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Left Ventricular Mass as Related to Age

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Abstract: Hypertrophy of left ventricle has been recognized as a significant clue for cardiovascular insults in clinical practice. It's crucial to understand whether left ventricle mass increases with age. This cross-sectional study included 100 healthy males in total. All of the participants were assigned to one of four groups: Group I (N = 36) consisted of people aged 20 to 29, Group II (N = 28) of people aged 30 to 39, Group III (N = 19) of people aged 40 to 49, and Group IV (N = 17) of people aged 50 to 60.The Devereux method is used to make measurements of the left ventricle at end-diastole by M-mode derived echocardiography, as recommended by the American Society of Echocardiography (ASE). With age, LVM, LVMI, and RWT all increased statistically significantly. The measures of LVM and LVMI were statistically significant in groups I-III and I-IV. RWT varied significantly between groups I-II, I-III, and I-IV, as well as between groups II and III. IVSTd and PWTd showed a substantial increase with age, however LVIDD showed no significant change with age. Groups IV and III had significantly higher IVSTd and PWTd than Group I (p 0.05). Finally, the LV mass increased significantly as the patient's age increased.

Keywords: Left ventricle mass, left ventricle hypertrophy

Abbreviation: LVH; left ventricle hypertrophy, ASE: American Society of Echocardiography, LVM: left ventricle mass, LVMI: left ventricle mass index, RWT: relative wall thickness, IVSTd: interventricular septal thickness at diastole, LVIDD: left ventricle internal diameter at diastole, PWTd: posterior wall thickness at diastole

Introduction

In clinical practice, LVH has been documented as an essential indicator of heart illness. Its prevalence varies according to various variables, reaching from 3% in normotensive community-based studies [(1)] to over 75% in hypertension individuals [(2)]. Regardless of additional dangers, people with upper limit LV mass have a risk of future cardiovascular morbidity and mortality that is at least doubled. Several approaches for calculating left ventricular mass and defining hypertrophy have been utilized, each with its own set of defects and strengths. As a result, a wide range of values is produced. The most significant constraint for exact LV mass computation is poor picture quality. Various researches are unable to capture comprehensive study in nearly 25% of screened individuals due to unsuitable acoustic windows [(3)].The most often used formulas are all versions of similar mathematical principle, which is volumes based equations. Troy and collaborators' equations were suggested a formula for assessing LV mass from M-mode measures. LV mass = 1.05([LVIDd + PWTd + IVSTd]3- [LVIDd]3) g. [(4)].

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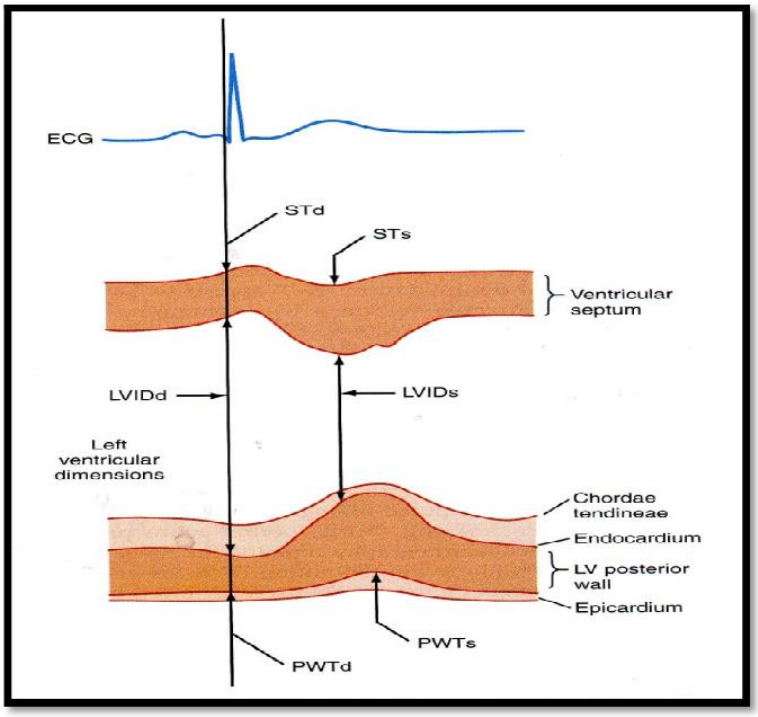

Figure 1: M-mode calculation of LV mass

When it comes to LV mass formulas, there are a few key points to remember. Necropsy validation studies has a limited sample size and evaluates a wide range of ventricular geometries.. Second, when a ventricle is deformed, where a 2D echocardiography is preferable, these equations may not work well. As Levy and colleagues in the Framingham cohort revealed, different formulae can produce different cut point values [(5)]. Finally, numerous post-mortem investigations discovered only modest concordance between echocardiography and autopsy-derived estimations of LV mass. [(6)]

Levy (1988) [(5)] found that LV mass rises with age [(3)], this was seen in both normotensive and hypertensive individuals. [(7)]. Due to body size enlargement, heart size grows during childhood and adolescence, and gender differences become more noticeable at this time [(8)]. The amount of LV mass increases with age [(9)], which weakens its independent significance in older people, when other risk variables are more important [(10)].

In 1989, Dannenbeg and colleagues showed that mass of left ventricle did not rise with aging in a normal subsample of the Framingham research, implying that other variables are responsible for the majority of the alleged physiological increase. These findings are supported by research in younger patients, which shows that the age-related rise in mass of left ventricle is partly elucidated by changes in size of the body and level of blood pressure [(8)]. Nonetheless, in epidemiological studies of LV mass and hypertrophy, it appears reasonable to account for age. RWT For over 30 years, parietal thickness and its relationship to the size of left ventricle have been documented as indices of LVH [(11)]. Relative wall thickness (RWT) calculated as:
Thickness of posterior wall multiplied by 2 divided by end diastolic diameter of left ventricle.
Regardless of whatever formula is employed, the upper normal values is commonly 0.44 [(12)] or 0.45. [(13)]

Methods

Following written and oral consent, a total of 100 healthy males were recruited for this cross-sectional investigation. To rule out any factors that might have impacted the results, the following requirements must be met:

a) No history of medical problem.
b) Avoiding medications that might influence the findings.

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Participants were asked to provide information about their habit, family history and age. To rule out endocrine and cardiac co-morbidities, a thorough physical examination was performed. On the basis of age, all participants were separated into four groups:

•GROUP A (N=36): individuals between the ages of 20 and 29.
•GROUP B (N=28): ages 30 to 39.
•GROUP C (N=19): individuals between the ages of 40 and 49.
• GROUP D (N=17): individuals in their 50s and 60s.

At Al-Furat teaching hospital, all echocardiographic and Doppler investigations were performed by a single examiner using two-dimensional (2D) Vivid E9 equipment with a 2-4 MHz transducer produced in the United States. (See Figure2).

Figure 2 Vivid E9 echo equipment

The Devereux technique is used to make M-mode measurements of the LV during diastole, as recommended by the American Society of Echocardiography (ASE), (Devereux *et. al.*, 1986).

$LVM=0.8[1.04(IVSd+ PWTd+ LVIDd)^3-(LVIDd)^3] +0.6$. Devereux formula

After acquiring the patient's weight and height, as well as an echocardiographic assessment of mass of left ventricle (g), then it connected to the BSA.

Results

The following table shows a statistical study of individual components of LVM by age group.

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Table: Individual component of LVM by age groups

Data (M±SD)	Group I (20-29 yr) N=36	Group II (30-39 yr) N=28	Group III (40-49 yr) N=19	Group IV (50-60 yr) N=17	ANOVA P value
IVSTd (cm)	0.91±0.14	1.01±0.14	1.05±0.12	1.08±0.19	significant
PWTd (cm)	0.77±0.17	0.84±0.15	0.95±0.16	0.96±0.13	significant
LVIDd (cm)	5.22±0.06	4.82±0.47	4.86±0.34	4.81±0.46	Not significant
LVM (g)	153.18±39.4	161.03±38.4	180.63±30.44	182.02±35.2	significant
LVMI (g/m^2)	79.71±14.6	79.62±16.4	90.62±16.6	94.96±17.1	significant
RWT	0.33±0.06	0.38±0.06	0.41±0.05	0.42±0.06	significant

With age, LVM, LVMI, and RWT all increased statistically significantly. The measures of LVM and LVMI were statistically significant in groups I-III and I-IV. RWT varied significantly across groups I-II, I-III, and I-IV, as well as between groups II and III. IVSTd and PWTd showed a substantial increase with age, however LVIDD showed no significant change with age . Groups IV and III had substantially greater IVSTd and PWTd than Group I (p 0.05). Groups II, III, and IV had substantially greater LVIDd than group I (p 0.05). According to our findings, LVM, IVSd, and PWTd all rose considerably as people aged, according to our findings. In the case of LVIDd, there were no age-related alterations. The LVMI altered considerably as people got older.

Discussion

Levy, 1988 [(14)] showed that LV mass rises with age, especially relative wall thickness [(3)], which was observed in both normotensive and hypertensive individuals [(7)]. These studies back up our findings, indicating that LVM, RWTd, and LVMI all rise with age.

According to Sarita et al. (2010)[(15)], the normotensive obese participants had a considerably greater LVMI and RWT than the normotensive obese participants. However, this study focused on pediatric and adolescent groups rather than adults and middle-aged groups. Both normal-weight and obese older children exhibited a greater prevalence of increased LVMI, suggesting that LVM is significantly connected to age.

Conclusion

With increasing age, the left ventricle mass increases.

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