

Title: Intradialytic Exercise Preconditioning and the Effect on Myocardial Stunning

Trainee Name: Jarrin Penny RN, BSN, C.Neph

Supervisor(s): Dr. Chris McIntyre

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 caused by hemodialysis (HD) increases the risk of CVD, myocardial stunning, morbidity and mortality. The effect of intradialytic exercise on myocardial stunning is unknown.

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

Hypothesis: We hypothesize that, through increased cardiac output, intradialytic cycling would provide protection against HD-induced cardiac injury, resulting in fewer wall motion abnormalities and less myocardial stunning at peak HD stress.

Design: Single-centre cross-sectional observational study

Methods: 24 adult patients participating in a clinical intradialytic cycling program were recruited of which 19 were 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 regional wall motion abnormalities (RWMA), indicative of myocardial stunning (>20% reduction in LS in two or more segments).

Findings: Mean age was 57.2 and participants were 42% female with median dialysis vintage of 3.8 years. The number of stunned segments at usual exercise time was 4.5 ± 2.6 in control and 3.6 ± 2.7 with exposure, respectively; $p=0.168$. The number of stunned segments at peak HD stress was 5.8 ± 2.7 in control visit and 4.0 ± 1.8 in exposure visit, respectively; $p=0.012$. Mean change in number of stunned segments post exercise between control and exposure sessions was -0.95 ± 2.9. Similarly, mean change in number of stunned segments at peak HD was -1.8 ± 2.8.

Conclusion: In this observational study, intradialytic exercise significantly reduced HD-induced myocardial stunning as compared to control. Intradialytic exercise is an intervention that should be considered to be a treatment that has the potential to ameliorate the detrimental cardiovascular effects of HD. This intervention is easily implementable, safe and can improve clinical outcomes for HD dependent patients.