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THE EFFECT OF SURGICAL AORTIC VALVE REPLACEMENT ON AORTIC STIFFNESS AND THE PROGNOSTIC ROLE OF AORTIC STIFFNESS ON SURGICAL SUCCESS

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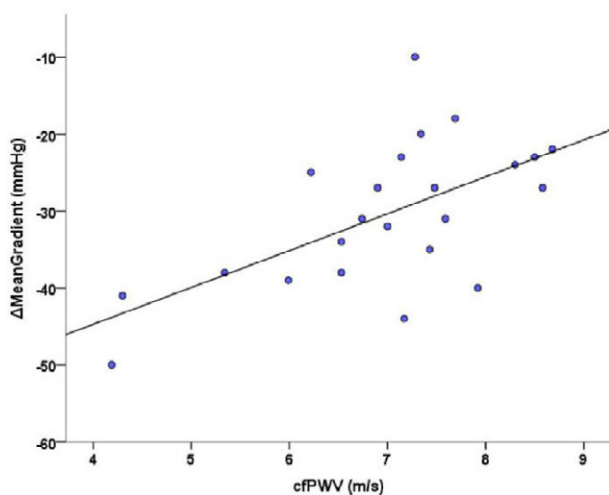
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Purpose/Background/Objectives: Aortic stiffness and hemodynamics are established biomarkers for cardiovascular events. Surgical aortic valve replacement (SAVR) remains the first choice of treatment in most patients with aortic stenosis. We investigated the effect of SAVR on aortic stiffness and the role of arterial biomarkers in predicting the echocardiographic responses.

Methods: We included thirty-three patients (mean age 71 ± 8 years, 58% males) with moderate to severe aortic stenosis undergoing SAVR. In measurements prior and acutely after the surgery, carotid-femoral pulse wave velocity (cfPWV) and brachial-ankle pulse wave velocity (baPWV) and aortic hemodynamics (aortic augmentation index corrected for heart rate [AIx@75]) were used as indicators of arterial stiffness. Echocardiography, mean and peak pressure gradient of the aortic valve was measured and their differences post and pre-surgery were calculated (i.e. $\Delta\text{MeanGradient} = \text{MeanGradient post-surgery} - \text{MeanGradient pre-surgery}$).

Results: There was a statistically significant increase on measurements of aortic stiffness (7.5 ± 1.4 vs 8.2 ± 1.9 m/s for cfPWV, $p = 0.033$) and a decrease in wave reflections ($28 \pm 13\%$ vs $21 \pm 11\%$ for AIx@75, $p = 0.015$). We also observed a negative association of baseline cfPWV with baseline mean and peak gradient of aortic stenosis ($r = -0.598$ and $r = -0.614$ with $p = 0.002$ and $p = 0.001$, respectively), independently of age, gender and systolic blood pressure. Baseline cfPWV was associated with $\Delta\text{MeanGradient}$ and $\Delta\text{PeakGradient}$ ($r = 0.609$ and $r = 0.533$ with $p = 0.002$ and $p = 0.009$, respectively). (Figure)

Conclusions: Our study shows that post-operative aortic stiffness increases while there is an improvement of wave reflections. Furthermore, increased aortic stiffness prior to surgery predicts smaller benefit in decreasing transvalvular pressure gradient as assessed echocardiographically, implying that low aortic stiffness prior to surgery could lead to better outcome.



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PULSE WAVE VELOCITY DISTRIBUTION IN CHILDREN AT A SCHOOL IN THE NORTH OF PORTUGAL

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Background: Pulse Wave Velocity (PWV) is a measure of arterial stiffness and vascular aging and an important parameter for cardiovascular risk stratification. A previous study showed high prevalence rates of early vascular aging in an adult population from the North of Portugal. The aim of this study was to characterize children from the same region regarding PWV and its relationship with central adiposity indices and blood pressure.

Methods: A convenience sample of 285 children aged 10–14 years attending a Northern Portuguese school was used. PWV, height, weight, body mass index (BMI), waist circumference and blood pressure (BP) were measured. Collected data was distributed by gender, age and height specific percentiles.

Results: Mean PWV values were 5.4 ± 1.0 for males and 5.1 ± 0.7 for females. We only found statistically significant differences between males and females PWV in the 13' years old group ($p = 0.02$). 27.4% of the children ($N = 78$) had $\text{PWV} \geq 90\text{th percentile}$, 64.1% of which were males ($N = 50$) and 15.3% ($N = 12$) were overweight/obese. PWV was significantly higher in children with systolic BP $\geq 90\text{th percentile}$ ($p = 0.004$). No differences were found in PWV between overweight/obese ($\text{BMI} \geq 85\text{th percentile}$) and healthy weight children.

Conclusion: Our study found a high prevalence rate of elevated PWV in children. This is a concerning aspect, taking into account the highly recognized relationship of PWV and cardiovascular outcomes, indicating that healthy policy measures need to be implemented early in life. Future research is needed to establish PWV reference percentile curves specific for Portuguese children.

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DOES THE METHOD OF THE MEASUREMENT OF BLOOD PRESSURE CORRELATES DIFFERENTLY WITH PULSE WAVE VELOCITY IN RESISTANT HYPERTENSION?

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Objective: Carotid-femoral Pulse Wave velocity (cfPWV), the gold standard for measuring stiffness, is a marker of organ damage (OLD). Even though cfPWV correlates with casual (BpC), central (CBP) and ambulatory (ABPM) blood pressure (BP), evidence is limited for resistant hypertension (RH).

Method: Thirty-three patients (age, 56.1 ± 8.2 years; weight, 78.0 ± 12.4 kg; height, 1.62 ± 0.08 m) with RH participated in a cross-sectional study. Outcomes included clinical data, BpC, ABPM, and carotid-femoral, cfPWV. Correlation analysis was conducted to assess the association between variables; independent t-tests were conducted to compare variables between those participants with cfPWV < and ≥ 10 m/s.

Results: Patients (20 women and 13 men) presented a peripheral systolic and diastolic BpC of 144.0 ± 3.8 mmHg and 82.0 ± 1.9 mmHg, respectively. The cfPWV correlated with age ($r = 0.356$, $p = 0.045$), 24 h systolic BP (24 h SBP) nighttime pulse pressure (night PP), 24 h pulse pressure (24hPP), casual systolic (SBpC) and diastolic BP (DBpC), central systolic (CSBP), diastolic (CDBP) and central pulse pressure (CPP); controlled for age the correlation remained significant for 24h SBP ($r=0.446$, $p=0.009$) 24hPP ($r=0.464$, $p=0.007$), nightPP ($r=0.365$, $p=0.036$), SBpC ($r=0.620$, $p<0.001$), DBpC ($r=0.488$, $p=0.004$), PPc ($r=0.592$, $p<0.001$), central SBP ($r=0.587$, $p<0.001$), central DBP ($r=0.487$, $p=0.001$) and central PP ($r=0.506$, $p=0.003$). Patients with lower values of cfPWV ($n=26$) showed lower SBpC (142.8 ± 15.9 vs. 162.6 ± 30.9 mmHg, $p=0.025$), central SBP (136.0 ± 15.7 vs. 154.1 ± 31.8 mmHg, $p=0.041$) and PP (49.6 ± 9.5 vs. 60.9 ± 20.8 mmHg, $p=0.043$) than patients with cfPWV ≥ 10 m/s ($n=7$).

Conclusion: Our data shows that cfPWV correlates with SBpC, 24hSBP, 24hPP and CSBP, after controlled for age, in patients with RH.

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DETERMINANTS OF PULSE WAVE VELOCITY IN CHILDREN

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Background: Arterial stiffening measured by Pulse Wave Velocity (PWV) predicts cardiovascular events and mortality in adults. It advances with age and seems accelerated in children with certain disease conditions such as chronic kidney disease or diabetes. The aim of this study was to determine factors that influence PWV in children.

Methods: PWV was captured in 285 children aged 10-14 years attending a Portuguese school. The effects of sex, age, height, weight, body mass index, waist circumference, blood pressure, heart rate and sodium excretion in 24-h urinary samples in PWV were tested.

Results: PWV correlated positively with age, height, systolic blood pressure, diastolic blood pressure and heart rate in males and females ($p < 0.05$) and with weight in males ($p < 0.05$). Major predictors for PWV in a multivariate regression analysis were gender, height, weight, diastolic blood pressure, heart rate and body mass index.

Conclusion: Our study found several determinants of PWV in children, some of them modifiable and interfering with cardiovascular outcomes. Future research may provide clarity to the association between PWV in children and cardiovascular events in adulthood.

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CARDIO ANKLE VASCULAR INDEX (CAVI) AS ARTERIAL STIFFNESS MARKER IN SUBJECTS WITH ANKYLOSING SPONDYLITIS

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Background: Ankylosing spondylitis (AS) is a chronic, inflammatory disease of the axial spine that can manifest with various clinical signs and symptoms¹. Cardio-ankle vascular index (CAVI), which is calculated based on the stiffness parameter thus obtained, is theoretically independent of changes in blood pressure. With this distinct advantage, CAVI has been widely applied clinically to assess arterial stiffness in subjects with or without known cardiovascular diseases².

Objectives: The aim of this study was to evaluate the Cardio Ankle Vascular Index (CAVI) in subjects with ankylosing spondylitis paired with controls free of morbidities.

Methods: We enrolled 41 participants in this study. Eighteen patients with diagnosed AS and 23 controls free of comorbidities. CAVI was measured by VaSera VS-1000 (Fukuda - Denshi Company, Ltd, Tokyo, Japan).

Results: The results are expressed as mean \pm standard deviation for continuous variables. The data were analyzed using SPSS v. 24 (SPSS Inc., Chicago, IL). The normality of the data was evaluated with Shapiro-Wilk test. A two-tailed $p < 0.05$ was considered statistically significant. Individuals with AS exhibited greater pSBP ($p < 0.01$), DBP ($p < 0.05$), and MBP ($p < 0.01$) compared to controls. Moreover, in the AS group we observed a higher CAVI with a mean difference of 1.14 ($p < 0.01$, 95% CI of .41 to 1.8) (Figure 1).

Conclusion: AS is a chronic inflammatory disease that primarily affects the articular joints of the spine. Individuals with ankylosing spondylitis showed increased CAVI, this contributes to explain the higher risk of cardiovascular disease in this pathological condition.

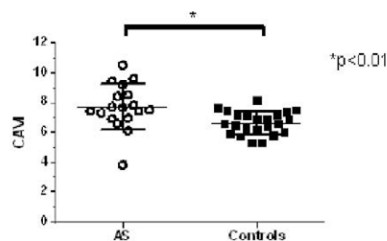


Figure 1. Cardio-ankle vascular index (CAVI) in patients with ankylosing spondylitis (AS) compared to controls

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AORTIC CALCIFICATIONS AND INFLAMMATION ARE ASSOCIATED WITH IN-HOSPITAL COMPLICATIONS IN ACUTE CORONARY SYNDROME

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