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ORIGINAL RESEARCH

Left Ventricular Mass important indicator in Hypothyroidism

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Abstract
Background: Echocardiography is used to assess cardiac parameters. Altered parameters can affect the morbidity in patients of hypothyroidism so echocardiography can be used to assess morbidity in such cases.
Aims and Objective: To measure cardiac functions in patients of hypothyroidism and to correlate cardiac functions with euthyroid state.
Material and Methods: The study conducted at M.M.I.M.S.R, Mullana. Ambala. Fifty individuals were included in the study out of them 25 were cases and 25 were control. The patients were taken from both from OPD and Indoor wards of department of Medicine. The patients were studied during October 2014 to December 2016. All the patients were scrutinized and investigated as per the plan. All were subjected to evaluation by echocardiography.
Results: In our study there was significant increase in left ventricular mass with preserved left ventricular systolic function.
Conclusion: Echocardiography can be used as a sensitive tool to assess morbidity associated with hypothyroidism.
Keywords: Echocardiography, Left ventricular mass, hypothyroidism, euthyroid.

Introduction

A condition of abnormally low thyroid hormone production is called Hypothyroidism.
It affects many parts of body which constitute growth and development. It is a important hormone in many cellular processes and has widespread consequences on the body. Blood sample taken empty stomach will confirm the state of thyroid hormone in an individual i.e low,excess or normal. It is estimation of T4 and T3 and TSH concentration in serum. Low thyroid hormone cause changes in cardiac contractility, myocardial oxygen consumption, cardiac output, blood pressure and systemic vascular resistance[1,2].In contrast to hyperthyroidism, which can lead to atrial arrhythmias, a variety of case reports have shown that hypothyroidism may cause a prolongation of QT interval that predisposes the patients to ventricular irritability. Hypothyroidism is characterized by a decrease in oxygen and substrate utilization by all the major organ systems of the body. As a result, the demands for cardiac output decrease; in addition, hypothyroidism directly alters cardiac function through changes

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in myocyte-specific gene expression[3]. Cardiac contractility which is a measure of left ventricular performance is impaired in both short and long term hypothyroidism leading to a reduction in cardiac output. There is also a decrease in the rate of ventricular diastolic relaxation; as a result, compliance and diastolic filling are impaired[4].

Materials & Methods

Study Design

The study was conducted at M.M. Institute of Medical Sciences and Research, Mullana, Ambala. The patients were studied during October 2014 to December 2016. Total Fifty individuals were included in the study out of them 25 are cases and 25 are control. The patients were taken from Outpatient department (OPD) and Indoor wards of the department of Medicine and Emergency Department. Those patients suspected to be suffering from hypothyroidism on clinical evaluation and confirmed by serum TSH, T4 and T3 levels estimation were taken for the study

Inclusion Criteria

All patients were subjected to following investigations at the beginning of the study like

1. Complete Blood Count
2. X Ray chest PA view.
3. Fasting Blood Sugar
4. Serum Electrolyte
5. Blood Urea and Serum Creatinine
6. Serum concentrations of T3,T4, TSH.
7. Echocardiography-Echocardiography assessment was done using an ultrasound system.
8. Written and informed consent from all the patients were taken.
9. Electrocardiography-12 lead ECG's was recorded on ECG machine

Exclusion Criteria

Patients with the following were excluded from the study.

(1) Age < 18 and > 80 years
(2) Patient with known primary cardiac disease
(3) Patient with hypertension, severe anaemia and diabetes mellitus or any other endocrinal disorder.
(4) Patient taking medicines that could alter cardiac functions like amiodarone, beta blockers, calcium channel blockers

Echocardiogram

Echocardiography was done in ECHO lab of Cardiology unit in M.M.I.M.S.R. Echocardiography assessment was done by using Model vivid Colour Doppler Echocardiography machine of GE make. Patients were examined in the left lateral and supine position in quiet respiration.

a. M Mode Echocardiography

b. Two Dimensional Echocardiography

Left Ventricular Indices were assessed and then were used to calculate Left Ventricular Mass by using the cube formula proposed by Devereux[5].

LV Mass= Myocardial Volume × 1.05g/cm3 = [{IVSd+ LVIDd+ LVPWd}3- (LVIDd)3] × 1.05g/cm3 .

Patients included in the study were treated as per the standard treatment schedule. The data obtained was analysed with appropriate statistical analysis tools at the end of the study and conclusive evidence was derived.

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Observations

The observations hence made have been tabulated and presented as follows:

Left Ventricular Indices

Table 1: Showing left ventricular dimensions.

Dimensions	N	Mean± SD	P value
IVS d case	25	14.80±2.75	0.000
control		9.28±1.67	
IVS s case	25	20.52±4.22	0.000
control		12.60±1.44	
LVPW d case	25	11.12±1.39	0.038
control		10.12±1.87	
LVPW s case	25	12.47±0.22	0.000
control		7.064±0.99	

Table 2: Showing left ventricular volumes.

Dimensions	N	Mean± SD	P value
IVS d case	25	14.80±2.75	0.000
control		9.28±1.67	
IVS s case	25	20.52±4.22	0.000
control		12.60±1.44	
LVPW d case	25	11.12±1.39	0.038
control		10.12±1.87	
LVPW s case	25	12.47±0.22	0.000
control		7.064±0.99	
LVID d case	25	44.88±6.94	0.104
control		42.56±0.76	
LVID s case	25	36.28±0.39	0.033
control		34.29±0.21	

a) IVSd was found to be in cases mean value of 14.80mm and while in control mean value was 9.28mm which was statistically significant.
b) IVSs was mean value of 20.52mm in cases and 12.60mm in control which was statistically significant when hypothyroid were compared with euthyroid.
c) LVPWd was with mean value of 11.12mm in cases and 10.12mm in control group

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(1) which was statistically significant.

d) LVPWs was with cases mean value of 12.4mm and in control 7.06 mm which was statistically significant

e) LVIDd was in cases 44.88mm and in control 42.56mm which was not statistically significant

f) LVIDs was in 36.28mm and in control 34.29mm which was not significant statistically.

Table 3: Showing significant LV Mass

LV mass(gm)	N	Mean±SD(gm)	p value
Case	25	284.4296±89.08	0.000
Control	25	170.0180±31.83	

Table 4: Showing EF value

	Case_Control	N	Mean±SD(%)	P value
Ejection Fraction (%)	Hypothyroid	25	63.92±9.25	0.653
	Euthyroid	25	63.04±2.99	

Results

1) The present study was aimed to assess cardiac functions in patients of hypothyroidism and to compare it with euthyroid state.
2) Twenty five patients of hypothyroidism were selected for the present study. All patients were evaluated and compared with normal subjects.
3) On echocardiography assessment interventricular septum(IVS) and left ventricular posterior wall thickness(LVPW) both in diastole and systole was statistically significantly increased when compared with euthyroid with p value-<0.05.
4) Left ventricular mass was statistically significantly increased in hypothyroid cases with p value-<0.01

Discussion

In long standing hypothyroidism cardiac complications are very serious. As a non invasive method, echocardiography can play important role in recognising the cardiac pathology and dysfunction as well as to follow up effect of therapy. In previous study by Almira Hadzovic Dzuvo et al[6] found that in hypothyroid patients in diastole left ventricular internal diameter and left ventricular posterior wall thickness and interventricular septum thickness was increased as compared to euthyroid. In our study it was found left ventricular posterior wall thickness and interventricular septum thickness was statistically significant both during diastole and systole. In our study mean LV mass was statistically significant in hypothyroid patients. Monzani et al[7] also noted higher value of LV mass and LV wall thickness in hypothyroid cases as compared with control group.

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Conclusion

Hypothyroidism is a fairly common disease with female preponderance. Hypothyroid and cardiac functions are closely related and should be viewed in correct perspective. In present study echocardiographically assessed left ventricular dimensions shows statistically significant increase in left ventricular mass these are not because of increased muscle mass but because of increase inventricular septum thickness and left ventricular posterior wall thickness due to myxomatous tissue increase. Left ventricular systolic function is preserved in hypothyroid states. Conventional echocardiography is a simple, non invasive and affordable method to assess morbidity in hypothyroid patients. However electrocardiogram is good tool to document changes in muscle mass and to some extend effects on coronary circulation but Echocardiography remains an excellent tool for cardiac functional assessment, which makes the main stay of therapeutic decisions and prognostic assessments.

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