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Role of chest physiotherapy in pulmonary disorders: A case study

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Abstract

Background: Pneumothorax is defined as the presence of air in the pleural space. Although intrapleural pressures are negative throughout most of the respiratory cycle ^[1]. Bronchiectasis is a chronic respiratory disease characterised by a clinical syndrome of cough, sputum production and bronchial infection, and radiologically by abnormal and permanent dilatation of the bronchi ^[2]. The process begins with inflammatory damage to the bronchial walls, which then stimulates the formation of excess thick mucus ^[4]. Asthma is a condition of acute, fully reversible airway inflammation, often following exposure to an environmental trigger. The pathological process begins with the inhalation of an irritant (e.g., cold air) or an allergen (e.g., pollen), which then, due to bronchial hypersensitivity, leads to airway inflammation and an increase in mucus production. This leads to a significant increase in airway resistance, which is most pronounced on expiration. The classical symptoms of asthma are wheeze, shortness of breath, chest tightness or difficulty breathing and cough. In this case study we are discussing the main goal of physiotherapy after the diagnosed combined condition to prevent the further deterioration of the lungs and to enhance the well-being along with promoting the quality of life by boosting the functions of lung by the means of chest physiotherapy in which the early and gradual progression of physiotherapy protocol is effective to prevent the worsening of the conditions.

Methodology: This is a single case report to study the effectiveness of physical therapy intervention on physiological outcome in a patient with bronchial asthma. And we included the tests as follows.

1. Short physical performance battery test [SPPB]
2. Peak expiratory flow rate test [PEFR]
3. 6 minute walk test

Conclusion: Physiotherapy plays an important role in terms of the improving quality of life and enhancing the lung functions in the individual who is suffering from combined lung condition. So, the early and gradually progressive physiotherapy protocol is effective in such cases to prevent the worsening of the conditions.

Keywords: Bronchial asthma, Bronchiectasis, pneumothorax, chest physiotherapy, short physical performance battery, pulmonary function test, peak expiratory flow rate

Introduction

Pneumothorax is defined as the presence of air in the pleural space. Although intrapleural pressures are negative throughout most of the respiratory cycle ^[1]. It is classified as spontaneous and non-spontaneous Primary spontaneous pneumothorax (PSP) is defined as the spontaneously occurring presence of air in the pleural space in patients without clinically apparent underlying lung disease ^[3]. It has an incidence of 7.4-18 cases (age-adjusted incidence)/100,000 population per year in males, and 1.2-6 cases/100,000 population per year in females ^[4, 5] Precipitating factors includes atmospheric pressure changes exposure to loud music. Risk factors are male gender and smoking. A multitude of respiratory disorders have been described as a cause of spontaneous pneumothorax ^[1].

Bronchiectasis is a chronic respiratory disease characterised by a clinical syndrome of cough, sputum production and bronchial infection, and radiologically by abnormal and permanent dilatation of the bronchi ^[2]. The process begins with inflammatory damage to the bronchial walls, which then stimulates the formation of excess thick mucus ^[4]. The warm and moist environment of the lungs combines with the mucus to cause further inflammation and obstruction, creating an excellent environment for infection ^[4]. The thick mucus crushes the cilia and causes further damage. The immune response releases toxic inflammatory chemicals, as well as leads to fibrosis and bronchospasm if persistent ^[4].

Bronchiectasis imposes a significant burden on patients with respect to symptoms, lung function, exacerbations and quality of life.

Asthma is a condition of acute, fully reversible airway inflammation, often following exposure to an environmental trigger. The pathological process begins with the inhalation of an irritant (e.g., cold air) or an allergen (e.g., pollen), which then, due to bronchial hypersensitivity, leads to airway inflammation and an increase in mucus production. This leads to a significant increase in airway resistance, which is most pronounced on expiration. The classical symptoms of asthma are wheeze, shortness of breath, chest tightness or difficulty breathing and cough. These symptoms are typically variable and can be absent for long periods of time, with possible episodic exacerbations often triggered by factors such as exercise, allergen or irritant exposure, cold

air or viral respiratory infections. A multifold increase in incidence of bronchial asthma has been reported in the past decade [1]. This increase is attributed mainly by increasing environmental smoke and air pollution due to rapid industrialization of cities [2, 3]. Many previous studies on asthma in India reported an estimated prevalence rate of 2% up to as high as 23%. In sharp contrast to the earlier belief of bronchial asthma to be considered a disease of metro cities, a study reported higher prevalence in rural areas compared with urban areas [12].

Methodology

This is a single case report to study the effectiveness of physical therapy intervention on physiological outcome in a patient with bronchial asthma. The study was conducted at SDM medical college and hospital, Dharwad-Karnataka.

Test

Table 1: Short Physical Performance Battery [SPPB]

	Pre	Post
Repeated chair standing	16.27sec	14.85sec[1 point]
Balance testing	1 point	1 point
a.	1 point	1 point
b.	1 point	1 point
c.	1 point	1 point
Gait speed test	130mts in 6mins 12sec	130mts in 5mins

SPPB: The Short Physical Performance Battery (SPPB) is one of the most commonly used instruments for measuring physical performance in population [1]. The SPPB consists of three subtests: a hierarchical test of balance, a short walk at

usual pace and standing up from a chair five times consecutively. The SPPB can be safely used to assess functional capacity in outpatient and clinical settings [12].

Table 2: Peak Expiratory Flow Rate [PEFR]

	1st trial	2nd trial	3rd trial
Pre	300 l/m	350 l/m	400 l/m
Post	350 l/m	400 l/m	450 l/m

Table 3.6: Minute Walk Test:

	Heart rate	Spo2	Distance	Modified Borg
PRE	104 bpm	99%	310 mts	0.5
POST	103 bpm	100%	310 mts	1

Case Report

A 24 year old male patient came to the OPD complaining of difficulty in breathing, patient gave a history of pneumothorax 8 years back, where he underwent surgical procedure for the same and occurrence of bronchiectasis to development of asthma.

Reports

HRCT

- Hyper inflated lungs fields suggestive of –COPD?
- Bilateral apical pleural thickening

- Areas of minimal tubular bronchiectasis in bilateral lungs mainly in pre hilar area with few mediastinal lymph nodes-? Infective aetiology.

Plain CT- Chest

- No evidence of pneumothorax in present study.
- Few small focal fibrotic changes noted in bilateral apical regions.
- Mild hyperinflation/mild emphysematous changes in bilateral lung parenchyma.

Table 4: Pre and Post PFT Reports:

Parameters	Pred	LLN	Pre-best	Trial 8	%Pred	Post-best	Trial 5	%Pred	%Chg
FCV[L]	4.26	3.46	4.91	4.90	115	4.67	4.60	110	-5
FEV1[L]	3.59	2.84	3.20	3.20	89	3.14	3.14	87	-2
FEV1/FVC	0.840	0.730	0.653*	0.653*	78	0.674*	0.684*	80	3
FEF25-27[L/s]	4.36	2.41	2.01*	2.01*	46	2.07*	2.07*	48	3
PEF[L/s]	9.02	-	6.57	6.75	73	7.30	7.30	81	11
FET[L/s]	-	-	6.4	6.4	-	6.4	6.4	-	0
FIVC[L]	4.26	3.46	5.03	5.03	118	4.96	4.85	116	-1
PIF[L/s]	-	-	7.02	5.58	-	6.16	6.16	-	-12

System Interpretation: Pre – Mild Obstruction

Post-Mild Obstruction

Pulmonary function tests: In general, pulmonary function testing is employed to measure lung volumes, bronchial obstruction, gas exchange, lung compliance and ventilator obstruction. Pulmonary function tests (PFTs) provide important quantitative information about lung function and can be used to elucidate pathologic conditions responsible for respiratory symptoms, assess the severity and course of disease, and evaluate the patient for suitability and timing for lung transplantation.

Intervention

Procedure

Patient who consulted physiotherapy department was enrolled in the study after obtaining written informed consent.

In this Institutional setting, patient underwent chest physiotherapy for 6 weeks on OPD basis. On Day 1 Patient performed breathing exercises such as deep breathing exercise, diaphragmatic breathing exercise, along with pectoral stretch, prone on elbow for back strengthening, chin tucks, thoracic expansion exercise, and balloon blowing exercise.

On Day 2 when patient visited OPD was made to perform same exercises as day. Patient performed all these exercises for 5 repetitions. He was told to continue same at home for 1 week, all the exercises 3 times a day with 5 repetitions each, and was informed to follow up after 1 week.

When he visited after 1 week all the previous exercises were revised and necessary modifications were made along with that new exercises such as FET's, butterfly exercises, unilateral thoracic expansion was taught and added to exercise regime. All the exercises were done for 10 repetitions each and were told to repeat same at home for 3 times a day and follow up after 1 week was advised. In the first week of follow up chest expansion measurement was taken and the results are mentioned below.

Table 5: Chest Expansion Measurement Values in 1st Week:

	Pre	Post
Axillary level	2 cm	2 cm
Nipple level	1 cm	1 cm
Xiphisternal level	1 cm	1 cm

During his 2nd week follow up after examination and looking at improvement new breathing exercises like air shift technique and buteyko's were taught along with the revision of previous exercises for repetitions of 10 times each exercise. Then again he was told to follow up on weekly basis.

On the day of 3rd week follow up previous exercises were revised and was advised few more exercises such pursed lip breathing, box breathing, postural drainage, inspiratory and expiratory holds along with incentive spirometer.

Strengthening exercises for upper limb with ½ kg weight, 5 repetitions was started from his 4th week follow up along with the revision of previous exercises. And was told to continue same at home for 2 week 3 times a day and follow up after that. In the 4th week of follow up 6 minute walk test was done, patient covered distance of 130 mts and the results are mentioned in table-3.

When patient followed up after 2 weeks he was taught endurance exercises were taught. And in the 6th week of

follow up chest expansion measurement was taken again, and results as follows.

Table 6: Chest Expansion Measurement Values in 6th Week:

	Pre	Post
Axillary level	2 cm	2 cm
Nipple level	1 cm	1 cm
Xiphisternal level	1 cm	1 cm

Discussion

The main goal of physiotherapy after the diagnosed combined condition was to prevent the further deterioration of the lungs and to enhance the well-being along with promoting the quality of life by boosting the functions of lung.

In this case study physiotherapy management focused on both by improving the inspiratory and expiratory airflow in the form of chest, upper-limb, back-strengthening physiotherapy.

Each and every exercises repetition was gradually increased in every follow up sessions by keeping in mind the progression of condition. Endurance exercises were given for upgrading the health of the individual.

Follow up session up to 6 weeks was achieved.

The limitation of the study was that it was a single case study and couldn't be called for the further follow up to 8th or 12th weeks.

Future research may include large sample populations, long-term follow-up.

Conclusion

Physiotherapy plays an important role in terms of the improving quality of life and enhancing the lung functions in the individual who is suffering from combined lung condition. So, the early and gradually progressive physiotherapy protocol is effective in such cases to prevent the worsening of the conditions.

References

1. Noppen M, De Keukeleire T. Pneumothorax. *Respiration*. 2008;76(2):121-7.
2. Smith MP. Diagnosis and management of bronchiectasis. *CMAJ*. 2017;189(24):E828-35.
3. Bhalla K, Nehra D, Nanda S, Verma R, Gupta A, Mehra S. Prevalence of bronchial asthma and its associated risk factors in school-going adolescents in Tier-III North Indian City. *Journal of family medicine and primary care*. 2018;7(6):1452.
4. Behr J, Furst DE. Pulmonary function tests. *Rheumatology*. 2008;47(suppl_5):65-7.
5. Gómez JF, Curcio CL, Alvarado B, Zunzunegui MV, Guralnik J. Validity and reliability of the Short Physical Performance Battery (SPPB): a pilot study on mobility in the Colombian Andes. *Colombia medica*. 2013;44(3):165-71.
6. Bush A, Floto RA. Pathophysiology, causes and genetics of paediatric and adult bronchiectasis. *Respirology*. 2019;24(11):1053-62.