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Echocardiographic Assessment Of The Left Side Physical Parameters Of The Heart In Ischaemic Heart Disease Patients

تقييم المتغيرات الفيزياويه باستخدام الموجات فوق الصوتيه للجانب الأيسر من القلب لمرضى ذووي(اقفار) القلب

Ghazwa Hatem Al-Zubaydi
Raja Khadum Mouhamed **Nadwa Jasim Abdual-Zahra**
غزوه حاتم الزبيدي
رجاء خضر محمد ندوه جاسم عبد الزهرة

Abstract:

Ischaemic heart disease is a common health problem after the age of 40, it has a several complication including changes which has very important effect on the heart. This disease causes myocardial changes, which could be physically evaluated by echocardiographic type "combison 530D model voluson 530D". which was used to evaluate the left ventricular structure parameters(Left Ventricular Internal Diameter in diastole and systole LVIDd & LVIDs, Inter Ventricular Septum Thickness in diastole and systole IVSTd & IVSTs, Posteriov Wall Thickness of left ventricular(LV)in diastole and systole PWTd & PWTs). Evaluation of left ventricular geometry by using specific formula of(Left Ventricular Mass LVM , Left Ventricular Mass Index LVMI and Relative Wall Thickness of LV in diastole and systole RWTd & RWTs). The study sample included two groups: control group (Group I),and group Ischaemic Heart Disease (IHD) (Group II). Control group constituted of (40) normal individuals and group II constituted of (45) ischaemic heart disease patients.

الخلاصة :

مرض القلب الذاوي هو مشكله صحيه شائعه بعد الاربعين من العمر له مضاعفات تتمثل ببعض التغيرات التي تطرأ على عضلة القلب يمكن تقييم هذه المتغيرات فيزياويا بواسطة جهاز فحص القلب بالأمواج فوق الصوتيه (الدوبلر) نموذج (530 D) حيث استخدم لايجاد وتقييم متغيرات تابعه للجانب الايسر من القلب شملت (قطر البطين الايسر في حالتي الانقباض والانبساط ,وسمك الحاجز البطين في حالتي الانقباض والانبساط والجدار الخلفي للبطن الايسر) . اما تحديد هيكلية البطين الايسر فقد تم باستخدام معادلات (كتله البطين الايسر ,كتله البطين الايسر المعتمده على الوزن والطول .وسمك جدار البطين الايسر النسبي). لقد تضمنت الدراسه مجموعتان , مجموعه (I), وهي مجموعه الأصحاء وشملت على (40) شخصا طبيعيا , والمجموعه الثانيه (II)1شملت على (45) هم مرضى ذووى(اقفار) القلب.

Introduction:

Ischaemic heart disease, this disease occurs due to degeneration part of the myocardium and due to insuffiency of blood supply because of the obstructing of coronary artery.

The ischaemic heart disease probably results from atheroma heart disease and atherosclerosis of coronary artery which include the lipids infiltration, and the constituents of plasma will concentrate especially the lipids which is to due to the relation between the cholesterol and atheroma formation. In addition the existence of lipid protein stimulates the production of leiomuscular cells. There fore, the increase of plasma protein is considered the most popular reason, especially among those having familial hyperlipoprotienaemia especially the low density lipoprotein LDL.

There are reasons which give the disturbance of lipid metabolism including the myxoedema, diabetes, in women who underwent overiectomy [1],[2].

Till present time the ischaemic heart disease is not fully investigated , but the clinical and epidemiological studies denote that the cause of the disease is due to the increase of lipids, hypertensive, obesity and diabetes[3].

This disease causes the prolapse of the mitral valve, due to blocking of the left anterior descending artery, and this affect the anterior wall of the left ventricle, which includes the ventricular septum and papillary museles[4].

Enchocardiographic system used in this study:

The echocardiography which was used in this project consisted of the following components:

A-the instrument:

It's of the type combisom 530D model voluson 530D.

It's has two properties:

1.It has the capability of magnifying the images.

2.It has the capability of storing several forms with serial pictures and displays them in slow mition.

B- the monitor:

the monitor was avitron KDS types,(U.S.A). model AV-5T multi scanning at horizontal frequencies of 30 KH_z to 70 KH_z, and vertical frequencies of 50 Hz to 120 Hz,15 inch (14 view area),of sony trinitron picture tube with automatic display setup button and digital controls.

C-the video copy processor.

Mitsubishi video copy processor model P91W,P91E with thermal papers K65HM (high-density synthetic paper for high quality printing).

D- the probe:

Probe used in the this study was an electronic probe type S-PPA2-4. It has sector transducer, the scanning of this type of transducers was fan shaped, almost triangular and originated through very small acoustic window. This type of scanner utilizes frequencies 2.5 MH_z.

Echocardiographic examination:

In transthoracic examination, the normal persons and patients were typically placed in left lateral position and scanned from several different left intercostals spaces. The fan shaped scan plane was directed into the chest to provide tomographic imaging planes , the standard transthoratic views are recorded from apical and parasternal transducer position.

Each returning ultrasound signal (ECHO) was registered and converted to M-mode and Two-Dimensional image.

Echocardiographic windows which use in this study:

The Echocardiographic windows used in our study were:

1.parasternal long – axis view: This view was used to assess LV dimension in systole and diastole.

2.Apical view: The apical views were used to assess LV septum in systole and diastole.

Apical view either:

I-Four – chamber view.

II-Two- chamber view.

In addition to these views, m- mode Echocardiography was used to assess the posterior wall thickness LV in systole and diastole [5],[6].

Results and Discussion:

1.Control Group (Group I):

In this group the ages of males and females were (mean ± SD)(40.7 ± 6.3) and(45.6± 8) years. They had normal left ventricular structure, normal Echocardiography finding. The statistical analysis showed that there was no significant difference between males and females regarding to echocardiographyic measurements of LV.

2. Ischaemic Heart Disease Patients (Group II):

A-Patient characteristic:

The ages of males and females were (57.7 ± 12.5) and (75.3 ± 11.6) years, respectively.

Systole blood pressures in this group were different in males and females but this difference was not statistically significant as shown in (table 1), the systole blood pressure of males and females were (157.5 ± 16.3) and (158.5 ± 21.7) mmHg. The mean values of systolic B.Ps for both sexes were significantly higher in this group as compared with control group ($P<0.01$).

B-Echocardiographic measures of LV structures:

Left ventricular (LV) include the parameters LVIDd, LVIDs, IVSTd, IVSTs, PWTd, PWTs. Mean values of LVIDd, IVSTd and IVSTs in both sexes were higher among in group(II) than control group, and reach to the level of significance ($P<0.01$).

PWTs and PWTd in both sexes were not significantly different in comparison with control (see table 2).

C-Left ventricular Geometric parameters:

The mean value of LVMI in (group II) for females was obtained to be higher than that of the males but it was not significant which (99.4±34), (80.52±43) g/m^2,respectively were.

It was found that LVM,LVMI and RWTd for both sexes were relatively greater in (group II) as compared with control group and the statistical evaluation should a significant difference ($P<0.01$) (table 3).

LV stress in this group for both sexes was higher than that with group(I) was (110.8± 40.2),(103.3±35.4) $dyne/cm^2$ respectively ($P<0.01$).

In the present study to ischaemic heart group decreases differences between end- diastolic volume and end – systolic volume , and the means (stroke volume) is high significant in comparison with the healthy group, while left atrial dimensions measurement has recorded a higher values than that of control group for that may be is that the ischaemic heart disease(IHD) mostly accompanied with mitral valve prolapsed, and so, the blood, at the left a atrium formed from that blood coming from pulmonary veins and plus the blood which returned back through the mitral valve [7], so as the measurement of left ventricular and left atrium as a result of extra work that the left ventricular do for keeping ejection of the demanded blood for supplying body and sub stituting the a mount that passed wrongly through the mitral valve and the left ventricular insufficiency and from the physiological aspect and inability of the heart to maintain enough circularity for body demands inability of the heart to maintain enough circularity for body demands.(see table 2,4).

Table (1): The characteristics of patients group and control group.

Parameters		Control(group I)		IHD(groupII)	
		Male	Female	Male	Female
AEG	Mean ±SD	40.78±63	55.	57.7±12.7	73.311.6
	O			**4.8	**6.8
	OO	NS		NS	
HT	Mean ±SD	165.6±5.8	159±3.7	167.1±3.7	164.8±4.8
	O			NS	*0.38
	OO	S		NS	
WT	Mean ±SD	72.2±12.1	69.6±7.3	80.2±8.5	90.3±7.9
	O			NS	*3.94
	OO	NS		NS	
B.PS	Mean ±SD	120.3±10.2	124±12.4	157.5±16.3	158.5±21.7
	O			**4.8	**4.9
	OO	NS		NS	
BSA	Mean ±SD	1.79±0.1	1.72±0.09	1.84±0.08	1.90±0.06
	O			NS	**0.18
	OO	NS		S	
E.F	Mean ±SD	71. 8±3.95	72.4±8.26	43.1±5.84	47.6±4
	O			**-40	**-34.3
	OO	NS		NS	
F.S	Mean ±SD	34.6±3.06	35.5±6.6	17. 8±3.67	20.3±2.3
	O			**-48.6	**-48.8
	OO	NS		NS	

Parameters		Control(group I)		IHD (groupII)	
		Male	Female	Male	Female
EDV	Mean ±SD	264±91	340±71	59±11	90±44
	o			*-77.9	**-73.5
	oo	NS		NS	
ESV	Mean ±SD	63.9±26.3	2±13.5	32.8±6.4	53.4±30
	o			**-48.7	*-31.7.
	oo	NS		NS	

IHD: Ischaemic Heart Disease.
AEG: Aeg of subjects (years).
HT: Hight of subjects (cm).
WT: Weight of subjects (kg).
B.Ps: Blood pressure (systolic)mmHg.
BSA: Body surface Area(m^2).
E.F: Ejection Fraction.
F.S: Fractional Shortening
EDV :End –Diastol Volume .
ESV: End–Systalic Volume.
o: percentage of difference from control for the same sex.
oo: percentage of difference of the same group for different sexes.
*: $P<0.05$(significant).

**: P<0.01(high significant).
S: (significant).
NS: (No significant).

Table (2): Echo cardio graphic measurements of LV structure in control subject and patients with (IHD) .

Parameters		Control(group I)		IHD(groupII)	
		Male	Female	Male	Female
IVSTd	Mean ±SD	0.8±0.1	0.8±0.1	1.28±0.2	1.19±0.1
	o			**3.7	*2.7
	oo	NS		NS	
IVSTs	Mean ±SD	1.13±0.1	1.2±0.2	1.5±0.13	1.5±0.1
	o			**3.6	**2.7
	oo	NS		NS	
LVIDd	Mean ±SD	4.6±0.3	4.7±0.2	5.5±1.7	6.2±0.97
	o	**-27.1	**-36.6	*2.1	**7
	oo	NS		NS	
LVIDs	Mean ±SD	3.3±0.4	3.4±0.1	4±1.1	4.3±1.2
	o			NS	*4.2
	oo	NS		NS	
PWTd	Mean ±SD	0.97±0.1	0.90±0.1	1.08±0.1	1.08±0.1
	o			*2.1	*3
	oo	NS		NS	
PWTs	Mean ±SD	1.2±0.3	1.2±0.1	1.4±0.3	1.4±0.3
	o			NS	NS
	oo	NS		NS	

IVSTd &IVSTs (cm): Inter Ventricular Septum Thickness in diastole and systole.
LVIDd &LVIDs (cm): Left Ventricular Internal Diameter in diastole and systole.
PWTd & PWTs: Posterior Wall Thickness of LV(cm) in diastole and systole.

Table (3): Echocardiographic measurements of LV in control subject and patients with (IHD).

Parameters		Control(group I)		IHD (groupII)	
		Male	Female	Male	Female
LVM	Mean ±SD	135.6±25	141.8±26	183±34.4	153±26
	o			**3.4	
	oo	NS		NS	
LVMI	Mean ±SD	75.6±13	82.5±14	99.4±43	80.52±43
	o			**2.7	**3.6
	oo	NS		NS	
RWTd	Mean ±SD	0.4±0.03	0.4±0.07	0.35±0.06	0.52±0.08
	o			*2.9	**2.7
	oo	NS		NS	
RWTs	Mean ±SD	0.82±0.1	0.77±0.1	9.76±0.2	0.78±0.1
	o			NS	NS
	oo	NS		NS	
LV.E.D	Mean ±SD	74.6±23.6	80.7±15.9	110.8±40.2	103.3±35.4

stress	o			*3.2	*2.7
	oo	NS		NS	

LVM :Left Ventricular Mmass(g) .
LVMI :Left Ventricular Mass Index (g/m^2) .
RWTd &RWTs : Relative Wall Thickness of LV in diastole and systole.
LV.E.D stress : LV End • Diastole wall stress (mmHg) .

Table (4): Echo cardio graphic measurements of left atrail in control and patients groups.

Parameters		Control(group I)		IHD(groupII)	
		Male	Female	Male	Female
LA.C.V.d	Mean ±SD	21.4±8.1	14.1±2.5	190±23	141±54.5
	o			**78.8	**90.0
	oo	S		S	
LA.C.V.s	Mean ±SD	6.3±2.1	4.2±0.9	108±26.5	787±33.7
	o			16.14	17.73
	oo	S		S	

LA.C.V.d : Left Atrial Calculated Volume (cm^3) in diastole.
LA.C.V.s : Left Atrial Calculated Volume (cm^3) in systole.

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