

Case Report

BRONCHOPLEURAL FISTULA-THE ROLE OF PHYSIOTHERAPY REHABILITATION: A CASE REPORT

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ABSTRACT

Purpose: Bronchopleural fistula is a commonest complication developed in post-traumatic cases and the management of which is still a challenge due to lack of scientific evidence. The purpose of this case report is to investigate the effects of physiotherapy treatment in management of patients with bronchopleural fistula.

Case Description: A 20-year-old man met with a road traffic accident following which he was diagnosed with hemopneumothorax and ICD was placed. Continuous removal of ICD over 3 to 4 times by patient himself in unconscious state lead to the development of bronchopleural fistula.


Results: The patient was seen for 15 sessions over 3 weeks period (5 days per week). At discharge, his Functional status score in ICU (FSS-ICU) was 35. He was able to complete exercise tolerance test in 6-minute time interval with 540 meters of distance involving 10 laps with single rest pause during 4th minute.

Discussion: Though bronchopleural fistula is considered as a relative complication of physical therapy; this case report suggests that with appropriate care physical therapy along with other medical management team can help to cure it and improve patient's functional status as well as his quality of living.

KEY WORDS: Bronchopleural fistula, Surgical Intensive Care Unit, Glasgow Coma Scale, Active Cycle of Breathing Technique, Functional Status Score in ICU, Saturation of Oxygen.

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INTRODUCTION

Bronchopleural fistula is a sinus tract between the bronchus and the pleural space[1]. It is generally uncommon however a dreaded complication of several pulmonary conditions[2]. BPF conveys a high grimness and mortality and is related with prolonged hospital stay and high resource utilization [2] with death rates between 18% to 67%[1].

The administration of BPF is a standout amongst the most unpredictable difficulties experienced by the chest physician[1].

BPF is as yet a test for all the medical fraternity as the logical proof for management of BPF is missing, with a few remedial alternatives that run from preservationist treatments to forceful surgeries, which can be very crippling[2].

Physiotherapy in treating bronchopleural fistula is not yet established as it is considered to be a relative contraindication to physiotherapy treatment.

The purpose of this case report is to investigate the scope of physiotherapy administration in the management of BPF as it has never been concentrated before.

CASE REPORT

A 20-year-old man was brought to the casualty in gasping and unconscious state with associated history of road traffic accident. The patient had a history of head injury with chest and abdominal trauma along with history of vomiting and loss of consciousness. On examination, the patient was in an unconscious state with Glasgow coma scale score 3 out of 15. The air entry was reduced on right side of the chest. Immediately, patient was intubated in emergency due to nonrecordable pulse and low GCS with saturation of oxygen 60% on room air. CT scan of brain revealed cerebral edema with fracture of right orbital and right frontal lobe. Chest x-ray suggested right sided hemopneumothorax. Following which emergency ICD insertion done with informed consent of relatives. ICD was inserted on right side of the chest in the 5th intercostal space in the mid axillary line with 200ml of blood drained out immediately. Chest movement was present and the saturation of oxygen was improved from 60% to 98% on CMV mode (volume control) with 5 PEEP, 400ml of tidal volume, heart rate 120/minute, respiratory rate 36 breaths/minute. The patient was then shifted to Surgical Intensive Care Unit (SICU).

In SICU, along with medical management physiotherapy treatment also started which included abdominal PNF, postural drainage, positioning. For next two days patient was on ventilator out of which on 1st day he was on CMV mode (volume control) with 4 PEEP, 450 ml of tidal volume, heart rate 96 beats/minute, respiratory rate 30 breaths /minute and on 2nd day he was put on SIMV mode due to improvement in his status with 3 PEEP, 400 ml of tidal volume, heart rate 96 beats/minute, respiratory rate 30 breaths /minute which was followed by extubation on 4th day.

On 5th day of Surgical Intensive Care Unit (SICU) stay there were evident bubbling movement was noticed in the ICD bag which was suggesting bronchopleural fistula. This was due to continuous removal of ICD over 3 to 4 times by patient himself in his unconscious state lead to the development of bronchopleural fistula.

Along with medical management i.e. dependent drainage and reduction of the pleural space, antibiotics, nutritional supplementation simultaneously physical therapy management continued further. The limitation of physiotherapy treatment is due to significant drowsiness (GCS – 10); however objective evaluation revealed SpO₂ of 100% on 12L of oxygen (O₂), spontaneous breathing via oxygen mask with use of sternocleidomastoid muscle for breathing with I: E ratio 1:1. Intercostal drain was placed in 5th intercostal space on right side and bruises present over the right arm and right side of head. Grade 3 tenderness was present around the intercostal drain insertion with mild swelling and warmth around it. On examination, chest excursion was more on the left side than right side with tactile vocal fremitus decrease on left side. Percussion notes were reduced in resonance over the right side as compare to left side of the lung. Reduced air entry in all the zones of lung bilaterally in anterior, posterior and lateral segment with foreign sound of crepitation present in the middle and lower lobes anteriorly on auscultation. Conventional radiograph then suggested haziness over the right side of the lung which was suggestive of health care pneumonia.

Level of functional impairment was measured on a day before physiotherapy treatment using functional status score in ICU (FSS-ICU). Total score attained by patient was 3 out of 35 at the time of admission in the ICU which includes rolling with moderate support.

The rehabilitation programmed in the ICU included positioning the patient on quarter turn to left side. The main purpose was to prevent respiratory complications and improve bronchial hygiene. Along with the positioning abdominal PNF was given to the patient to enhance the lung capacity and volume along with reduction in respiratory rate. Main emphasis was given to deep breathing exercises in the ICU phase such

as diaphragmatic breathing with 5 repetitions started in bed, later it was incorporated with the thoracic expansion exercises where active movements of upper limb was emphasized with deep breaths during prolonged inspiration as well as expiration. Lung expansion maneuvers for all the segments of upper middle and lower zones were started initially on bed with 5 repetition TDS and then slowly were progressed and were incorporated with the movements of upper limb and lower limb, this deep breathing exercises helped in developing the patient lung capacity and the perfusion of gases. Lung expansion maneuver using upper limbs and secretion removal maneuver involving ACBT with assisted huffing has been taught to the patient. This was gradually progressed with increased level of repetition. On the 3rd day of physiotherapy treatment after development of BPF, bedside mobilization started which included supine to sit transfer with minimal assistance, unsupported sitting at bedside under supervision and sit to stand transfer starting with moderate support (FSS-ICU Score- 12). This was then gradually progressed to minimal support followed by complete independence.

The mobility exercise of the extremities helped in building up and improving the functional independence of the patient and improved the proprioception and joint mobility and strengthen the muscles. Lower extremity mobility exercises helped in preventing circulatory complication. ICD removed on the 5th day and ambulation was started with minimal assistance. The patient completed one round in the ICU of about 200 meters with 1 rest pause in between as he was feeling too weak and moderate breathless (score 3 according to modified Borg scale). Ambulation and other physiotherapy exercises which incorporated earlier were also given. On 7th day, patient shifted from ICU to general surgical ward.

Before shifting to the general surgical ward, the functional level scored in ICU (FSS-ICU) was calculated which came 25 out of 35 with patient doing complete supine to sit transfer and unsupported sitting with complete independence, sit to stand transfer with moderate independence and ambulation under supervision.

In wards the focus was mainly on improving the

aerobic capacity and endurance level of patient.

After discharge, on telephonic conversation the follow up was continued for 3 weeks post discharge from the hospital. The patient was advised to progressed with exercises including both aerobic and endurance training every after 1 week. Along with aerobic and endurance training, the patient was also trained for all his functional activities as well.

DISCUSSION

Emerging evidence suggest that early mobilization of critically ill patients is useful and it should be incorporated securely into daily in intensive care units (ICU) [4], as it decreases the functional deterioration and improves functional outcomes [5]. But there is less evidence in the literature for diagnosis and management of bronchopleural fistula and also no evidence that support efficacy of physiotherapy in chest trauma cases that develop complications such as bronchopleural fistula as it is considered as relative complication of physiotherapy.

We have found that patients who present with a BPF growing late or the individuals who build up the fistula as an entanglement of suppurative pleuropulmonary diseases are primarily managed medically which incorporates subordinate drainage and decrease of the pleural space, antibiotics, nutritional supplementation and adequate ventilator management if ventilated [1].

The first principle of therapy is to address any immediate, life-threatening conditions, such as endobronchial contamination, pulmonary flooding and tension pneumothorax. This is accomplished by placing the patient with the affected side dependent and performing adequate pleural drainage [1], as it helps in rapid and sustained improvement in oxygenation thatwith positioning, deep breathing exercises and chest PNF, we found a great improvement in patient's cardiopulmonary status following spirometry result in enhancement in patient's respiratory muscle strength. Aerobic training help in enrichment of functional performance, exercise capacity, and quality of life in patient. It helped in faster recovery in spite of patient having bronchop-leural fistula, as bronchopulmonary fistula is considered to be a relative

contraindication physiotherapy treatment.

Studies with controlled methods are necessary to offer guidance for physiotherapists to manage bronchopleural fistula. Because of the low prevalence, case studies allow researchers and clinicians to present informative facts to help others deal with such conditions.

CONCLUSION

Although physiotherapy alone cannot help to cure such condition but along with medical management it can help to cure further complications of bronchopleural fistula and also improves patient's pulmonary health.

ABBREVIATIONS

Intensive care unit (ICU),
Bronchopleural fistula (BPF),
Functional status score (FSS-ICU),
Intercostal drain (ICD),
Active cycle of breathing technique (ACBT),
PNF (Proprioceptive neuromuscular facilitation),
3 times a day (TDS),
Glasgow coma scale (GCS),
Surgical intensive care unit (SICU),
Computed tomography (CT),
Continuous mandatory ventilation (CMV),
Positive end expiratory pressure (PEEP),
Synchronized intermittent mechanical ventilation (SIMV),
Saturation of oxygen (SPO₂).

Conflicts of interest: None

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