Cardiac Evaluation in Chronic Obstructive Pulmonary Disease Patients by Using Echocardiography

Thesis

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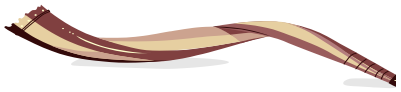

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List of Abbreviations

Abbrev.	Meaning
6MWD	: 6-minute-walk distance
AF	: Atrial fibrillation
AMVL	: Ant mitral valve leaflet
AO	: Ascending aorta
AS	: Aortic stenosis
ASD	: Atrial septal defect
AV	: Aortic valve
BOLD	: Burden of Obstructive Lung Diseases
CAD	: Coronary artery disease
CAT	: COPD Assessment Test
CBC	: complete blood count
CF	: cardiac frequency
CFR	: Coronary flow reserve
CLD	: Chronic lung disease
CO	: Cardiac output
COPD	: Chronic obstructive pulmonary disease
CT	: Computer tomography
CPET	: Cardiopulmonary exercise testing
CTEPH	: Chronic thromboembolic pulmonary hypertension

CV : Chamber view

CVD : Cardiovascular diseases

CVRF : Cardiovascular risk factor

CW : Continuous-wave Doppler

DE : Doppler echocardiography

DLCO : Diffusing capacity of the lungs for carbon monoxide

1D : One dimension

2D : Two dimension

3D : Three dimension

E/A : Peak velocity of early diastolic flow (E), peak velocity of atrial contraction (A)

ECG : Electrocardiograph

FER : Forced expiratory ratio

FEV1 : Forced expiratory volume in 1 second

FVC : Forced vital capacity

GOLD : Global Initiative for Chronic Obstructive Lung Disease

HCM : Hypertrophic Cardiomyopathy

HF : Heart failure

HFpEF : Heart Failure with a Preserved Ejection Fraction

HOCM : Hypertrophic obstructive cardiomyopathy

IC/TLC : Inspiratory capacity/total lung capacity

IHD : Ischemic heart disease

IVC : Inferior vena cava

JA : Jet area

LA : Left atrium

LV : Left ventricle

LVEF : Left ventricular ejection fraction

LVDD : Left ventricular diastolic dysfunction

LVH : Left ventricular hypertrophy

LVPW : Left ventricular posterior wall

LVSD : Left ventricular systolic dysfunction

LTOT : Long-term oxygen therapy

M mode : Motion mode

mMRC : Modified British Medical Research Council

mPAP : Mean pulmonary arterial pressure

MR : Mitral regurge

MV : Mitral valve

PAP : Pulmonary artery pressure

PAWP : Pulmonary Artery Wedge Pressure

PEEP : Positive end-expiratory pressure

PH : Pulmonary hypertension

PHT : Pulmonary hypertension

PL : Trans-pulmonary pressure

PMVL : Posterior mitral valve leaflet

Ppa : Pulmonary arterial pressure

PRA : Pressure of right atrium

PRV : Pressure of right ventricle

PVR : Pulmonary vascular resistance

PW : Pulsed-wave Doppler

RA : Right atrium

RAP : Right atrial pressure

RHC : Right heart catheterization

RHF : Right heart failure

RV : Right ventricular

RVol : Regurgitant volume

SD : Standard deviation

sPAP : Systolic pulmonary artery pressure

SV : Stroke volume

TAPSE : Tricuspid Annular Plane Systolic Excursion,

TTE : Transthoracic echocardiography

TTPG : Trans-tricuspid pressure gradient

TV : Tricuspid valve

VA/Q : Ventilation perfusion ratio

V : Velocity

WHO : World Health Organization

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Introduction

Chronic obstructive pulmonary disease (COPD) is a common preventable and treatable disease characterized by persistent airflow limitation that is usually progressive and associated with an enhanced chronic inflammatory response in the airways and the lung to noxious particles or gases. It has some significant extra pulmonary effects that may contribute to its severity in individual patient.

COPD is considered as a major cause of respiratory morbidity and mortality world- wide and reported to be fourth-leading cause of chronic morbidity and mortality worldwide. (1)

Among COPD patients, cardiovascular diseases (CVD) are responsible for approximately 50% of all hospitalizations and 20% of all deaths. However, population-based studies have suggested that regardless of smoking status, age or sex; COPD diagnosis increases the risk of cardiovascular morbidity and mortality by approximately two folds. (2)

COPD affects pulmonary blood vessels, right ventricle, as well as left ventricle leading to development of pulmonary hypertension, corpulmonale, right ventricular dysfunction, and left ventricular dysfunction (3).

Pulmonary hypertension (PH), defined as an elevated mean pulmonary arterial pressure (mPAP) ≥25mmHg measured by right heart catheterization, is a common complication of chronic lung disease (CLD). PH often progresses to right heart failure (RHF), with initial compensatory right ventricular (RV) hypertrophy becoming overwhelmed by increased systolic requirements, whilst left ventricular (LV) systolic function remains preserved. The term "corpulmonale" has been used to describe this form of RHF and hypertrophy. It is a progressive condition, associated with increased mortality in CLD. [4]

Pulmonary artery pressures and other cardiac of hemodynamic parameters can be accurately assessed by right heart catheterization (RHC), Doppler echocardiography (DE) has gained popularity in the last 2 decades for non-invasive estimation of systolic pulmonary artery pressure (sPAP) from the peak velocity of tricuspid regurgitated jet. [5]

Left ventricular systolic dysfunction (LVSD) is defined as an LVEF <50% [6]. The reported prevalence of LVSD in patients with stable COPD varies widely, and is related to the exclusion of cardiovascular risk factor (CVRF) in different series (0%–16% in COPD patients