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Left Heart Changes in Hypertensives Attending Rivers State University Teaching Hospital: An Echocardiographic Review

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Abstract

Background: Hypertension, commonly known as high blood pressure, is a significant health challenge globally and in Nigeria, where it stands as the primary cause of cardiovascular diseases. Hypertensive heart disease refers to the complex and diverse change of the cardiac structure and function secondary to hypertension.
Objective: This study aims to investigate the patterns and gain insight to the progression of cardiac changes among hypertensives patients presenting at the Rivers State University Teaching Hospital, Port Harcourt.
Methods: This hospital-based cross-sectional study was conducted at Rivers State University Teaching Hospital's Echocardiogram lab. Ethical clearance was obtained, ensuring privacy and informed consent. Hypertensive patients aged 18 and above were included, excluding those with diabetes, heart diseases, or rheumatic valvular disease. Demographic and clinical data were collected, and echocardiograms performed to assess cardiac parameters like LAD, LV dimensions, and LVM. Statistical analysis was performed using Excel and SPSS 25 for descriptive and comparative evaluation.
Results: The prevalence of combined and isolated cardiac abnormalities were 278(76.80%) and 73 (20.14%) respectively, with only 11(3.31%) normal
The most prevalent combined condition was left atrial enlargement occurring in combination with other cardiac abnormalities in 164 (45.30%) of the study population.
Conclusion: The study highlights the complexity of hypertensive heart disease in Nigerian adult and the need for classifications that encompass the full spectrum of cardiac structures, including those in the left atrium. Public health initiatives aimed at increasing awareness and facilitating access to diagnostic services like echocardiography could help in early identification and intervention.

Keywords: Hypertension, Hypertensive heart disease, Grading of HHD, Echocardiography

Introduction

Hypertension, commonly known as high blood pressure, is a significant health challenge globally and in Nigeria, where it stands as the primary cause of cardiovascular diseases. It is a frequent presentation in cardiology clinics and is a leading contributor to cardiac conditions within the region. The impact of hypertension extends beyond the heart, affecting vital organs such as the brain, eyes, kidneys, and blood vessels causing stroke. It is responsible for at least 45%[1] of deaths attributed to heart disease and 51%[2] of stroke-related deaths. The extent of organ damage correlates with the duration of uncontrolled blood pressure and the effectiveness of antihypertensive treatment.[3]

A review analysis showed an estimated prevalence of hypertension among Nigerian adults at 28.9%,[4] with a range of 6.2%–48.9% for men and

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10.0%–47.3% for women, as well as 30.6% and 26.4% among urban and rural dwellers, respectively.[4] Another study reported a prevalence of 55.0% based on the 2017 American College of Cardiology and American Heart Association Guideline for the Prevention, Detection, Evaluation, and Management of High Blood Pressure in Adults (ACC/AHA) 2017 guideline and 27.5% based on the Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC 7) guidelines in an urban Nigerian population.[5] A meta-analysis estimated the overall pooled crude prevalence of hypertension in Nigeria at 30.6%.[6]

Hypertensive heart disease, characterized by changes in the structure and function of the heart's left ventricle, left atrium, and coronary arteries are the most prevalent cardiac consequence of hypertension. Studies within the Nigerian population indicate a significant occurrence of left ventricular hypertrophy (LVH), a condition where the heart's muscle wall thickens, affecting up to 40% of individuals with hypertension.[7]

The definition of hypertensive heart disease varies across different regions and medical societies. The European Society of Cardiology, for instance, has adopted a classification system based on the Spanish proposal by Gonzalez-Maqueda et al,[8] which uses the acronym "VIA." This system categorizes hypertensive heart disease according to ventricular dysfunction (V), myocardial ischemia (I), and atrial fibrillation (A). However, this classification focuses more on the structural and functional alterations rather than providing a comprehensive understanding of the disease's progression. The "VIA" classification does not fully encapsulate the multifaceted impact of hypertension on cardiac health, many patients will not have atrial fibrillation but have dilated left ventricle, and it does not give an insight to disease progression. Moreover, the progression of hypertensive heart disease is dynamic, with echocardiography playing a crucial role in the detection and monitoring of cardiac changes over time.[9] This imaging technique allows for the non-invasive assessment of the heart's structure and function, aiding in the early detection of LVH, which can progress to heart failure if left unaddressed.

The progression of hypertensive heart disease is indeed complex and incremental. A longitudinal study has documented the transition from LVH to heart failure over time, emphasizing the need for ongoing research to fully comprehend the disease's trajectory.[10] Performing longitudinal studies in Nigeria can be quite challenging considering the fact that Nigerian patients are late presenters and considering the rather silent nature of the disease. Echocardiography remains an indispensable tool in diagnosing and monitoring cardiac abnormalities in patients with hypertension, offers a non-invasive method to evaluate heart function and structure.

Hypertension poses a significant threat to cardiovascular health, particularly in Nigeria. It necessitates prompt and effective management to prevent the onset of hypertensive heart disease and other related complications. Continuous research and consensus on definitions and classifications will enhance the understanding and treatment of this pervasive condition.

Hypertension, can lead to a variety of alterations in the heart's structure and function, collectively referred to as hypertensive heart disease (HHD).[11] The heart can be normal in hypertensives or associated with abnormalities termed hypertensive heart HHD This ranges from diastolic dysfunction to more severe alterations such as left ventricular hypertrophy (LVH) and dilated cardiac chambers with depressed ejection fraction. Left ventricular hypertrophy (LVH) is not just the thickening of the heart's left ventricular wall but dilatation with resultant increases in left ventricular mass. LVH can be preceded by left ventricular concentric remodeling, a change in the size, shape, and function of the heart without an increase in mass. Additionally, left ventricular systolic dysfunction, with impaired ability of the heart to pump blood effectively, and left ventricular diastolic dysfunction, affecting the heart's ability to fill with blood, are significant changes that can result from prolonged hypertension. Right ventricular dysfunction, left atrial enlargement, and various conduction abnormalities are also noted echocardiographic findings in HHD. Furthermore, ischemic heart disease (IHD), and aortic valvular Sclerosis (the thickening and stiffening of the heart valves) are also known complications of

hypertension on the heart.[11] An important question in evaluating the progression of hypertensive heart disease would be to assess the duration of hypertension, this would be a difficult variable as most hypertensives are not able to say for a certainty, when their disease started, knowing the silent nature of the disease and in addition, the absence of routine check -up or more accurately the neglect of it.

Hypertension poses a significant threat to cardiovascular health in Nigeria and globally, with serious implications for vital organs such as the heart, brain, kidneys, and blood vessels. Hypertensive heart disease stands out as a prevalent complication, often leading to structural and functional cardiac changes like left ventricular hypertrophy and diastolic or systolic dysfunction. Left ventricular hypertrophy, in particular, reflects both concentric remodeling and mass increases, which can progress to heart failure if left unchecked. Given the silent and progressive nature of hypertension, early detection through tools like echocardiography is crucial. This imaging method is invaluable for monitoring the structural and functional evolution of the heart, offering insights into the progression of hypertensive heart disease. Further longitudinal studies, especially within the Nigerian context, are essential to deepen the understanding of the disease's trajectory and its patterns.This study aimed to investigate the patterns and progression of cardiac changes among hypertensive patients presenting at the Rivers State University Teaching Hospital, Port Harcourt, using Echocardiography.

Methods

Study Design and Area: It was a cross sectional, hospital-based study carried out at the Echocardiogram lab of the Rivers State University Teaching Hospital, Port Harcourt, Rivers State, in southern Nigeria. Port Harcourt is the largest city in Rivers State and also serves as its capital. Each candidate had an echocardiogram carried out using a predefined imaging protocol. After interview with a medically trained research assistant to obtain socio-demographic characteristics. All participants had their weight and height measured and their body mass index (BMI) calculated.

Blood Pressure Measurements: An average of two blood pressure readings was obtained for each participant. Hypertension was defined according to the 2013 guidelines of the European Society of Hypertension/European Society of Cardiology: Systolic blood pressure (BP) ≥ 140 mmHg, Diastolic BP ≥ 90 mmHg and lower values in patients who reported treatment of hypertension using antihypertensive medications.[12]

Ethical Considerations: Patient's consent was obtained, privacy and confidentiality were strictly adhered to. Ethical clearance was obtained from the Hospital's ethics committee.

Inclusion Criteria:

Subjects diagnosed with hypertension regardless of duration aged 18years and above

Exclusion Criteria:

1. Subjects with diabetes
2. Subjects with a long history of heart diseases
3. Subjects with rheumatic valvular heart disease
4. Subjects who did not consent to be part of the studies.

Sample Size: The sample size was calculated using the sample size formula for single proportion, $n=Z^2pq/d^2$ and a prevalence of 27%[13] being the reported prevalence of a study on hypertension in Port Harcourt, a confidence interval of 95% and an error margin of 5%.

The calculated minimum sample size for the study was approximately 288.This was rounded up to 317 in anticipation of a non-response rate of 10%. However, a total of 362 participants who met the above stated inclusion criteria were consecutively recruited into the study

A larger study population was recruited to strengthen the reliability and depth of the findings. This allowed for better representation of various subgroups, such as age, gender, or location, ensuring the study's results were more inclusive and applicable to the broader population. Additionally, the increased sample size improved statistical power, enhancing result precision and reducing the margin of error. It also accounted for potential non-responses or dropouts, ensuring that sufficient data was available to draw valid conclusions despite any

participant attrition.

Data Collection: For each patient, an echocardiogram was performed following the collection of socio-demographic and clinical data using a structured data entry proforma that included an echocardiogram protocol. The socio-demographic and anthropometric information recorded consisted of the patient's age, sex, height, and weight. Clinical parameters, such as systolic and diastolic blood pressure (SBP and DBP) and heart rate (HR) were also gathered.

Echocardiography: Echocardiographic assessment provided data on key variables, including the left atrial diameter (LAD) and various left ventricular (LV) changes. These LV parameters encompassed wall thickness, dimensions (both end-diastolic and end-systolic), ejection fraction, relative wall thickness (RWT), and left ventricular mass index (LVM), normalized for body surface area (LVM/kg/m^2).

Data Analysis: The data collected was processed using Excel and SPSS version 25. Descriptive statistics were utilized to summarize demographic and clinical variables. Continuous variables, such as age, BMI, SBP, DBP, LAD, RWT, and LVM, were analyzed to compute means and standard deviations (SD). Comparative analysis of echocardiographic parameters between male and female hypertensive patients was conducted using independent T-tests.

Results

Table 2 represents a comprehensive set of socio-demographic, anthropometric and echocardiographic measurements and statistical analysis while table 3 compares some cardiac parameters between male and female subjects. The mean values and standard deviations for various parameters such as age, body mass index (BMI), Systolic blood pressure (SBP), diastolic blood pressure (DBP), heart rate (HR), left atrial diameter (LAD), interventricular septal diameter (IVSD), left ventricular internal diameter in diastole (LVIDD), left ventricular posterior wall diameter (LVPWD), end-diastolic volume (EDV), stroke volume (SV), ejection fraction (EF), relative wall thickness (RWT), left ventricular mass (LVM), E/A ratio, and deceleration time (DEC T) are provided.

There was no significant difference in age and BMI between males and females, (P<0.05). However, there was a significant difference in RWT (P=0.025) and LVM (P=0.001).

Table 1: Definition of Terms

Parameter	Definition of Abnormalities
Left Atrial Diameter (LAD)	abnormal when >4.0 cm, as defined by a study conducted in Nigeria by Oyati et al.[14]
Left Ventricular Internal Diameter (Lvidd)	abnormal when >5.6 cm, indicating potential ventricular dilation.[14]
Relative Wall Thickness (RWT)	calculated as 2 × posterior wall thickness ÷ lv internal diameter; increased when rwt >0.43, per ASE guidelines.[15]
Left Ventricular Mass (LVM)	calculated as LVM = 0.8[1.05(ivstd + lvidd + pwtd)^3 – (lvidd)^3] + 0.6 g; increased LVM suggests hypertrophy.[15]
Left Ventricular Ejection Fraction (LV EF)	categorized as depressed when <50%, reflecting impaired systolic function.[16]
Left Ventricular Diastolic Function	assessed using the e/a ratio and deceleration time, indicating relaxation and filling dynamics.

Table 2: Mean Values of Echocardiographic Measurements of Participants

Parameter	Value (Mean ± SD)
Total participants	362
Males	180 (49.73%)
Mean age	55.20 ± 13.77 years
Body mass index (BMI)	28.86 ± 8.77 kg/m^2
Systolic blood pressure	143.00 ± 19.04 mmHg
Diastolic blood pressure	86.34 ± 14.53 mmHg
Heart rate	77.21 ± 19.06 beats/min
Left atrial diameter	4.01 ± 0.76 cm
Interventricular septal thickness	1.12 ± 0.36 cm
Left ventricular internal diameter	5.11 ± 1.03 cm
Left ventricular posterior wall thickness	1.23 ± 0.32 cm
End-diastolic volume	128.84 ± 58.76 mL
Stroke volume	81.84 ± 31.15 mL
Ejection fraction	66.75 ± 14.18 %
Relative wall thickness	-0.51 ± 0.18 cm
Left ventricular mass	246.78 ± 7.22 kg
E/A ratio	1.04 ± 0.53
Deceleration time	165.09 ± 56.77 ms

Table 3: Comparison of Echocardiographic Measurements between Males and Females

PARAMETER	Mean SD (males)	Mean SD (females)	T	Df	Sig. (2-tailed)
AGE (yrs)	57.01± 13.00	55.86 ± 15.18	.538	44	.593
BMI (kg/m^2)	29.80 ± 6.85	31.39 ± 9.42	-1.199	11	.256
SBP (mmHg)	142.81 ± 18.75	146.07±17.70	-.492	8	.636
DBP (mmHg)	86.78 ± 14.51	86.50 ±11.27	.339	8	.743
LAD (cm)	4.08 ± 0.83	3.98 ± 0.68	1.131	89	.261
RWT (cm)	0.47 ± 0.22	0.49 ± 0.20	2.280	89	.025
LVM (kg)	254.40 ± 173.67	199.25 ± 98.60	3.599	89	.001
E/A	1.11 ± 0.61	0.98 ± 0.43	1.777	77	.080
DEC T (ms)	165.91 ± 52.84	164.39 ± 61.82	-.874	3	.447
Aortic valve area (cm^2)	3.74 ± 1.91	3.09 1.13	.718	2	.547

Age (AGE) Body Mass Index (BMI), Systolic Blood Pressure (SBP) and Diastolic Blood Pressure (DBP) Left Atrial Diameter (LAD Relative Wall Thickness (RWT). Left Ventricular Mass (LVM) The E/A ratio evaluates the relationship between early (E) and late (A) ventricular filling velocities, Deceleration Time (DEC T) Aortic Valve Area (AVA), "T," t-tests; "Df," the degrees of freedom; and "Sig. (2-tailed)," two-tailed p-value for statistical significance

Considering that the normal left ventricular mass in males and females are different. the Cohen's formular was used to the estimate the difference in the population.

Cohen's Formular(D) = Difference in Means÷PooledStandard Deviation: Mean for Males-Mean for female ÷ Pooled SD

Mean LVM for males = 254.4g, with standard deviation (SD)=173.67g and number of males = 180
Females (Group 20) with : Mean LVM=199.25g, SD= 98.60g and number of females = 181

The formula for the pooled standard deviation is:
SD pooled = (square root of Weighted average of Variances)
= √Weighted Average of Variances
Substituting correctly = 141.11.
Difference in Means = 254.40−199.25 = 55.15g

d = 55.15 / 141.11
d ≈ 0.39

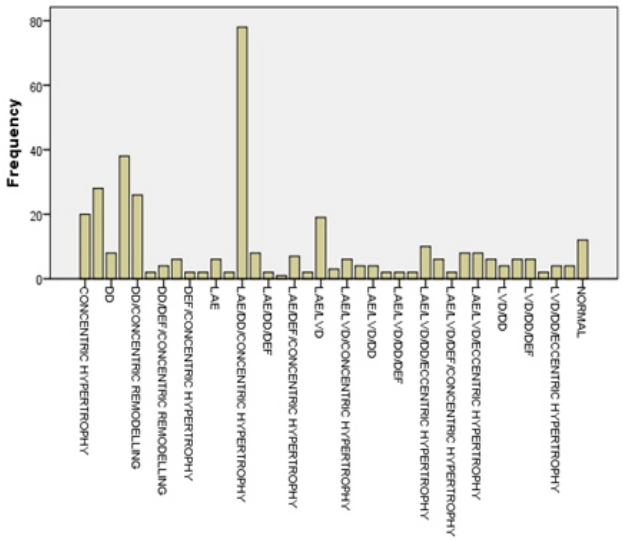

Fig 1: Chart to illustrate echocardiographic findings

LAE: left atrial enlargement DD: diastolic dysfunction NEF: normal ejection fraction DEF: depressed ejection fraction CR: concentric remodeling CH: concentric hypertrophy EH: eccentric hypertrophy DLV: dilated left ventricle NLA: normal left atrium PEF: preserved ejection fraction NSLV: normal-sized left ventricle ICA: isolated cardiac abnormalities CCA: combined cardiac abnormalities.

Step 5: Interpret the Effect Size using Cohen's d interpretation guidelines states that in Small effect: d=0.2d = 0.2; Medium effect: d=0.5d = 0.5;Large effect: d=0.8d = 0.8
In this case, d≈0.39d which indicates a small-to-medium sized difference.
This suggests that while there is a significant difference in LVM between males and females however it is not a large one

Isolated Abnormalities
Isolated abnormalities seen were; concentric remodelling, concentric hypertrophy, diastolic dysfunction and isolated left atrial dilatation was seen in 73 (20.14%) of the study population.

Table 4: Echocardiographic findings

Serial	Findings	Frequency	Percent
	Normal	11	3.04%
	Abnormal		96.69%
	Isolated cardiac abnormalities (ICA)	73	20.17%
2	Concentric remodeling (CR)	27	7.46%
3	Concentric hypertrophy (CH)	21	5.80%
4	Diastolic dysfunction (DD)	25	4.42%
5	Left atrial enlargement (LAE)	9	2.49%
	Combined cardiac abnormalities (CCA)	278	76.80%
A	Normal left atrium (NLA)	64	17.68%
6	DD/CR	26	7.18%
7	DD/CH	38	10.50%
B	LAE with normal-sized left ventricles (NSLV)	164	45.30%
B1	LAE with normal-sized left ventricles (NSLV)and NEF	130	35.91%
8	LAE/DD/CH	72	19.89%
9	LAE with normal EF (NEF)	46	12.70%
11	LAE/DD/CR	12	3.32%
B2	LAE with normal LV and DEF	34	9.39%
10	LAE/DD/Depressed EF (DEF)	3	0.83%
12	LAE/DD/DEF/CH	7	1.8%
13	LAE/DEF/CH	24	3.4%
C	LAE with dilated left ventricles (DLV)	48	13.3%
C1	LAE/NSLV/Preserved EF (PEF)	32	8.8%
14	LAE/DLV/DD	2	0.55%
15	LAE/DLV/DEF	7	1.92%
16	LAE/DLV/Eccentric hypertrophy (EH)	8	2.2%
17	LAE/DLV/CH	3	0.8%
18	LAE/DLV/DD/EH	12	3.31%
C2	LAE/DLV/DEF	16	4.42%
20	LAE/DLV/DD/DEF/CH	12	3.31%
21	LAE/DLV/DD/DEF/EH	4	0.6%
D	DLV without LAE	8	2.22%
D1	DLV without LAE with PEF	4	1.11%
22	DLV/DD/CH	4	1.10%
D2	DLV without LAE with DEF	4	1.11%
23	DLV/DD/DEF/CH	2	0.55%
24	DLV/DEF/	2	0.55%

LAE: left atrial enlargement DD: diastolic dysfunction NEF: normal ejection fraction DEF: depressed ejection fraction CR: concentric remodeling CH: concentric hypertrophy EH: eccentric hypertrophy DLV: dilated left ventricle NLA: normal left atrium PEF: preserved ejection fraction NSLV: normal-sized left ventricle ICA: isolated cardiac abnormalities CCA: combined cardiac abnormalities

TABLE 5: Proposed RSUTH Classification Of Hypertensive Heart Disease RSUTH: Rivers State

S/NO	Grading	Findings
	Grade 0	Normal
	Grade 1	Isolated findings of concentric remodeling, concentric LVH, Diastolic dysfunction
	Grade 2	concentric remodeling, concentric LVH, diastolic dysfunction, + LAE
	Grade 3	LAE +/_ Diastolic dysfunction + LV(PEF) dilatation
	Grade 4	LAE +/_ Diastolic dysfunction + LV dilatation (DEF)
	Grade 5	LAE + Normal LV or Dilated LV+ Clinical features of Heart Failure

University Teaching Hospital, LAE: left atrial dilatation, LVD: left ventricular dilatation, PEF: Preserved ejection fraction, DEF: Depressed EF.

Combined Abnormalities: Most echocardiograms in the study population had multiple pathologies 278(76.80%). There were different combinations ranging from two abnormalities to more than two. The most common, combined abnormalities were associated with left atrial dilatation and normal sized ventricles in 164 (45.30%) of the study population. However, left atrial dilatation with dilated ventricles were seen in 48(13.30%) and normal left atrial size with LV remodeling and diastolic dysfunction was seen in 64(17.68%)

There were no cases of Isolated LV dilatation or isolated depressed ejection fraction in the population studied. Most subjects with LV dilatation or depressed LV ejection fraction had left atrial dilatation, suggesting that left atrial dilatation predates LV dilatation and dysfunction.

Discussion

Hypertension is a significant risk factor for various cardiovascular complications, this includes left and right heart changes. This study paid attention to the left heart changes seen in hypertensives. The index study noted the patterns and progression of cardiac changes among hypertensive patients. Echocardiography is a valuable tool for assessing cardiac structure and function, allowing for the measurement of parameters such as left atrial diameter, left ventricular dimensions, wall thickness, mass, ejection fraction, and diastolic function.

There was a significant difference in LVM and RWT in the index study. Gender differences in LVM and RWT are evident in normal individuals. Additionally, in diseased individuals, a study evaluating gender differences in LV geometry among hypertensives found that women were more likely to have eccentric LVH, while men had concentric LVH.[16] Furthermore, women exhibited higher EF and FS. This goes to confirm the gender-related differences in cardiac structure and function in disease and normal state.

Echocardiographic parameters

The findings from this investigation suggest that concentric remodeling, concentric left ventricular hypertrophy (LVH), and diastolic dysfunction are the earliest detectable features of hypertensive heart disease. More advanced changes, such as left atrial dilatation, left ventricular dilatation, and reduced ejection fraction, tend to appear later as the disease progresses. This progression underscores the importance of early detection and intervention to prevent the escalation of cardiac abnormalities and associated complications.

These results align with observations from studies like the Hypertension and Ambulatory Recording Venetia Study (HARVEST)[18] Study Group, which identified diastolic dysfunction as an initial cardiac abnormality in hypertensives, preceding structural changes like LVH. Similarly, both this investigation and other reports emphasize concentric remodeling and LVH as hallmark early-stage changes. However, while this study highlights left atrial dilatation as a later manifestation, some evidence suggests that it can also act as an isolated cardiovascular risk factor in hypertensives.[19-20] This subtle distinction highlights the nuanced understanding required when evaluating the progression of hypertensive heart disease, further stressing the need for advanced diagnostic techniques and longitudinal research.

Hypertensive heart disease (HHD) refers to the complex and diverse change of the cardiac structure and function secondary to hypertension. Although conventional echocardiography is the most common imaging modality in detecting HHD, and may not detect subtle changes of cardiac structure in subclinical states. Strain imaging is however a useful tool in picking up very early changes.[19] The association of left atrial dilatation with LVH and dilated and dysfunctional left ventricles suggest that left atrial enlargement as an earlier pathology relative to either left ventricular dilatation or left ventricular depressed ejection fraction and it also

appears to be an important determinant of disease progression from LV concentric hypertrophy to LV dilatation and LV systolic dysfunction. A study has noted left atrial dilatation as an isolated cardiovascular risk factor in hypertensives.[21] from the index study left atrial enlargement is seen as an intermediary as was seen in 164 of the study population (see table 3), while only 48 had evidence of left atrial dilatation with normal sized left ventricle. This implies LA with normal sized LV as an earlier pathology, therefore left atrial dilatation should be included in the classification of hypertensive heart disease. More studies to include a longitudinal study will allow a deeper insight to hypertensive heart changes and possibly highlight this point.

Left heart abnormalities

Studies have shown that the left atrial dilatation seen in hypertensive patients on echocardiography predates LV dilatation.[16,22-23] This appears to be the case seen in this study as isolated lv dilatation without left atrial dilatation was seen in only of the study population. This places the left atrial dimension as an important marker of clinical diseases progression in hypertensive patients. A Study proposed that left atrial heart changes as an earlier marker and will need to be carefully monitored and treatment initiated.[22]

When the heart is exposed to stressors for an extended period, it seems the LA structure becomes more rigid, and its ability to reverse any changes diminishes

However, no study has shown regression of left atrial size on antihypertensive medication. The study by Mattioli et al[24] noted that left atrial (LA) remodeling is nearly non-existent in certain stages or conditions and suggests that there might be a critical window of opportunity where therapeutic interventions could be most effective in reversing or mitigating remodeling. Studies are also few that shown limitation of disease progression on initiation of therapy with left atrial size. One of the study was however on heart failure patients.[24] There have however been studies that show regression of LVH on antihypertensive therapy.[25,26]

Combined echocardiographic abnormalities

Majority of the subjects had combined abnormalities. There was a significant variation in the combination, however they were categorized into the following

A. Combinations with normal left atrial and LV sizes Size,
B. Left atrial dilatation with normal LV size and preserved LV EF.
C. Left atrial dilatation with normal LV size and depressed EF
D. Left Atrial Dilatation with LV dilatation and Preserved LV ejection fraction
E. Left atrial Dilation with LV Dilatation and Depressed LV eject fraction
F. Normal LA size LV dilatation with Preserved LV ejection fraction
G. Normal LA size LV dilatation Depressed LV Ejection fraction

The European Society of Cardiology (ESC) has attempted to classify HHD, focusing primarily on changes in the LV. Their classification includes:
- Grade 0: No changes
- Grade 1: LVH
- Grade 2: Diastolic Dysfunction
- Grade 3: LV systolic dysfunction

However, this classification may overlook disease progression which will be important to limit the effect of hypertension, it also leaves off the significant changes in the left atrium, such as LAE, which the index study suggests may precede LV dysfunction. The association of LV dilatation and depressed ejection fraction with LAE supports the need for a more comprehensive classification that includes left atrial changes when compared to the European accepted classification. The left atrium appears to be an intermediary for disease progression seeing it precedes LV dilatation and depressed ejection fraction. This will stimulate studies that will take a closer look at understanding the left atrium and possible receptors and molecules that may stall disease progression, in hypertensives.

A suggested classification:

The study in question, which recruited 362 adults and found a high prevalence of echocardiographic abnormalities at 96.3%, presents a significant finding within the field of cardiovascular research. When compared to local and regional studies, where

the percentage of hypertensive heart diseases with combined abnormalities accounted for 71.93% of the abnormalities, it suggests a slightly lower prevalence rate.[20,25]

The discrepancy in prevalence rates could be attributed to several factors, including differences in study design, population demographics, and diagnostic criteria.

This study highlights the intricate nature of hypertensive heart disease among Nigerian adults and underscores the necessity for comprehensive classifications that address the entire range of cardiac alterations, particularly those involving the left atrium. The left atrium plays a crucial role as an intermediary in disease progression, and prioritizing its study could inspire further local and global research. This includes broader investigations and molecular studies focused on the left atrium to better understand and curb disease progression. These findings are essential for designing targeted interventions and developing effective management strategies for hypertensive heart disease as a whole.

Conclusion

The intricate nature of hypertensive heart disease among Nigerian adults is brought to light in this investigation, particularly highlighting the prevalence and patterns of echocardiographic abnormalities observed among hypertensive patients at the Rivers State University Teaching Hospital, Port Harcourt. The role of the left atrium, an important intermediary in disease progression, is emphasized, with a call for molecular research to deepen understanding and mitigate the advancement of the condition. Advanced echocardiographic techniques and comprehensive patient histories, including the duration of hypertension, are pivotal for achieving accurate comparisons with other studies and for developing a holistic understanding of the disease.

The findings reinforce the importance of early detection and management strategies to address the progression from concentric remodeling to severe cardiac abnormalities. Additionally, public health education and routine health checks are crucial in alleviating the burden of hypertensive heart disease and improving cardiovascular outcomes. These insights pave the way for targeted interventions and robust management approaches, encouraging further local and global research to combat this significant public health challenge.

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