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Radiological, electrocardiographic and echocardiographic changes among chronic COR Pulmonale

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Abstract
Background and Objective: The objective of the study was to know the clinical profile, radiological features, electrocardiographic and echocardiographic changes in chronic cor pulmonale.
Methodology: This was a hospital based longitudinal study carried out among cases admitted in medical wards of Karnataka Institute of Medical Sciences, Hubli during December 2011 to November 2012. Inclusion criteria were confirmed cases of chronic cor pulmonale with history of cough with sputum, paroxysmal cough, dyspnea, fluid retention with edema and sometimes ascites, recurrent chest infections, cyanosis, fatigue, chest pain, near syncope, palpitation.
Results: About 50 cases were included in the study, 31 were males and 19 were females. The peak incidence of chronic cor pulmonale was found to be in the middle and older age groups Chronic cor pulmonale patients were admitted more commonly in the winter months of the year. Smoking was found to be an important factor in precipitating or aggravating the primary lung disease and hence cor pulmonale. Most of the cases had chronic bronchitis with or without emphysema. 70% of the patients showed chest x- ray suggestive of chronic bronchitis with or without emphysema. 38% showed evidence of cardiomegaly with or without signs of pulmonary hypertension. Electrocardiogram showed changes from normal to right ventricular hypertrophy. The present study showed 22% cases with RVH (Right Ventricle Hypertrophy), 62% RAD(Right Axis Deviation), 30% RBBB(Right Bundle Branch Block) and 52% with P pulmonale.
Conclusion: In the present study most of the patients showed clear evidence of features suggesting chronic cor pulmonale on 2D-ECHO. Thus, ECHO was a better diagnostic tool when compared to ECG in the present study.

Keywords: chronic cor pulmonale, bronchitis, pulmonary hypertension, Cardiomagaly, emphysema

Introduction
Definitions for chronic cor pulmonale have been put forward by many authors in clinical, functional or morbid anatomical terms. A clinical definition is considered unsatisfactory, as the chief clinical manifestation is heart failure, which may be delayed. A functional definition in terms of pulmonary hypertension or raised pulmonary vascular resistance is difficult to measure and is variable. Hypertension may be evanescent and may occur only on exercise and may decline in the terminal phase of the disease. The WHO committee therefore prefers a definition based upon morbid anatomy, for this provides the only characteristic common to all patients at all stages of the disease [6].

The definition of cor pulmonale is now fairly universally accepted as 'alteration in structure and function of the right ventricle resulting from diseases affecting the structure and function of the lung or its vasculature'. This specifically excludes the alterations resulting from diseases of the left ventricle or congenital heart disease. Chronic cor pulmonale is characterized by hypertrophy and dilatation of the right ventricle secondary to the pulmonary hypertension caused by disease of the pulmonary parenchyma and/or pulmonary vascular system between the origins of the main pulmonary artery and the entry of the pulmonary vein into the left atrium [3]. Chronic cor pulmonale is the term applied to hypertrophy of the right ventricle with or without failure resulting from disease affecting the function and/or structure of the lung, except when these pulmonary alterations are the result of diseases that primarily affect the left side of the heart [1].

Chronic cor pulmonale is recognized as a serious protracted, ultimately fatal human experience consuming frequently a large segment of the sufferer's life. Thus it constitutes a serious problem in public health and preventive medicine [2, 3]. It is only recently that physiological relationships between chronic pulmonary disease and cor pulmonale have been worked out by the clinical physiologists and recently adequate methods of diagnosis have been established. Physiologists are now in the process of simplifying these principles and methods of diagnosis so that physician can add them to his clinical analysis [4, 5]. The reported incidence of the disease in different areas show wide disparities and may reflect these inconsistencies in the diagnostic terminology and conventions. These reports also indicate real variations in disease experience and may give important clues to those differences in local environment or ways of life which may underlie the geographical distribution of the disease [2, 6]. Hence the present study was undertaken with the Objectives to know the radiological features, electrocardiographic and echocardiographic changes in clinically proven cases of chronic cor pulmonale.

Methodology
This was a hospital based longitudinal study were in participants were cases admitted in medical wards of

Karnataka Institute of Medical Sciences, Hubli during December 2011 to November 2012. Universal sampling was used and fifty cases were selected who fit into the inclusion criteria of our study on the basis of personal history, physical examination, radiological and electrocardiographic changes with confirmation of chronic cor pulmonale. Each participants were subjected echocardiography. Inclusion criteria for the study were confirmed cases of chronic cor pulmonale with history of cough with sputum, paroxysmal cough, dyspnea, fluid retention with edema and sometimes ascites, recurrent chest infections, cyanosis, fatigue, chest pain, near syncope, palpitation. General physical examination suggesting signs of Right ventricular failure. Radiological examination, electrocardiographic and echocardiographic changes associated with chronic cor pulmonale. Exclusion criteria were Patients with primary involvement of left side of the heart, valvular or myocardial disease, arterial occlusive disease from emboli, primary pulmonary hypertension, congenital heart disease and congenital heart diseases with reversal of shunt.

Ethical clearance was obtained from institutional ethical committee and informed consent was obtained from the participants before the commencement of the study. The results were analysed using SPSS software version 18. Data was tabulated using bar diagrams. Odds ratio was used to know the statistical significance.

Results

A total of 50 cases of chronic cor pulmonale were included in the study. The age of the patients was in the range of 24 to 85 years. With least incidence among those less than 35 years of age. In the present study the percentage of male (62%) was slightly higher as compared to females. Majority of the patients followed agriculture as their primary occupation. Smoking was mainly seen among middle aged men with the history of 10-12 beedis per day. The duration of smoking was more than 10 years in 80% of smokers.

All patients in the study had features suggestive of right heart failure (Raised JVP, pedal edema and tender hepatomegaly). The physical findings noticed in our study were Tachypnoea, Diminished chest movements**,** Prominent use of accessory muscles of respiration**,** Cyanosis**,** Clubbing (in some patients), Crepitations and rhonchi on chest auscultation**,** Loud P_2 and pansystolic murmur in Tricuspid area on cardiac auscultation. The factors which are significantly associated with Chronic cor pulmonale were chronic bronchitis with or without emphysema, Right Axis deviation and P pulmonale(Table.No.1)

Hematology

In most of the cases the hemoglobin percentage was between 8gm% - 14gm% except in 4 patients where the hemoglobin was 8 gm%, 5 male patients had Hb >15g%. The total leucocyte count was between 4,000 to 11,000 cells/Cu.mm, 6 cases had counts >12,000 cells/cu.mm. ESR was raised in 32 cases.

Urine Examination

Urine examination showed traces of albumin in 18 patients. In 1 patient 10 pus cells with 7-8 epithelial cells were found.

Sputum examination

Sputum for AFB was done in 12 patients with X- ray suggestive of pulmonary kochs. In 3 patients sputum AFB was positive. Sputum for culture and sensitivity was done in all patients. In 40 patients the sputum culture was sterile. In 4 patients, the sputum culture showed Streptococcus, 2 patients showed klebsiella and 1 patient showed staphylococcus and 2 patients showed E-coli organisms.

Radiological Features

The chest X-ray showed features according to the clinical profile. Majority of the chest X-rays showed chronic bronchitis with or without emphysema and was the main etiological factor for chronic cor pulmonale and this was seen in 35 cases (70%). 19 cases(38%) showed cardiomegaly.

Electrocardiogram

Among 50 cases, 31 cases showed ECG suggestive of right axis deviation, 14 cases showed low voltage complexes, 26 cases showed P pulmonale and 15 cases showed right bundle branch block. Right Ventricular hypertrophy was seen in 11 cases and 3 cases showed Multifocal atrial tachycardia, 1 case had Atrial premature complex and 15 cases showed ST-T changes.

Echocardiography

All the patients showed enlarged right atrium and right ventricle with Pulmonary artery hypertension either associated with trivial or moderate Tricuspid regurgitation.3 patients had mild pericardial effusion.

Discussion

In the present study chest x- ray showed features according to the clinical profile. Majority of the chest x-rays were suggestive of chronic bronchitis with or without emphysema (70%) and cardiomegaly (38%). 3(6%) patients had cystic changes suggestive of Bronchiectasis. Fibrocavitatory lesion with emphysema was seen in 22% cases in the present study. Pulmonary TB per se may not be considered as the sole cause of chronic cor pulmonale. Emphysema due to cigarette smoking and occupational hazards are also contributory factors for lung damage. In a study by P.K. Jain *et al*, out of 125 patients of pulmonary TB, 11 cases (8.8%) had clinical evidence of cor pulmonale in the form of congestive heart failure [32].

In the present study among 50 patients, 26 cases (52%) showed P pulmonale and it had definite correlation with severity of chronic cor pulmonale and was found in majority of cases who had longer duration of illness. Study by catalayud showed 46.2% had P pulmonale and study by Ivan J Pinto showed 32.32% had P pulmonale. In the study by mathur, 40% of patients had P pulmonale which correlated well with our study. In the present study, 31 cases (62%) showed ECG suggestive of right axis deviation. Similar study conducted by Mathur, Pinto and Padmavathi showed 69%, 45.5% and 43.4% of right axis deviation respectively. Thus the findings of our study correlated well with other studies.

In the present study 15 cases (30%) had ECG showing RBBB. In the study by Padmavathi 7.2% had RBBB. Study by Vishwanathan showed 10.7% and study by Pinto showed 13.3% patients having RBBB. In comparison with the studies done by various authors, the present study shows that ECG though it has its limitations can still be useful in diagnosing chronic cor pulmonale. ECG can also be used as a negative prognostic sign in targeting COPD patients at risk

of shorter survival. Almost every patient in the study group showed echocardiographic features of chronic cor pulmonale i.e. right ventricular enlargement, right atrial Enlargement, pulmonary arterial hypertension and tricuspid regurgitation (either trivial or moderate).3 patients showed mild pericardial effusion.

Table 1: Radiological, echocardiographic and echocardiogram findings among chronic cor pulmonale.

Findings	Percentage	Odds ratio
Chronic bronchitis with or without emphysema	70	2.33(0.83-1.19)
Cardiomegaly	38	0.73(0.55-1.80)
Honey coomb appearance	6	0.063(0.31-3.21)
Fibrocavitatory lesion with emphysema	22	0.28(0.51-1.95)
Lung collapse	2	0.02(0.13-7.24)
Reticulo nodular shadows	2	0.02(0.13-7.24)
Right axis deviation	62	1.63(0.56-1.77)
Low voltage	28	0.38(0.53-1.85)
P pulmonale	52	1.08(0.57-1.74)
Rbbb	30	0.42(0.54-1.83)
Rvh	22	0.28(0.51-1.95)
Mat	6	0.063(0.31-3.21)
Apc	2	0.02(0.13-7.24)
St-t changes	30	0.42(0.54-1.83)

Conclusion

The present study showed various clinical presentation and investigatory findings which are almost comparable to previous studies done by many authors. In the present study echocardiogram was found to be a better diagnostic tool when compared to electrocardiogram or chest roentgenogram. Though echocardiogram has its own limitations to be considered in a patient with chronic obstructive lung disease, it is found to be useful in diagnosing accurately cases of occult cor pulmonale in recent studies. Thus, chronic obstructive pulmonary disease resulting in chronic cor pulmonale constitutes a major burden in the rural as well as the urban population.

References

1. Braunwald E, Kasper DL, Fauci AS, Longo DL, Braunwald E, Hauser SL, Jameson JL. Heart failure and Cor pulmonale. Harrison's principles of Internal medicine. 18 th ed. New York: McGraw-Hill; 2005, 1367-1378.
2. White J, Bullock RE, Hudgson P, Gibson GJ. Neuromuscular disease, Respiratory failure and Cor pulmonale. Postgraduate Med J. 1992; 68:820-823.
3. Gandhi MJ. Cor pulmonale and pulmonary hypertension. In: Shah SN, editor. API Text Book of Medicine. 7t h ed. Mumbai: The Association of Physicians of India; 2003, 487-490.
4. Bhargava RK. Corpulmonale (Pulmonary Heart Disease). New York USA: Futura publishing company, 1973.
5. John B, Pier G, Agaston. Cor pulmonale. In: Murray Nadel, editor. Text Book of Respiratory Medicine. 2nd ed. Vol-2. Philadelphia: W.B Saunders company, 1988, 1779-1798.
6. Newman JH. Chronic Cor pulmonale. In: Fuster V, Alexander RW, O Rourke RA, Roberts R, King SR, Wellen HJJ, editors. Hurst's the Heart.10th ed. Vol.2. USA: McGraw Hill, 2001, 1645-1654.
7. Jain PK, Singh RG, Agarwal BV, Jha VK. Significance of right sided Electrocardiographic leads in the diagnosis of cor pulmonale in pulmonary tuberculosis. Ind J chest Dis Allied Sci. 1978; 20(3):112-117.
8. Mathor KS, Nigam DK, Gupta MC. Electrocardiographic Changes in chronic Cor
9. Pulmonale. Ind J Chest Dis. 1968; 10(1):26-32.
10. Padmavathi S, Joshi B. Incidence and etiology of chronic cor pulmonale. Diseases of chest. 1984; 48(4):457-463.
11. Vishwanathan K. Chronic Cor pulmonale. Ind J Chest Dis. 1965; 7(4):155-169.