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**TO EVALUATE ROLE OF ECHOCARDIOGRAPHY IN DETECTING RIGHT
VENTRICULAR HYPERTROPHY PRIOR TO ECG EVIDENCE OF RIGHT
VENTRICULAR HYPERTROPHY****Kant Nishi* , Hemant Sharma and Lal Darbari**

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*Corresponding Author: drnkjha01@gmail.com**ABSTRACT**

This study was conducted in the Department of Medicine at Hindu Rao Hospital, New Delhi. Patients with history and clinical features suggestive of COPD with Corpulmonale were selected. COPD is a very common disease both in rural and urban area. Corpulmonale is an important consequence of COPD. The presence of pulmonary artery hypertension has been associated with a reduced rate of survival in patients with COPD and episodes of right ventricular failure have been reported to be major contributor to morbidity from the disease. This study included both indoor and outdoor patients. . Echocardiography was done in all patients with COPD and controls had normal ECG. 40 percent (8/20) patients with COPD had right ventricular free wall thickness more than 5 mm. Right ventricular free wall thickness in diastole was significantly more in patients with COPD as compared to controls (.450 cm and .321 cm respectively p value .0009). Patients with Corpulmonale had a mean RV free wall thickness of .762 cm which was significantly more than that of other groups.

Keywords: Corpulmonale, Disease, Right ventricular, Thickness.**MATERIAL & METHODS**

This study was conducted in the Department of Medicine at Hindu Rao Hospital, New Delhi. This hospital is the largest multi-speciality hospital in North Delhi catering to all section of society. COPD is a very common disease both in rural and urban area. Corpulmonale is an important consequence of COPD. Several factors contribute to the development of corpulmonale in patients with chronic obstructive pulmonary disease, but its primary cause is chronic alveolar hypoxia resulting in pulmonary vasoconstriction, vascular remodelling and pulmonary hypertension. The presence of pulmonary artery hypertension has been associated with a reduced rate of survival in patients with COPD and episodes of right ventricular failure have been reported to be major contributor to morbidity from the disease.

This study included both indoor and outdoor patients. Patients with Chronic Obstructive Pulmonary disease and clinical features suggestive of COPD with Corpulmonale were selected from the Medical Out Patient Department (OPD) of Hindu Rao Hospital, Delhi. The study included twenty patients of Chronic Obstructive Pulmonary disease (COPD), twenty patients with COPD with corpulmonale and twenty age and sex matched control subjects. The study was performed after stratification of their condition with adequate medical treatment i.e. they were in a condition to be discharged from the hospital.

INCLUSION CRITERIA

- I. Expiratory airflow limitations as revealed by an absolute value of FEV1 less than 80percent predicted and/or ratio $FEV1 / FVC < 0.7$ predicted on a well performed test on a spirometer which was largely irreversible i.e. less than 15percent change in FEV1 in response to two puffs of beta-2 agonists.(400µg salbutamol or equivalent)
- II. All patients were in a stable condition which was defined as the absence of any acute exacerbation of dyspnoea, cough and expectoration or respiratory tract infection for at least 5 weeks prior to entry into the study.
- III. All patients were taking bronchodilators and/or prednisolone. No change in treatment was made at the time of entry into the study.

EXCLUSION CRITERIA

- I. Patient with a history of asthma or any other associated respiratory disease were excluded from the study.
- II. Patients with associated evidence of coronary artery disease, hypertension, congenital or valvular heart disease or previous history of myocardial infarction were excluded from the study.

CONTROL CASE SELECTION

A control group of twenty cases was selected. The characteristics of these were:

1. They were age and sex matched with patients.
2. They were not suffering from any respiratory or any other significant major illness.
3. Pulmonary function study by spirometry was essentially within normal limits.

DATA COLLECTION TECHNIQUE AND TOOLS

CLINICAL FEATURES

HISTORY

A detailed history regarding duration of illness, smoking habits treatment, received and past history of illness was taken. Age and sex of the patient were noted.

GENERAL PHYSICAL EXAMINATION

A detailed general physical examination was done with special reference to respiratory rate, pulse rate, blood pressure, jugular venous pressure, presence of cyanosis, clubbing and pedal edema.

RESPIRATORY AND CARDIOVASCULAR SYSTEM EXAMINATION

A thorough examination of Chest and CVS was done with emphasis on features of emphysema and evidence of right ventricular failure i.e. parasternal lift, epigastric pulsation, loud second heart sound, right sided gallop, murmur of tricuspid insufficiency, pulsatile liver etc.

CHEST ROENTGENOGRAM

Posteroanterior (PA) film of chest x-ray was obtained in all subjects. The parameters suggestive of COPD was noted.

ELECTROCARDIOGRAPHY (ECG)

A standard 12 lead ECG was done in all cases. ECG often provides the first evidence of right ventricular dysfunction in patients in whom it is suspected.

PULMONARY FUNCTION TESTS

Pulmonary function test was performed using spirometer in all patients and controls. Pulmonary function tests were performed as per standardization and conventional techniques (Gardner et al 1987).

ECHOCARDIOGRAPHY

Echocardiography was done in the ECHO Laboratory of Hindu Rao Hospital by a single person. The ACUSON 128 Cardiovascular system which uses Acuson's computerized sonography technology was utilized for M Mode, 2D and Doppler echocardiography. Sector 3194 3.5 MH2 and 2.5 MH2 cardiac transducer of

19 mm aperture was used for sonography. Patients were examined in the left lateral and supine position and all measurements were taken during quiet respiration.

DATA ANALYSIS

The data was fed in a computer and analyzed using software SPSS 15.0 and Microsoft excel. Tests used: for intra group comparisons we have used paired t-test and for inter group, we have used independent t-test.

OBSERVATION

1. The mean age of patients in the study was 50.35 years in COPD patients; 49.9 years in control and 50.5 years in Corpulmonale. Seventy percent of patients studied were males and thirty percent of patients studied were female.
2. All patients with COPD and controls had normal ECG. 40 percent (8/20) patients with COPD had right ventricular free wall thickness more than 5 mm. All patients with corpulmonale had ECG evidence of right ventricular hypertrophy.
3. Right ventricular free wall thickness in diastole was significantly more in patients with COPD as compared to controls (450cm and 0.321 cm respectively p value 0.0009). Patients with Corpulmonale had a mean RV free wall thickness of 0.762 cm which was significantly more than that of the other two groups.

REVIEW OF LITERATURE

Several criteria have been proposed for use in detecting RVH. Most criteria show high specificity but low sensitivity and are unable to isolate RVH from biventricular hypertrophy. A study by Lehtonen J et al (1980)¹ compared the ability of several different groups of ECG criteria to predict the presence of RVH at autopsy. An ECG is considered diagnostic for RVH if one or more of the following criteria are met -

- Right axis deviation greater than 110° without right bundle branch block
- $R \text{ or } R' \geq S$ in V_1 or V_2
- $R < S$ in V_6
- $A + R - PL \geq 0.7$
- Where A : Maximal R or R' in V_1 or V_2
- R : Maximal S in lead I or V_6 .
- PL: Minimal S in V_1 or minimal R in lead I or V_6 .

These criteria correctly identify RVH in 75 percent of cases with isolated RVH and 53 percent with biventricular hypertrophy. Only 25 percent of patients examined in this study had COPD. The absence of all four criteria, however, excludes the presence of RVH in 96 percent of case.

Ravi Prakash (1980) conducted a study of the echocardiographic diagnosis of right ventricular hypertrophy, its correlation with ECG and necropsy

findings in 248 patients. He observed that measurement of right ventricular wall thickness (RVWT) by echocardiography and necropsy correlated well ($r = 0.83$) in 36 patients. Echocardiography had a sensitivity of 93% and a specificity of 95% in diagnosing RVH at necropsy. ECG had a sensitivity of 31% and specificity of 85% in diagnosing RVH. Additional 212 patients were studied by ECG and ECHO. Based on echocardiographic criteria of RVH (RVWT 5 mm) 134 of 212 patients had RVH and 78 were without RVH. ECG had a sensitivity of 27 percent and a specificity of 88% for diagnosing RVH. The mean diastolic RVWT was 6.0 ± 1.5 mm in 134 RVH patients and 3.4 ± 0.8 mm in 78 no RVH patients ($p < 0.05$). They concluded that echocardiographic measurement of RVWT is useful in the diagnosis of RVH and is more sensitive than ECG criteria in adults.

Bommer W *et al* (1979) conducted a study of two dimensional echo measurement of the right atrium and the right ventricle and validated against the actual cast measurement at necropsy in man. Alvin Cacho *et al* (1983) evaluated the usefulness of 2D echo measurements in diagnosing RVH in 15 patients with RVH and 11 normal subjects. The 2D right atrial area and long axis had a sensitivity and specificity of 100 percent in the diagnosis of RVH.

RECOMMENDATIONS

Noninvasive diagnostic technique utilizing Doppler echocardiography and radionuclide angiography allow for detection of RV dysfunction at an earlier stage and in most cases, preclude the need for right heart catheterisation. An early identification of PAH before the development of right sided heart failure can lead to appropriate interventions designed to limit the progression of disease. It is recommended that an assessment of right ventricular function at rest be carried out routinely in patients with moderately severe or worse COPD. RV performance can also be used to assess the efficacy of therapy in acute studies as well as following prolonged treatment in patients with established PAH or cor pulmonale.

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