Impact of Ethnicily on Left Ventricular Mass in Newly Diagnosed Hispanic and White Hypertensive Patients

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A. Introduction

Left ventricular hypertrophy (LVH) has been found to be an independent risk factor for stroke, MI, congestive heart failure and sudden death in patients with hypertension, aortic stenosis and those with no evidence of pressure overload (1,2,3). Because it is a powerful predictor of morbid events independent of traditional risk factors, assessment of left ventricular mass is an important component of the assessment of cardiovascular risk. 20-30% of hypertensive patients have LVH (4). These patients have myocardial infarction or death at a rate of 4.6 events per 100 patients. This is three times the risk in hypertensive patients without LVH (5,6). Normotensive, asymptomatic patients have an increase in relative risk of all cause mortality of 1.5 in men and 2.0 in women for every 50 g/m increment in LVH mass indexed to height (3). The relative risk of sudden death is 1.7 per 50 g/m (3). The risk conferred by LVH is similar to multi vessel disease. In one study Liao et al found that in blacks, 5 year mortality is 16. 1 % with LVH and normal coronary anatomy, compared to 17.6% with multi vessel disease and no LVH (7). In a four year follow up of 1141 original Framingham participants free of apparent CHD, levy et al showed that after adjusting for age, systolic blood pressure, smoking, obesity and cholesterol, increased LV mass had relative risk of 7.8 in men and 3.4 in women for a CHD event (3). Increased left ventricular mass has been associated with age, blood pressure, body mass, sex, and height (8,9,10). There is also growing evidence that ethnicity may play a role in the amount of left ventricular mass.

Multiple studies comparing white and black hypertensives have suggested that there are ethnic variations in ventricular structural response to hypertension. These studies have shown a significant difference in ventricular septal and posterior wall thickness between blacks and whites. One study found that ventricular septal thickness was > I Omm in 5 3 % of blacks as opposed to 3 2% of whites with hypertension (11). Left ventricular mass has also been found to be greater in blacks that whites with hypertension even when adjusted for other variables. In another study, 4243 black and white individuals between the ages of 23-35 had their left ventricular mass measured and blacks had a significantly larger mass than whites (12). The data including Hispanic hypertensive patients is very limited. Zabalgoitia et al looked at black, Hispanic and white individuals with known hypertension. They found a trend towards larger LV mass in Hispanics when normalized to BSA and height, but not reaching significant numbers. When LV mass was indexed to height to the allometric power of 2.7 to account for the flattening effect of obesity on LV mass, Hispanics had a larger mass that blacks and whites. Also, the concentric form of hypertrophy was more common in Hispanics that the other two groups. This study had limitations because it used a small number of Hispanics and treatment strategies and its duration were quite variable prior to enrollment in the study (13).

B. Primary hypothesis

Newly diagnosed Hispanic hypertensive patients have greater LV mass at the time of diagnosis than newly diagnosed white hypertensive individuals.

C. Purpose

The objective of this study is to evaluate the impact of ethnicity on left ventricular mass and wall thickness in newly diagnosed hypertensive Hispanic and white individuals. This will be done by using M

mode two dimensional . echocardiographically determined LV mass and wall thickness. The subjects in the study will be newly diagnosed hypertensive Hispanic and white individuals. The results of this study may help understand whether LVH and greater LV mass are more prevalent in Hispanics than in whites, and it may provide additional data to understand why mortality among Hispanic hypertensive patients hasn't decreased at the same rate as other ethnic groups. The higher prevalence of diabetes and obesity in Hispanics may in part explain this difference, but the extent of LV mass and its remodeling in hypertensive Hispanics could add to the lack of significant reduction in mortality. Also, it was suggested by Chaturvedi et al that LV mass index may not be valid for comparison between ethnic groups because it doesn't take into account ethnic differences in ventricular response to hypertension (11). Therefore, relative wall thickness will also be measured and compared between the two groups. If a significant difference is found, this may be considered a better way of comparing LV response to hypertension between ethnic groups. Furthermore, the concentric form of LV adaptation was reported by one small study as being more common in Hispanic than white hypertensive patients (13). It would be important to add support to this theory because the concentric form of LV adaptation has been associated with higher morbidity and mortality in patients with uncomplicated hypertension as well as hypertensives with normal left ventricular mass (6,14).

D. Study Design and Methods

Two dimensionally guided M-mode echocardiograms will be attempted in 1400 subjects equally divided into Hispanic and white men and women. Ethnicity will be assigned based on medical records and confirmed according to response to a self definition questionnaire. Participants will be collected from individuals enrolled in 1199 or HIP medical insurance who have been followed on a yearly bases for at least two years and were found to have hypertension within six months of enrollment in the study. Hypertension will be defined as systolic blood pressure ≥140 or diastolic blood pressure ≥90 mmHg on measurements taken at each of two or more clinic visits. Echo will be performed while the patient is off medications. The following data will be obtained at the time of enrollment: age, sex, weight, height, diabetes history, smoking history, systolic and diastolic blood pressure, heart rate and physical activity. Body mass index and body surface area will be calculated from the above data. Echocardiographic studies will be standardized by training echo technicians and readers according to a protocol. The following measurements will be obtained from the echocardiogram: septal thickness (ST), posterior wall thickness (PWT), and left ventricular internal diameter (LVID). LV mass will be calculated from the formula described by Devareux and associates (15). Mass is estimated at the end of diastole using the formula LV mass= 0.8 { 1.04[(ST+PWT+LVID)]3 - LVID 31 + 0.6 gm. Relative wall thickness will be determined by using the ratio of LV PWT x 2/ LVID in diastole and using < 0.45 as normal (6,14). Left ventricular mass will be indexed to BSA with normal being > 125 g/m~ for men and > 110 g/m2for women (16). LV mass will be calculated according to height using Framingham recommendations which consider LVH as > 143 g/m for men and > 102 g/m for women. Also, based on Cornell recommendation which assessed the allometric relations and the impact of obesity on LV mass, LV mass will be indexed according to height at the allometric power of 2.7. This index defines LVH as > 51 for men and > 47 for women. This last index will be done because it has been suggested that the BSA index may disguise the effect of weight on LV mass (17).

Subjects will be identified by reviewing insurance codes and selecting those patients who have the diagnosis of hypertension in a visit within the last six months, but not prior to that. These charts will then be reviewed to identify those patients who had documented blood pressures not meeting the criteria for hypertension over the two years prior to the diagnosis. Flyers will also be posted in clinics and medical staff will be informed of the protocol and the selection criteria.

E. Statistical Analysis

Mean unadjusted values and standard deviations will be calculated for LV mass in both groups. Multiple regression will be used to determine potential associations for each group between LV mass and each of the variables. T test will be used to calculate sample differences. A p value of < 0.05 will be used to identify significant results

F. References

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