Surendranath Reddy Veeram Reddy: This author has nothing to disclose.

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A-065

Title: Assessment of Aortic Stenosis Severity using Pressure Drop Coefficient: A Retrospective Study in Humans

Category: Valvular Interventions and Structural Heart Disease

Authors: Anup K Paul, University of Cincinnati, United States; Mohamed A Effat, University of Cincinnati College of Medicine, United States; Rupak K Banerjee, University of Cincinnati, United States; Jason J Paquin, University of Cincinnati College of Medicine, United States

Background: Accurate assessment of the stenosis severity is critical in patients with aortic stenosis (AS). The ambiguities and reduced sensitivities of the current diagnostic parameters can result in sub-optimal clinical decision making. In this preliminary study, we investigate the functional diagnostic parameter pressure drop coefficient (CDP: ratio of the transvalvular pressure gradient to the proximal dynamic pressure) for the assessment of AS severity by correlating with the current diagnostic parameters. CDP was calculated using diagnostic parameters obtained from retrospective chart reviews. It was proposed that CDP, based on fundamental fluid dynamics principles, will improve the sensitivity and specificity of the AS severity assessment and better delineate AS severity.

Methods: Eight patients suspected to have mild to severe AS based on Doppler echocardiography or invasive cardiac catheterization measurements were selected by a retrospective review of patient records. The mean values of jet velocity (V_{jet}), LVOT velocity (V_{LVOT}), and calculated pressure gradient ($\Delta p_{doppler}$) were obtained from the Doppler images. Similarly, the mean pressure gradient (Δp_{cath}) was obtained from the catheterization reports. The hemodynamic diagnostic parameter, CDP was calculated independently from the Doppler ($CDP_{doppler}$) and catheterization measurements (CDP_{cath}). Velocities are not measured during standard of care catheterization; hence, Doppler measured V_{LVOT} was used to calculate CDP_{cath} in this retrospective study.

Results: The mean values of $\Delta p_{doppler}$, V_{jet}, Δp_{cath}, $CDP_{doppler}$ and CDP_{cath} were 31.5 $\pm$ 8.2 [mm Hg], 263.5 $\pm$ 40.4 [cm/s], 35.1 $\pm$ 14.5 [mm Hg], 25.3 $\pm$ 16.75 and 26 $\pm$ 17.1 respectively. $CDP_{doppler}$ exhibited better correlation with $\Delta p_{doppler}$ and V_{jet} simultaneously ($r = 0.7$), than when correlated independently with the same variables ($r = 0.55$ & $r = 0.5$ respectively). Similarly, the simultaneous correlation of CDP_{cath} with Δp_{cath} and V_{jet} ($r = 0.76$) was better than the individual correlations with the same diagnostic parameters ($r = 0.52$ & $r = 0.74$ respectively).

Table 1: Correlation of CDP, Δp and V_{jet}

Dependent vs. Independent variable	Regression equation	Correlation coefficient	p-value
$CDP_{doppler}$ vs. $\Delta p_{doppler}$	1.12 x($\Delta p_{doppler}$) - 10.0	r=0.55	p=0.16
$CDP_{doppler}$ vs. V_{jet}	0.21x(V_{jet}) - 29.15	r=0.5	p=0.21
$CDP_{doppler}$ vs. $\Delta p_{doppler}$ and V_{jet}	9.26 x($\Delta p_{doppler}$) - 1.66x(V_{jet}) + 172.0	r=0.7	p=0.18
CDP_{cath} vs. Δp_{cath}	0.61 x(Δp_{cath}) + 4.5	r=0.52	p=0.19
CDP_{cath} vs. V_{jet}	0.31x(V_{jet}) - 56.5	r=0.74	p<0.05
CDP_{cath} vs. Δp_{cath} and V_{jet}	-0.44 x(Δp_{cath}) + 0.45x(V_{jet}) - 75.9	r=0.76	p=0.11

CDP increases with increasing AS severity, which is consistent with hydrodynamic principles.

Conclusion: This preliminary study has confirmed the feasibility of using both pressure drop and flow in a single diagnostic index, CDP for the assessment of AS severity. It is anticipated that with the inclusion of more patients in this retrospective study, significant correlations between CDP and the existing diagnostic parameters will be obtained. This retrospective study is a prelude to a prospective study to evaluate CDP for AS severity assessment.

Disclosures:

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Jason J Paquin: This author has nothing to disclose.

A-067

Title: Heart Rate Variability of the Aortic Regurgitation Index Following Transcatheter Aortic Valve Replacement

Category: Valvular Interventions and Structural Heart Disease

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Background: One of the limitations of transcatheter aortic valve replacement (TAVR) is perivalvular aortic regurgitation (periAR). Greater degrees of periAR negatively impact outcomes. The AR index has been proposed as an echocardiographically independent method of quantifying periAR, with a post-TAVR AR index < 25 associated with increased mortality. We sought to evaluate the effects of heart rate (HR) on the AR index.