ORIGINAL ARTICLE

Frequency of Obstructive Pattern of Spirometry in Bronchiectasis Patients

HAFIZA SHAFIA NAZ, M IRFAN MALIK*, JAVED IQBAL**

ABSTRACT

Aim: To determine the frequency of obstructive pattern of spirometry in bronchiectasis patients.
Methods: This descriptive case series study was conducted in the indoor and outdoor Department of Pulmonology, LGH, Lahore from January 2014 to July 2014. Sixty cases of bronchiectasis were included in this study. On the day of the study, spirometry was performed and values of FEV_1, FVC, FEV_1 /FVC were noted. Then these patients were nebulized with 2.5mg salbutamol. After 15 minutes spirometry was performed again and values of the above given parameters were noted. When FEV_1 was less than 80% of predicted and FEV_1/FVC value was less than 70% the spirometry was considered as obstructive pattern. Post bronchodilator improvement in FEV_1 and/or FVC was noted. Improvement of 12% in FEV_1 from pre-bronchodilator value was considered as post bronchodilator reversibility.
Results: The mean age of the patients was 39.4±14.4 years. There were 34(56.7%) male patients and 26(43.3%) female patients. The mean weight of the patients was 52.1±13.3kg. The mean height of the patients was 156.3±9.5 cm. There were 34(56.7%) patients with obstructive pattern and 26(43.3%) had non obstructive pattern. There were 24(40%) patients who had reversibility and 36(60%) had no reversibility.
Conclusion: It is concluded that 34(56.7%) patients had obstructive pattern of spirometry and 24(40%) patients had reversibility with short acting beta-2 agonist.
Key words: Bronchiectasis, obstructive pattern, spirometry, short acting ß-2 agonist.

INTRODUCTION

Bronchiectasis is permanent abnormal dilatation of bronchi and bronchioles.[1] As the disease progresses, the process involves bronchioles and even much smaller airways[2]. Exact prevalence of bronchiectasis is not known. It is very badly studied disease[3] especially in our part of world. High resolution CT (HRCT) scanning has become definitive diagnostic test for bronchiectasis[4]. Pulmonary function tests are used for functional assessment of impairment due to bronchiectasis. Obstructive impairment (i.e. reduced FEV_1, low FVC and low FEV_1/FVC ratio) is most frequently seen on pulmonary function tests[5]. In bronchiectasis, 50% patients showed obstructive pattern and 39% patients showed significant reversibility with short-acting beta-2 agonist in obstructive pattern[6].

Presence of a restrictive defect (FEV_1/FVCratio >70% along with a reduction in FVC <80% of predicted values) is seen in only few cases and it indicates presence of significant atelectasis (due to mucus plugging), fibrosis (scarring resulting from chronic inflammation) or consolidation (commonly due to infection). A very low FVC can also be seen in advanced disease in which much of the lung has been destroyed. Reversibility testing i.e. features of improvement in FEV_1 and / or FVC after the administration of inhaled bronchodilator, means that chance of improvement with inhaled bronchodilator is there. Most of the people with bronchiectasis show features of airways hyper responsiveness.[7] Studies are very limited and it is thought to be reemergence of old concept now. In the past, studies have demonstrated about >15% improvement in FEV_1 in >40% of cases of bronchiectasis after administration of a beta adrenergic agonist.[8]

METHODOLOGY

This descriptive case series study was conducted in the indoor and outdoor Department of Pulmonology, LGH, Lahore from January 2014 to July 2014. Total 60 patients of both gender having age from 15-80 years with clinically and radiologically diagnosed cases of bronchiectasis were included in this study. Patients with history of smoking or ex-smoker, patients with history of acute infective exacerbation during the past four weeks and patients with associated respiratory disease, diagnosed case of interstitial lung disease (ILD), chronic obstructive lung disease (COPD) and bronchial asthma on HRCT were excluded from the study.

On the day of the study, spirometry of the patient was performed and values of FEV_1, FVC, FEV_1/FVC were noted in Performa to detect frequency of obstructive pattern of spirometry. Then these patients were nebulised with 2.5mg salbutamol.

Salbutamol respiratory solution (5mg/ml) ½cc and ½cc normal saline was used for nebulization. After 15 minutes spirometry was performed again and values of the above given parameters were noted in the Performa by researcher himself.

When FEV_1 is less than 80% of predicted and FEV_1/FVC value is less than 70%, the spirometry was considered as obstructive pattern. Post bronchodilator improvement in the FEV_1 and/or FVC was noted. Improvement of 12% in FEV_1 from pre-bronchodilator value was considered as post bronchodilator reversibility. All this information was collected through a specially designed Performa attached.

The collected data was entered into SPSS computer program version 11.0 and analyzed. Mean and standard deviation was calculated for quantitative variables like age, weight and height. Frequency and percentages was calculated for qualitative variables like obstructive spirometry.

RESULTS

The detail of results is given in tables 1,2 and 3. The mean predicted, pre-bronchodilator, percentage predicted and post- bronchodilator of FEV1, FVC, FEV1/FVC, PEFR and FEF25-75 were given in table 3. In the distribution of patients by obstructive pattern, 34 (56.7%) patients had obstructive pattern and 26 (43.3%) had non obstructive pattern (Fig 2).

Table 1: Weight distribution (n=60)

Weight (Kg)	n	%age
30-40	10	16.7
41-50	22	36.7
51-60	14	23.3
61-70	6	10.0
71-80	6	10.0
81-90	2	3.3
Mean± SD	52.1±13.3	

Table 2: Height distribution (n=60)

Height (cm)	n	%age
131-140	2	3.3
141-150	18	30
151-160	18	30
161-170	20	33.3
171-180	2	3.3
Mean± SD	52.1±13.3	

Fig 1: Age distribution (n=60)

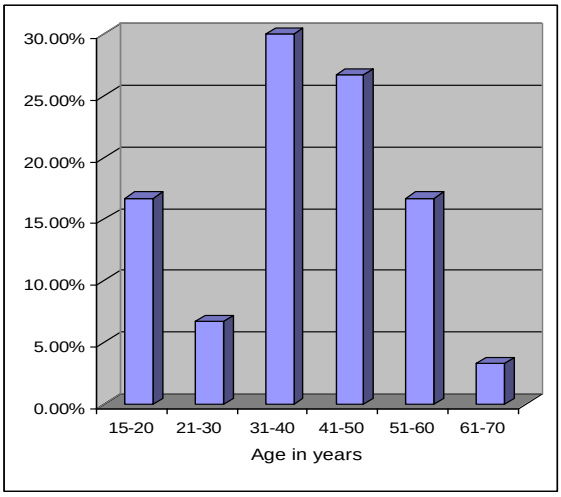

Fig 2: Distribution of patients by obstructive pattern (n=60)

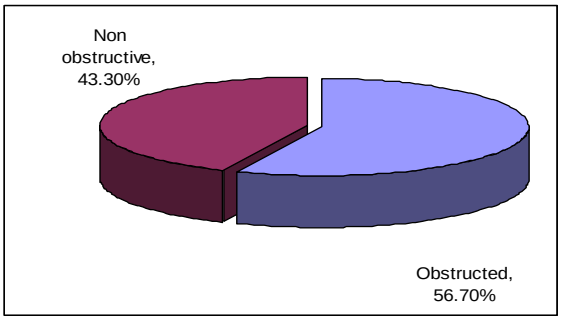

Table 3: Distribution of mean outcome of spirometry (n=60)

Outcome of spirometry	Predicted	Pre-bronchodilator	% Predicted.	Post-bronchodilator
FEV1	2.5±0.6	1.2±0.6	48.5±23.0	1.4±0.6
FVC	3.2±0.9	1.8±0.6	56.6±21.3	1.9±0.7
FEV1/FVC	82.4±9.9	66.9±14.6	76.2±21.9	71.5±15.2
PEFR	419.5±84.2	148.2±64.3	38.1±16.6	188.2±132.9
FEF25-75	3.6±0.6	1.0±0.6	29.2±19.2	1.2±0.7

DISCUSSION

Bronchiectasis is an uncommon disease that results in the abnormal and permanent distortion of one or more of the conducting bronchi or airways, most often secondary to an infectious process.[9] Bronchiectasis is permanent abnormal dilatation of bronchi and bronchioles[10]. As the disease progresses, the process involves bronchioles and even much smaller airways[11]. Exact prevalence of bronchiectasis is not known. It is very badly studied disease[3] especially in our part of world[12]. High resolution CT (HRCT) scanning has become definitive diagnostic test for bronchiectasis[13]. Pulmonary function testing is used for functional

assessment of impairment due to bronchiectasis. Obstructive impairment (i.e. reduced FEV_1, low FVC and low FEV_1/FVC ratio) is the most frequent funding seen on pulmonary function testing. In bronchiectasis, 50% patients showed obstructive pattern and 39% patients showed significant reversibility with short-acting beta-2 agonist in patients[14].

In our study the mean age of the patients was 39.4±14.4 years. As compared with the study of Walker et al[15] the mean age of the patients was 53±14 years. In another study conducted by Sevgili et al[16] the mean age of the patients was 48.9±14.3 years, which is comparable with our study. In our study there were 56.7% male and 43.3% female patients. As compared with the study of Walker et al[15], there were 44% males and 56% females . In another study conducted by Sevgili et al[16] there were 60% male and 40% female which is comparable with our study. In our study, 56.7% patients had obstructive pattern positive. As compared by King et al[6] 50% patients showed obstructive pattern with short-acting beta-2 agonist in patients with bronchiectasis which is comparable with our study.

CONCLUSION

It is concluded that 56.7% patients had obstructive pattern of spirometry and 40% patients had reversibility with short acting beta-2 agonist.

REFERENCES

1. Jan JA, Anwar M, Saleem N, Ali M, Hafiz M, Anjum. Bronchiectasis sicca: A case report. Pak J Med Sci 2003; 19: 128-31.
2. Bilton D. Bronchiectasis. Oxford textbook of medicine. 4th ed. New York: Oxford University Press; 2005: 421.
3. Frey JG. Bronchiectasis – a reemerging disease. Rev Med Suisse 2007; 3: 477-8.
4. Anne E, O'Donnell. Bronchiectasis. Chest 2008; 134: 815-23.
5. Seaton D. Bronchiectasis. Anthony Seaton, Douglas Seaton A. Gordon Leitch. Crofton and Douglas's respiratory disease. 5th ed. London: Blackwell Science; 2000: p. 808.
6. King PT, Holdsworth SR, Freezer NJ, Villanueva E, Holmes PW. Characterization of the onset and presenting clinical features of adults bronchiectasis. Respir Med 2006; 100: 2183-9.
7. Williams N. bronchiectasis: a study centred on Bedford and its environs. BMJ 1953;1:1194-9.
8. Pang J, Chan HS, Sung JY. Prevalence of asthma, atopy and bronchial hyp0r-reactivitiy in bronchiectasis: a controlled study. Thorax 1989; 39: 179-84.
9. Nursing Diagnosis Nanda: Diagnosis of Bronchiectasis [Internet]. Nursing Diagnosis Nanda. 2011 [cited 2014 Jul 14]. Available from: http://nursing-diagnosis-nanda.blogspot.com/2011/04/diagnosis-of-bronchiectasis.html
10. Bronchiectasis. 2014 Mar 31 [cited 2014 Jul 14]; Available from: http://emedicine.medscape.com/article/296961-overview.
11. Guidotti TL, Prezant D, Hoz RE, Miller A. The evolving spectrum of pulmonary disease in responders to the World Trade Center tragedy. Am J Ind Med. 2011 Sep 1;54(9):649–60.
12. Stick SM, Brennan S, Murray C, Douglas T, von Ungern-Sternberg BS, Garratt LW, et al. Bronchiectasis in Infants and Preschool Children Diagnosed with Cystic Fibrosis after Newborn Screening. The Journal of Pediatrics. 2009 Nov;155(5):623–628.e1.
13. Klein JS, Gamsu G, Webb WR, Golden JA, Müller NL. High-resolution CT diagnosis of emphysema in symptomatic patients with normal chest radiographs and isolated low diffusing capacity. Radiology. 1992 Mar 1;182(3):817–21.
14. Habesoglu MA, Ugurlu AO, Eyuboglu FO. Clinical, radiologic, and functional evaluation of 304 patients with bronchiectasis. Ann Thorac Med. 2011;6(3):131–6.
15. Walker PP, Mitchell P, Diamantea F, Warburton CJ, Davies L. Effect of primary-care spirometry on the diagnosis and management of COPD. Eur Respir J. 2006 Nov 1;28(5):945–52.
16. Sevgili S, Hasanoaylu HC, Karalezli A, Er M. Bronchial reversibility in the patients with bronchiectasis. Tuberk Toraks 2009; 57: 38-47.