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A CROSS-SECTIONAL STUDY ON IMPORTANCE OF ECHOCARDIOGRAPHIC EVALUATION IN CHRONIC OBSTRUCTIVE PULMONARY DISEASE PATIENTS IN A TERTIARY CARE CENTRE.

Medicine

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ABSTRACT

Background: COPD is a powerful and independent risk factor for cardiovascular morbidity and mortality.The aim of this study is to find echocardiographic changes in COPD patients and compare with the disease severity. **Methods:**Sixty patients of COPD fulfilling the inclusion & exclusion criteria coming to the Sterling Hospital, Ahmedabad were recruited. They were staged by pulmonary function test and evaluated by echocardiography. Statistical analysis was done with chi square test &statistical significance was taken $p<0.05$. **Results:** Most common echocardiographic finding was Pulmonary hypertension (57%). Cor pulmonale was observed in 53% cases. 45% had features of RV dilatation, 43% had RVH, 42% had features of RA dilatation.All echocardiographic findings of RV dysfunction were significantly associated with disease severity. **Conclusion:** PH and Cor pulmonale are an underdiagnosed entity that frequently complicates the course of disease in COPD patients. This study puts emphasis on early cardiac screening by Echocardiography of all COPD patients which will be helpful in the assessment of the prognosis.

KEYWORDS

Cor pulmonale, Echocardiography, RV dysfunction.

INTRODUCTION

Chronic Obstructive Pulmonary Disease is a major cause of chronic morbidity and mortality throughout the world.COPD accounts for a substantial number of visits to general physician, emergency department, hospital admissions and also a cause for frequent absence from work [1].The GOLD, a project initiated by the National Heart, Lung, and Blood Institute (NHLBI) and WHO, defines COPD as follows: "COPD is a common, preventable, and treatable disease that is characterized by persistent respiratory symptoms and airflow limitation that is due to airway and/or alveolar abnormalities usually caused by significant exposure to noxious particles or gases"[2].Cardiovascular disease is a major comorbidity in COPD and probably the most frequent and most important disease co existing with COPD [3].Echocardiography provides a rapid, noninvasive portable and accurate method to evaluate the right ventricle function, right ventricular filling pressure tricuspid regurgitation, left ventricular function and valvular function.[4]

OBJECTIVES:1) To assess the right heart changes secondary to COPD by echocardiography.2)To compare these findings with duration and severity of the disease.

REVIEW OF LITERATURE

From the time of Laennec, et al through the first half of 20th century, mechanical explanations of COPD dominate. Chronic lung disease may cause heart failure even on otherwise normal heart was made at that time. Rao et al[5] concluded that in their echocardiographic study, the right heart parameters were significantly increased when very severe COPD group were compared to moderate and severe and very severe COPD. Jatav et al[6] described that echocardiography is more sensitive in detecting cardiovascular complications in COPD patients. Thus, from above studies, it is clear that Echocardiography helps in early detection of cardiac changes in COPD cases giving time for early interventions. With the increasing prevalence of smoking in developing countries, and aging populations in high- income countries, the prevalence of COPD is expected to rise over the next 30 years and by 2030 there may be over 4.5 million deaths annually from COPD.COPD should be considered in any patient who has dyspnea, chronic cough or sputum production, and/or a history of exposure to risk factors for the disease. Spirometry is required to make the diagnosis in this clinical context[2].Cor pulmonale is defined as an alteration in the structure and function of the right ventricle of the heart caused by a primary disorder of the respiratory system. Pulmonary hypertension is often the common link between lung dysfunction & the heart in cor pulmonale. Echocardiography can be used to assess right ventricular dimensions, wall thickening and right ventricular volume over load in patients with COPD, and also the presence of pulmonary artery hypertension.[7]

METHODS

It was a Hospital based, cross-sectional, observational Study done in sterling hospital, Ahmedabad &sample size was 60. Study was conducted over a period of one year. Patients diagnosed as COPD were screened for inclusion/exclusion criteria. Based on GOLD criteria, patients were classified as mild, moderate, severe, very severe disease based on post bronchodilator spirometric FEV1 >80%, FEV1 <80% to >50%, FEV1 <50% to 30%, FEV1<30% respectively. Echocardiography was done.All collected data by above methods will be appropriately entered in preformed open-ended questionnaire and analyzed.

Inclusion criteria: 1)Age >40 years.2)Cases having the symptoms suggestive of chronic airway obstruction like cough, cough with expectoration for>3 months for 2years duration & exertional dyspnea.3)All patients are subjected to spirometry and presence of COPD will be confirmed by GOLD guidelines.4)Patients are willing to participate in the study.

Exclusion criteria:1)H/O of diagnosed chronic lung disease other than COPD like Interstitial lung disease, Old pulmonary TB, etc.2)Patients with primary cardiac disease like congenital heart disease,rheumaticheart disease,valvular heart disease, Left ventricular dysfunction etc.3)Patients who have poor echo window.

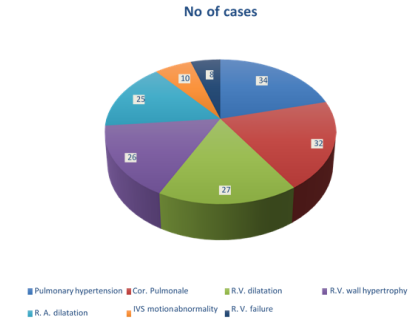
Statistical Methods: The data entry was done in MS excel and analysis was done using SPSS version 21 software along with MS excel. Results were reported in mean, standard deviation and frequency. Further analysis was done using Chi-square test. A p value of < 0.05 was considered as significant.

RESULTS

In present study 85% of the patients were males and 15% were females. The mean age was 59.94 (±10.37) years, range 40-85 years. The maximum incidence of COPD in this study is among the age group 50-69 years (71%). The mean duration of symptoms was 5.71 (±4.98) years, range 2 to 20 years. Maximum number of patients (52%) had symptoms of 6-10 years of duration. Majority of the patients in the study were Gold Stage IV of COPD.3% of the patients belonged to Stage I of COPD. The mean duration of tobacco use was 23.2 pack years with a range of 5 to 45 pack years.All patients in this study had history of breathlessness at presentation.The most common sign at presentation is tachypnea (83%), followed by epigastric pulsation (68%). 33% of the patients had parasternal heave. 32% of the patients had cyanosis &clubbing.28% of the patients had loud P2.16% of the patients had wheezing.40% of the patients had features of right heart failure.57% of the patients had echo cardiographic evidence of pulmonary hypertension. 53% of the patients in this study had echocardiographic evidence of Cor pulmonale. 45% of the patients had

right ventricular dilatation and 43% patients had right ventricular hypertrophy. 42% of the patients had right atrial dilatation. 17% had evidence of IVSmotion abnormalities and 13% of the patients had echocardiographic features of R. V. failure.

Figure: 1 Analysis of ECHO findings



Major percentage (52%) of the study group had duration of illness between 6 -10yrs most of which is contributed by severe and very severe COPD groups. 40% had duration of illness less than 5yrs of which 20% is constituted by moderate COPD group.8% had duration of illness for >10yrs and majority of them belonged to very severe COPD. There is a significant association between various stages of disease and duration of disease(Chi-square–33.23,df-6,p-value<0.01).All echocardiographic findings of RV dysfunction i.e. PAH,Cor pulmonale,RA/RV dilatation, RVH, RV failure and IVS motion abnormality significantly associated with disease severity (p<0.05).

Table 1 Echocardiographic findings with severity of the disease

Echo Finding	Mild (n=2)	Moderate (n=14)	Severe (n=16)	Very Severe (n=28)	Total (n=60)	%
Pulmonary hypertension	1(2%)	5(8%)	13(22%)	15(25%)	34	57
Cor pulmonale	0	5(8%)	10(17%)	17(28%)	32	53
R.V. dilatation	0	4(7%)	10(17%)	13(22%)	27	45
R.V. hypertrophy	0	3(5%)	11(18%)	12(20%)	26	43
R. A. dilatation	1(2%)	3(5%)	6(10%)	15(25%)	25	42
IVS motion abnormality	0	1(2%)	1(2%)	8(13%)	10	17
R.V. failure	0	0	1(2%)	7(12%)	8	13

DISCUSSION

In this study, echocardiographic changes seen in COPD patients were studied and compared to the duration and severity of the disease. COPD is a male dominant disease, the high prevalence in males is due to higher prevalence of smoking in this gender.In present study 85 % of the population were males.This study is similar to other studies done by Musku et al[8] , Chaudhari et al[9] , Krishnan et al[10].COPD is a disease of late adulthood. As the age advances the lung function (FEV1) declines and other risk factors add to the disease process. Patients between 50-69years form the maximum number of patients admitted mainly because of the longer duration of tobacco exposure and repeated respiratory tract infections, which would have compromised their quality of life. This study age distribution is similar to studies conducted by Jatav et al[6] (70%), Musku et al[8] , Chaudhari et al[19](70 %),Lokesh et al[11](40 %), Dave et al[12], Dhadke et al[13](38 %).Maximum number of patients (52%) had symptoms of 6-10 years of duration which is similar with the study of Rao et al[5](48.38%), Jatav et al[6](48%) Majority of the patients in the study were Gold Stage IV which is similar with the study of Dave et al[12]. Comparing with other studies i.e. Jatav et al[6] & Sekhar et al[13] study maximum number of patients were in severe category. In present study, the mean duration of tobacco use was 23.2 pack years with a range of 5 to 45 pack years which is similar to the study by Radhakrishnan et al[10]. All patients in this study had history of breathlessness at presentation. 98% of the patients had cough with sputum.40% of the patients presented with edema Similar findings were observed in study of Jatav et al[6] , Musku et al[8]. Krishnan et al[10] &Lokesh et al.[11] The most common sign at presentation is tachypnea (83%), 33% of the patients had parasternal heave, the clinical evidence of right ventricular hypertrophy & 28% of the patients had loud P2 suggestive of pulmonary hypertension. Similar finding were observed in study by Musku et al[8].Most common echocardiographic finding was pulmonary hypertension which is defined as pulmonary arterial systolic pressure (PASP)> 30 mmHg was observed in 57 % cases. Other findings noted in our study were Cor pulmonale in 53 % cases, RV dilatation in 45 %, RA dilatation in 42 %, RVH in 43 % of cases. Similar finding were observed in study by Sekhar et al.[13] Major percentage (52%) of the study group had duration of illness between 6 - 10yrs most of which is contributed by severe and very severe COPD groups.Rao V et al[5] found that the severity of the disease increased with the increase in the duration of illness. Hence it is inferred that the duration of illness has a linear relationship with the severity of the disease.In the present study, the incidence of all the ECHO findings, increased as severity of the disease increased. Statistical association were found with echo findings suggestive of RV dysfunction in COPD patients which were also significant (p<0.05). In the study by Dhadke et al.[14] Chi-square test was applied and the p value was < 0.0001 indicating statistically significant association between severity of COPD and presence of pulmonary hypertension &right ventricular enlargement on Echocardiography. Other studies comparing the ECHO findings with severity of the disease have also made similar observations, and also have given different explanations for their observation. In this study, a diagnosis of Cor pulmonale could be made in 40% of patients by clinically presented with oedema, 53 % by echocardiographic methods. This shows that echocardiography can detect a greater number of patients with Cor - pulmonale in COPD and is similar to previous studies. This is because clinical signs of RV dysfunction are difficult to detect in COPD due to lung hyperinflation and posterior rotation of heart. Many studies (Gupta et al[4], Jatav et al[6] Musku et al[8], Sekhar et al[13]) have proved that echocardiography is more sensitive than radiography and clinical methods in detecting RV dysfunction in COPD.

CONCLUSION

PH and Cor pulmonale are an underdiagnosed entity that frequently complicates the course of disease in COPD patients. This study puts emphasis on early cardiac screening of all COPD patients which will be helpful in the assessment of the prognosis and will further assist in identifying the individuals likely to suffer increased morbidity and mortality.

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