It also support during cough, sneeze and mobilization.
2. Splinted coughing and huffing: The main purpose of splinting is to minimize pain while moving and coughing. Coughing encourage expectoration of mucus and secretions that accumulate in the airways. Fowler's or upright sitting position allows increased diaphragmatic excursion secondary to downward shift of internal organs from gravity. Splinting by holding a pillow firmly over the incision supports the surrounding tissues and reduces pain during coughing.^[2]
3. Breathing exercises: Diaphragmatic breathing exercises are designed to improve the efficiency of ventilation, decrease the work of breathing, increase the excursion of the diaphragm, and improve gas exchange and oxygenation. It aids in bronchial hygiene, prevent accumulation of secretions, mobilization of these secretions and improve cough mechanism.^[3] Costal breathing concentrates on ventilation to specific areas of lungs. Technique can be localized to any involved segments of the lung. Mainly it consists of thoracic expansion exercises, segmental breathing exercises and lateral costal breathing exercises.
4. Incentive spirometry: It is a standardized pulmonary hygiene regimen. (Figure 1) It helps to prevent post operative pulmonary complications. It is important for strengthening of inspiratory muscles of respiration. And it also reduces the hospital stay.^[4]



Figure 1: Use of Incentive Spirometer

Limb physiotherapy:

1. Range of motion exercises: Active ROM exercises for upper and lower extremities in bed. Shoulder: flexion, extension, abduction, adduction, internal and external rotation. Elbow: flexion and extension. Hand and Wrist: flexion and extension. Hip and Knee: flexion, extension, abduction, adduction. Ankle and foot: flexion, extension and foot circling. Each joint motion was performed 3 times. (Figure 2a and 2b)



Figure 2a: ROM exercises for Upper Extremity



Figure 2b: ROM exercise for Lower Extremity

2. Strengthening exercises: Strengthening exercises for upper and lower extremities were done. Resisted exercises were done for upper and lower extremities.
3. Foot care in diabetes: Foot ulcers are common in diabetics as the main cause is diabetic peripheral arterial disease accelerated by direct damage to the nerves and blood vessels by high blood glucose levels. And thus wound healing is also impaired from affected collagen synthesis.^[5] Thus the proper foot care in important in diabetic patients.

Mobilization:

1. Bed mobility: Early mobilization was started by taking a patient getting in and out of bed. Starting from edge of bed sitting from post operative day 2 the patient was taken out of bed mobilization.
2. Room ambulation: Further progression was made from sitting on edge of bed to standing and chair sitting to walking in the room.
3. Ambulation: From independent walking patient was progressed to stair climbing. (Figure 3a and 3b)



Figure 3a and 3b: Stair climbing

DISCUSSION:

The main purpose of physiotherapy after cardiac surgery is emphasize as preventing and treating post operative complications, improving pulmonary function and encouraging physical activity.^[6] In this case study of post operative CABG surgery the physiotherapy management focused on early rehabilitation within ICU set up in the form of chest and limb physiotherapy along with early mobilization. Patient was independent in his ADL's by post operative day 6 and thus got discharged from the hospital. The further cardiac

rehabilitation was explained by means of long term goals to improve his cardiac endurance and quality of life.

CONCLUSION:

The early physiotherapy management is effective in CABG surgery to prevent the post operative complications and to improve the cardiac endurance.

Conflict of interest:

There are no conflicts of interest.

REFERENCES:

1. Fahrion C, Barg R, Mayfield R. Coronary Artery Bypass Grafting. UCSF Cardiac Surgery. Department of Surgery, University of California. 2020
2. Pryor JA, Prasad AS. Physiotherapy for respiratory and cardiac problems: adults and paediatrics. 4th edition. Edinburgh: Churchill Livingstone. 2008
3. Renault J, Costa-Val R, Rossetti M, Hourri Neto M. Comparison between deep breathing exercises and incentive spirometry after CABG surgery. Rev Bras Cir Cardiovasc. 2009;24(2):165-172
4. Overend TJ, Anderson CM, Lucy SD, Bhatia C, Jonsson BI, Timmermans C. The effect of incentive spirometry on postoperative pulmonary complications: a systematic review. Chest. 2001;120(3):971-8.
5. Weledji E, Fokam P. Treatment of the diabetic foot- to amputate or not?. BMC Surgery. 2014;14:83
6. Westerdahl E, Moller M. Physiotherapy-supervised mobilization and exercise following cardiac surgery: a national questionnaire survey in Sweden. Journal of Cardiothoracic Surgery. 2010;5:67