



A STUDY OF ECHOCARDIOGRAPHIC ABNORMALITIES IN PATIENTS ADMITTED WITH COPD

General Medicine

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ABSTRACT

COPD is currently the 4th leading cause of death worldwide and is going to be the third most fatal cause by 2020. More than 3 million people died of COPD in 2012 corresponding to 6% of all deaths globally. Chronic obstructive pulmonary disease (COPD) is a major cause of morbidity and mortality across the globe. Smoking is by far recognized to be the most important risk factor for development of COPD. COPD not only involves the lungs but also has various effects on the cardio vascular system. In our study we will deal with these cardio vascular abnormalities by Echocardiography and relate them to the severity of COPD.

KEYWORDS

COPD, Cor pulmonale, LVH, LVDD, LVSD

INTRODUCTION:

Chronic obstructive pulmonary disease (COPD) is a type of obstructive lung disease characterized by long-term poor airflow. The main symptoms include dyspnoea and cough with sputum production. Tobacco smoking is the most common cause of COPD, with factors such as air pollution and genetics playing a smaller role. In the developing world one of the common sources of air pollution is poorly vented heating and cooking fires. Long-term exposure to these irritants causes an inflammatory response in the lungs, resulting in narrowing of the small airways and breakdown of lung tissue. COPD is associated with significant extra pulmonary (systemic) effects among which cardiac manifestations are most common. However in India the COPD patients are not evaluated often for cardiac complications. In our study we will evaluate the cardiac changes in COPD patients through Echocardiography.

AIMS AND OBJECTIVES:

1. To find out various Echocardiography abnormalities in COPD patients
2. To find out association of Echocardiographic changes according to the severity of disease.

MATERIAL AND METHODS:

The study was conducted in General Medicine Department of K.D. Medical College and Research Centre, Mathura.

SAMPLE SIZE: 100 patients of COPD were enrolled in the study after informed consent

INCLUSION CRITERIA:

1. All patients must be >18 years old
2. Patients should be proven cases of COPD

EXCLUSION CRITERIA:

Patients with bronchial asthma, TB or post TB fibrosis, bronchiectasis, interstitial lung disease, primary pulmonary hypertension or any cardiac disease were excluded from the study. COPD patients during acute exacerbation, renal failure, patients with severe hypoxia, pneumonia and lung carcinoma were also excluded from the study.

After gaining informed consent from each patients we took a proper history with particular emphasis on duration of cough, amount of sputum, breathlessness, TB and smoking history. We examined each case physically.

We subjected the patients to various laboratory tests like CBC, Sputum for AFB, Chest X-Ray, Pulmonary function tests (PFT) and ECG.

The severity of COPD patients were evaluated by PFT using the GOLD criteria.

All collected data were analysed by proper statistical methods.

RESULTS:

Table 1. AGE distribution of COPD patients in the study.

AGE	NO. OF CASES	PERCENTAGE(%)
35-49	6	6
50-59	24	24
60-69	60	60
>70	10	10
TOTAL	100	100

Table 2. Findings of Echocardiography in our Study

ECHO FINDINGS	NUMBER OF CASES	PERCENTAGE
NORMAL	49	49
PULMONARY HYPERTENSION	38	38
COR-P	21	21
LVH	18	18
LVDD	48	48
LVSD	15	15
RVSD	09	09

Here in our study we find that 49% of the study population was normal Echocardiographically. The most common abnormality that we observed was LVDD (48%) while pulmonary hypertension is the second commonest abnormality with 38%. Other abnormalities that we observed were Cor pulmonale, LVH, LVSD & RVSD.

Table 3. ECHO findings in study population according to severity of COPD

ECHO FINDING	MILD COPD (n=21)	MODERATE COPD (n=43)	SEVERE (n=26)	VERY SEVERE (n=10)
PULMONARY HYPERTENSION	04	16	13	05
COR PULMONALE	02	04	09	06
LVH	01	07	06	04
LVDD	05	21	15	07
LVSD	01	04	05	05
RVSD	00	02	04	03

In our study we noted that the Echo abnormalities were directly proportional to the degree of COPD. We noted that in cases of mild and moderate COPD the Echo abnormalities were much less with Pulmonary hypertension and LVDD being commoner while in the severe and very severe COPD grade all the Echo abnormalities were much higher.

DISCUSSION:

Chronic obstructive pulmonary disease, or COPD, is a group of progressive lung diseases. The most common are emphysema and

chronic bronchitis. Many people with COPD have both of these conditions. Symptoms include breathing difficulty, cough, mucus (sputum) production and wheezing. It's caused by long-term exposure to irritating gases or particulate matter, most often from smoke. People with COPD are at increased risk of developing heart disease, lung cancer and a variety of other conditions.

Chronic obstructive pulmonary disease (COPD) is characterised by poorly reversible airflow obstruction and an abnormal inflammatory response in the lungs. The latter represents the innate and adaptive immune responses to long term exposure to noxious particles and gases, particularly cigarette smoke. All cigarette smokers have some inflammation in their lungs, but those who develop COPD have an enhanced or abnormal response to inhaling toxic agents. This amplified response may result in mucous hypersecretion (chronic bronchitis), tissue destruction (emphysema), and disruption of normal repair and defence mechanisms causing small airway inflammation and fibrosis (bronchiolitis).

The findings on physical examination of the chest vary with the severity of the COPD:

Early in the disease, the physical examination may be normal, or may show only prolonged expiration or wheezes on forced exhalation. As the severity of the airway obstruction increases, physical examination may reveal hyperinflation (eg, increased resonance to percussion), decreased breath sounds, wheezes, crackles at the lung bases, and/or distant heart sounds. Features of severe disease include an increased antero-posterior diameter of the chest ("barrel-shaped" chest) and a depressed diaphragm with limited movement based on chest percussion. Patients with end-stage COPD may adopt positions that relieve dyspnea, such as leaning forward with arms outstretched and weight supported on the palms or elbows. This posture may be evident during the examination or may be suggested by the presence of callouses or swollen bursae on the extensor surfaces of forearms. Other physical examination findings include use of the accessory respiratory muscles of the neck and shoulder girdle, expiration through pursed lips, paradoxical retraction of the lower interspaces during inspiration (ie, Hoover's sign), cyanosis, asterixis due to severe hypercapnia, and an enlarged, tender liver due to right heart failure. Neck vein distention may also be observed because of increased intrathoracic pressure, especially during expiration. Yellow stains on the fingers due to nicotine and tar from burning tobacco are a clue to ongoing and heavy cigarette smoking. Clubbing of the digits is not typical in COPD (even with associated hypoxemia) and suggests comorbidities such as lung cancer, interstitial lung disease, or bronchiectasis.

The formal diagnosis of COPD is made with spirometry; when the ratio of forced expiratory volume in 1 second over forced vital capacity (FEV_1/FVC) is less than 70% of that predicted for a matched control, it is diagnostic for a significant obstructive defect. Criteria for assessing the severity of airflow obstruction (based on the percent predicted post bronchodilator FEV_1) are as follows:

Stage I (mild): FEV_1 80% or greater of predicted

Stage II (moderate): FEV_1 50-79% of predicted

Stage III (severe): FEV_1 30-49% of predicted

Stage IV (very severe): FEV_1 less than 30% of predicted or FEV_1 less than 50% and chronic respiratory failure.

This is also known as GOLD criteria.

Cardiovascular disease is a frequent cause of mortality in COPD. Roughly 30% of patients die from a cardiovascular cause. A better understanding of the association between COPD and cardiovascular disease should help improve the outcome, particularly if cardiovascular disease could be identified earlier and/or prevented.

The most common abnormality that we observed in our study was LVDD (48%) while pulmonary hypertension is the second commonest abnormality with 38%. Other abnormalities that we observed were RVSD, LVH, LVSD and Cor Pulmonale.

Recent studies have suggested potential mechanisms that may explain the association between left ventricular dysfunction and COPD. First, the vascular dysfunction of systemic arteries, assessed by means of flow-mediated vasodilatation, arterial stiffness or carotid intima-media thickness, is more prevalent in COPD and could explain the

association with subclinical left ventricle abnormalities. Secondly, the presence of emphysema has been related to impaired left ventricle filling. It is conceivable that hyperinflation and increased intrathoracic pressures produced by emphysema may impair cardiac function by decreasing biventricular preload and increasing left ventricular afterload. Thirdly, chronic hypoxaemia might also affect myocardial relaxation. Finally, the influence of chronic right ventricular pressure overload on the interventricular septum may also jeopardize left ventricular filling as a result of abnormal left ventricle torsion and increased longitudinal and circumferential strain. Whatever the mechanism, it is apparent that the presence of left ventricular dysfunction has a negative impact on COPD survival. Accordingly, the early identification of such comorbidity might help improve patient outcome.

CONCLUSION:

To conclude our study shows high prevalence of study LVDD (48%) while pulmonary hypertension is the second commonest abnormality with 38%. COPD usually gets gradually worse over time and can ultimately result in death. It is estimated that 3% of all disability is related to COPD. The proportion of disability from COPD globally has decreased from 1990 to 2010 due to improved indoor air quality primarily in Asia. The overall number of years lived with disability from COPD, however, has increased. We suggest that all the COPD patients must be advised Echocardiography to rule out cardiac diseases that may be contributory to morbidity and mortality and also to assess prognosis of the condition.

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