Title: Intradialytic Exercise and the Effect on Myocardial Stunning

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Structured Abstract:

Introduction: Cardiovascular disease (CVD) has been well documented as the leading cause of death in the general population worldwide. Physical activity is a modifiable factor in the development and progression of CVD reducing its incidence by 42-44% and reducing mortality and hospital admissions. The presence of chronic kidney disease (CKD), and the recurrence of cumulative circulatory stress (myocardial stunning) caused by hemodialysis (HD) increases the risk of CVD morbidity and mortality. The effect of intradialytic exercise on myocardial stunning is unknown.

Objective: To assess the effect of intradialytic cycling on myocardial stunning in HD.

Hypothesis: We hypothesize that through pre-conditioning, intradialytic exercise can reduce regional wall motion abnormalities (RWMA), thus reducing HD-induced cardiovascular injury.

Methods: 19 adult patients participating in a clinical intradialytic cycling program were recruited and evaluated over 2 HD sessions using echocardiography. The control session involved no exercise and the exposure session incorporated the participant’s usual intradialytic cycling. Echocardiography was performed, pre-HD, post exercise (or at the same time point for control visit), and at peak HD stress for each visit. Longitudinal strain (LS) values for 12 left ventricular segments were generated using speckle-tracking software [EchoPac, GE], to assess the presence of HD-induced RWMA, indicative of myocardial stunning (>20% reduction in LS in two or more segments).

Results: Mean age was 59.2 and participants were 40% female with median dialysis vintage of 3.8 years. The number of stunned segments at usual exercise time was 4.5 (SD 2.6) and 3.9 (SD 2.8) in the control and exercise groups, respectively; p=0.168. The number of stunned segments at peak HD stress was 5.8 (SD 2.7) and 4.0 (SD 1.8) in the control and exposed groups, respectively; p=0.012. Mean change in number of stunned segments post exercise between control and exposure sessions was -0.95 (SD 2.88). Similarly, mean change in number of stunned segments at peak HD was -1.8 (SD 2.8).

Conclusion: Intradialytic exercise significantly reduced HD-induced myocardial stunning as compared to control. Further studies are warranted to determine the impact of intradialytic exercise on the reduction of CV injury in HD.