

C71. A Noninvasive Method For Evaluation Of Left Ventricular Overload Due To Combined Aortic Valve Pathology

Brandon Travis¹; Brett Fowler¹; Geoffrey Rose²; Francis Robicsek¹

¹Heineman Medical Research Laboratory, Charlotte, North Carolina, United States; ²Sanger Clinic, Charlotte, North Carolina, United States

OBJECTIVES: Patients with combined aortic valve pathology are often evaluated as if they only had a single pathology, as a means of evaluating the potential detrimental effects of a combination of insufficiency and stenosis has not yet been proposed. The purpose of this study was to test the performance of a new hemodynamic index based on mechanical energy loss for the measurement of the effects of combined valve disease on ventricular workload.

METHODS: An intact and subsequently perforated and sutured aortic bioprosthesis was tested within an in vitro model of the left heart, varying cardiac output, average diastolic aortic pressure, and type and combination of valve lesion. Regurgitant fraction (RF), systolic transvalvular pressure gradient (TPG), forward flow energy loss index (ELI(fwd)), regurgitant flow energy loss index (ELI(reg)) and the sum of the forward and regurgitant energy loss indices (ELI(combined)) were measured for each experimental condition and compared with the increase in ventricular work performed per unit volume net forward flow moved (Δ WPV) due to perforation and suturing.

RESULTS: TPG was found to underestimate (ELI(fwd)) when the valve was perforated. ELI(combined) had an excellent linear relationship with Δ WPV (Figure 1) that was independent of valve lesion or flow and pressure conditions.

CONCLUSIONS: TPG does not describe the increase in ventricular workload, or even the forward flow portion of it, when significant insufficiency is present. ELI(combined) was found to be a very good measure of the decrease in pump efficiency due to combined valve pathology.

Figure 1

