

Global longitudinal strain in hypertensive patients with low exercise capacity

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Abstract: Arterial hypertension is associated with a high rate of morbidity and death because to its negative effects on a variety of systems, particularly the cardiovascular system. There will be growing myocardial fibrosis before cardiac function insults of a hypertension patient become apparent. Diastolic impairment is a prominent component of this illness, and despite the growing recognition of its importance, it is still underappreciated due to its challenging diagnosis and lack of effective therapies. The study's goal was to assess global longitudinal strain in hypertensive individuals with inadequate exercise ability. After receiving their verbal and written consent, a total of 40 young people participated in this study. The research took place from January through April of 2021. Sample is collected from consultation room in Furat teaching hospital. A sample was taken from the Furat teaching hospital's consulting room. They were separated into two groups based on their ECG treadmill test results: those with fair or normal functional capacity >7 MET (n=25) and those with reduced functional capacity ≤7 MET (n=25). No important difference in the average GLS in these two groups is observed (P value:0.6). Conclusion: In hypertension individuals with inadequate functional capability, global longitudinal strain does not vary.

Introduction

A conventional echocardiography can detect changes in LV diastolic problems associated with left ventricular hypertrophy. Because LV systolic function is preserved until late in the disease's course, minor alterations in left ventricular contractile function might be difficult to detect early on.⁽¹⁾

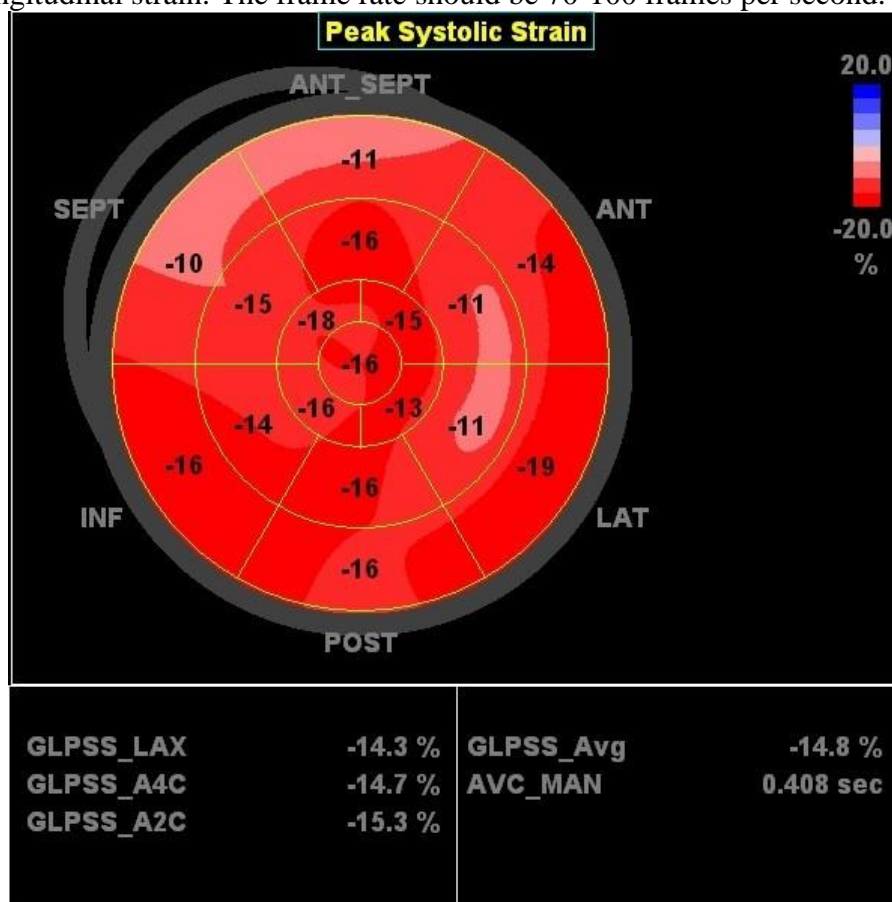
The strain of myocardial tissue, a dimensionless estimate of deformation, can be used to differentiate subclinical abnormalities in left ventricular function. Two-dimensional (2D) speckle tracking is a novel echocardiographic technique for examining longitudinal, circumferential, and radial fiber stresses in the left ventricle. Because it estimates two-dimensional rather than one-dimensional intra-tissue velocities, the speckle tracking derived strain is preferred to tissue Doppler. It also allows for separation between active segmental deformation and passive tethering effect motion. The deformation is compared to the original length using speckle tracking strain. Longitudinal stresses acquired from apical views that measure apex-base deformation, as well as circumferential or radial strains assessed from short-axis parasternal views, are examples of normal strains. Global longitudinal strain (GLS) has superior utility among different types of strain because: it is calculated from average strains across the entire length of the myocardium wall, which gives strength to this consideration; and in non-hypertrophied hearts, there is more myocardium available in the apical long-axis view than in the short-axis view. A score of $-20\pm 2\%$ was declared normal for GLS by the American Society of Echocardiography. For exact strain evaluation, image quality and frame rates (preferably, no less than 40 fps) are critical.⁽²⁾ Even though new recommendations do not support its efficacy due to restricted views and contractility of the actual apical cap segment, the seventeen-segment model is widely employed in most echocardiography imaging modalities.⁽³⁾

Methodology

After receiving their verbal and written consent, a total of 50 young people participated in this study. The research took place from January through April of 2021. Sample is collected from consultation room in Furat teaching hospital.

Patients with hypertension who are under the age of 65 and are taking antihypertensive medication.

The term "young age" refers to those who are between the ages of 18 and 40.⁽⁴⁾ Patients who have been diagnosed with primary noncomplicated hypertension and receiving antihypertensive drugs are involved. Participants were separated into two groups based on their ECG treadmill test results: those with fair or normal functional capacity >7 MET (n=25) and those with reduced functional capacity ≤7 MET (n=25), keeping in mind that functional capacity less than 7 MET is considered low.⁽⁵⁾ For the purpose of speckle tracking analysis, three apical views are used namely the parasternal long axis view, the 3 chambers view and the 4 chambers view. The regions of interest were marked at apex and the two mitral annuli at each view. The program then determines peak systolic longitudinal strain in matching regions of each image, as well as determining aortic valve closure. The average longitudinal strain for these three viewpoints is used to calculate global longitudinal strain. The frame rate should be 70-100 frames per second.⁽⁶⁾

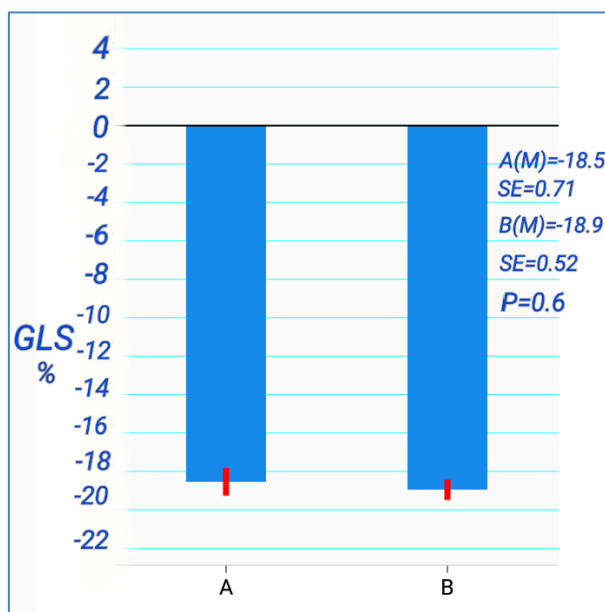


Bulls-eye figure of peak systolic strain

To determine exercise capacity and rule out the potential of IHD, all individuals were put through a treadmill test using the Bruce procedure. Our aim is to reach maximum stress, which is when they hit 85% of their maximum anticipated HR.⁽⁷⁾

Results

The average GLS of both groups shows no significant differences (P value:0.6)



Group A (exercise capacity >7 MET, n:25) and group B (exercise capacity 7 MET, n:25), (GLS) in (percent).

Discussion

According to a 2009 research by Jasmine G. et al. ⁽⁸⁾ diastolic dysfunction is a powerful reflector of impaired exercise capacity in hypertension individuals. E/e' of 15 or higher has been proven to have a strong correlation with invasively measured left ventricular end-diastolic pressure. ⁽⁹⁾

They also discovered that resting E/e' of 15 or higher was associated with a decrease in exercise ability. Furthermore, they hypothesized that exercise ability is unrelated to systolic blood pressure. This study's findings were similar to ours, although we vary in that we employ GLS to measure systolic function rather than EF and FS. We find no significant differences in GLS between those with exercise capacity equal to or less than 7 MET and those with exercise capacity greater than 7 MET, confirming that exercise intolerance in hypertensive patients is linked to diastolic abnormalities rather than systolic abnormalities, even in the subclinical phase as detected by strain echocardiography.

E/e and other diastolic parameters such as PCWP are considerably elevated in those with low functional capacity, according to a study by Ljubica G et al, 2017.⁽⁵⁾ We disagree with Ljubica G et al., who discovered that only a lower GLS % (more positive) was an independent predictor of 7 METs exercise capability, whereas our study observed no significant change in GLS.

Conclusion

In hypertension individuals with inadequate functional capability, global longitudinal strain does not vary.

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