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Pattern of Right Ventricular Changes in Patients with Uncomplicated Systemic Hypertension at A Tertiary Centre in Southwest Nigeria

Schéma des Modifications du Ventricule Droit chez les Patients souffrant d'Hypertension Artérielle Systémique non Compliquée dans un Centre Tertiaire du Sud-Ouest du Nigeria

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ABSTRACT

BACKGROUND AND AIMS: Hypertension is an independent risk factor for cardiovascular complications. The effect of systemic hypertension on the right ventricle (RV) has received less attention probably due to its complex structure and location. The aim of the study was to assess the effect of systemic hypertension on the structure and function of the right ventricle using transthoracic echocardiography.

METHOD: One hundred hypertensives and 100 healthy controls were recruited into the study. Transthoracic echocardiography was used to measure RV wall thickness (RVWT) in diastole, RV internal dimensions in diastole, tricuspid annular plane systolic excursion (TAPSE), right ventricular filling velocities (TE and TA), and RV systolic excursion velocity (RVSm). These measurements were repeated on the left ventricle.

RESULTS: There was significantly thicker RV wall (0.51 ± 0.08 cm vs 0.44 ± 0.08 cm; $p=0.001$) in the hypertensive group and higher frequency of RV hypertrophy (48.45% vs 18.75%; $p<0.001$). Tricuspid annular plane systolic excursion (TAPSE) and the tricuspid annular peak systolic excursion velocity (TSM) were significantly lower in the hypertensive group (2.34 ± 0.45 cm vs 2.50 ± 0.36 cm; $p=0.008$, and 11.70 ± 3.03 cm/s vs 12.60 ± 2.93 cm/s $p=0.039$, respectively), though no participant had abnormal TAPSE. Tricuspid E/A ratio was lower in the hypertensive group (1.13 ± 0.33 vs 1.24 ± 0.27 ; $p=0.011$). The tricuspid E/A ratio had positive correlation with mitral E/A ratio.

CONCLUSION: Right ventricular structural and functional changes are found in systemic hypertension, even in the absence of other systemic complications. These changes could have been mediated by ventricular interdependence and altered humoral factors. **WAJM 2024; 41 (2): 156 - 162.**

KEYWORDS: Hypertension; Echocardiography; Right ventricular hypertrophy; Right ventricular diastolic dysfunction.

RÉSUMÉ

CONTEXTES ET OBJECTIFS: L'hypertension artérielle est un facteur de risque indépendant pour les complications cardiovasculaires. L'effet de l'hypertension artérielle systémique sur le ventricule droit (VD) a reçu moins d'attention probablement en raison de sa structure complexe et de son emplacement. L'objectif de l'étude était d'évaluer l'effet de l'hypertension artérielle systémique sur la structure et la fonction du ventricule droit en utilisant l'échocardiographie transthoracique.

MÉTHODE: Cent hypertendus et 100 témoins en bonne santé ont été recrutés dans l'étude. L'échocardiographie transthoracique a été utilisée pour mesurer l'épaisseur de la paroi du VD (EPVD) en diastole, les dimensions internes du VD en diastole, l'excursion plane systolique annulaire tricuspide (TAPSE), les vitesses de remplissage ventriculaire droit (TE et TA), et la vitesse d'excursion systolique ventriculaire droit (RVSm). Ces mesures ont été répétées sur le ventricule gauche.

RÉSULTATS: Il y avait une paroi du VD significativement plus épaisse ($0,51 \pm 0,08$ cm vs $0,44 \pm 0,08$ cm ; $p=0,001$) dans le groupe hypertendu et une fréquence plus élevée d'hypertrophie ventriculaire droite (48,45% vs 18,75% ; $p<0,001$). L'excursion plane systolique annulaire tricuspide (TAPSE) et la vitesse maximale systolique annulaire tricuspide (TSM) étaient significativement plus basses dans le groupe hypertendu ($2,34 \pm 0,45$ cm vs $2,50 \pm 0,36$ cm ; $p=0,008$, et $11,70 \pm 3,03$ cm/s vs $12,60 \pm 2,93$ cm/s $p=0,039$, respectivement), bien qu'aucun participant n'ait eu de TAPSE anormal. Le rapport E/A tricuspide était plus bas dans le groupe hypertendu ($1,13 \pm 0,33$ vs $1,24 \pm 0,27$; $p=0,011$). Le rapport E/A tricuspide avait une corrélation positive avec le rapport E/A mitral.

CONCLUSION: Des modifications structurales et fonctionnelles du ventricule droit sont retrouvées dans l'hypertension artérielle systémique, même en l'absence d'autres complications systémiques. Ces changements pourraient avoir été médiés par l'interdépendance ventriculaire et des facteurs humoraux modifiés. **WAJM 2024; 41 (2): 156 - 162.**

MOTS-CLÉS: Hypertension ; Échocardiographie ; Hypertrophie ventriculaire droite ; Dysfonction diastolique ventriculaire droit.

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Abbreviations - ASE: American Society of Echocardiography; **BMI:** Body mass index; **ECG:** Electrocardiography; **ECHO:** Echocardiography; **ERVD:** Estimated right ventricular diameter; **JVP:** Jugular venous pressure; **LUTH:** Lagos University Teaching Hospital; **LVDD:** Left ventricular diastolic dysfunction; **LVH:** Left ventricular hypertrophy; **NO:** Nitric oxide; **PAH:** Pulmonary arterial hypertension; **PH:** Pulmonary hypertension; **RT3DE:** Real Time Three-Dimensional Echocardiography; **Rva':** Right Ventricular late tissue Doppler velocity; **RVD1:** Right ventricular basal diameter; **RVD2:** Right ventricular mid diameter; **RVD3:** Right ventricular longitudinal dimension; **RVDD:** right ventricular diastolic dysfunction; **Rve':** Right Ventricular early tissue Doppler velocity; **RVFAC:** Right ventricular fractional area change; **RVH:** Right Ventricular hypertrophy; **RVS'm:** RV systolic excursion velocity; **RVWT:** Right ventricular wall thickness; **TAPSE:** Tricuspid annular plane systolic excursion; **Ta:** Transtricuspid atrial inflow velocity; **Te:** Transtricuspid early inflow velocity