

“EFFECT OF PRE-OPERATIVE ISOMETRIC EXERCISE (PIE) ON VASCULAR CALIBER OF STAGE 2-5D CHRONIC KIDNEY DISEASE PEDIATRIC PATIENTS: A RANDOMIZED CONTROLLED STUDY “



Karen G. Escaner, M.D., Alona R. Arias-Briones, M.D., Teresita Joy P. Evangelista M.D., Francis Z. Castell, M.D.

Section of Pediatric Nephrology
Philippine Children's Medical Center



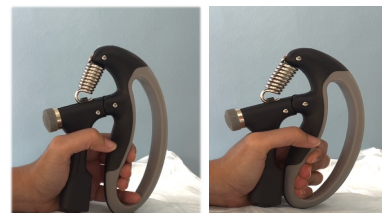
INTRODUCTION

- Chronic Kidney Disease (CKD) refers to an irreversible renal impairment that can lead to an End Stage Renal Disease (ESRD).
- In ESRD, renal replacement therapy such as Hemodialysis and Peritoneal dialysis serve as a life saving measure and a bridge in preparation for Kidney Transplantation (KT).
- In patients requiring hemodialysis, a functioning arteriovenous fistula (AVF) is the preferred access due to less thrombosis and loss of primary patency as compared to central venous catheters (CVCs) and arteriovenous grafts (AVG).
- A prerequisite for an optimal AVF is a vein diameter of more than or equal to 2.5mm.
- This poses a challenge in children who have smaller body weight with small vein diameter.
- Hence, any intervention that can increase the vein diameter remains of utmost importance.
- Previous evidence has demonstrated that Pre-operative Isometric exercise (PIE) can increase the vein diameter thereby enhancing the success rates of AVF creation and maturation.

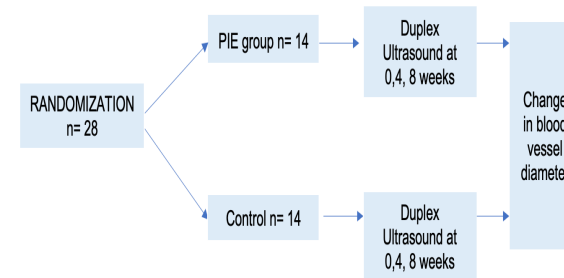
- The current research shall serve as a pioneer study on the utility of pre-operative isometric exercise (PIE) on pediatric CKD patients which will provide a baseline information and reference for future larger and multicentered research.
- The results of this study can be utilized as a basis for crafting a pre-operative protocol for AVF creation in pediatric ESRD patients.

METHODOLOGY

- Single-blind, randomized, single-centered trial of 28 CKD patients.
- Fourteen participants allocated in the intervention group (PIE) were provided with a handgrip device and performed handgrip exercise consisting of two sets of 30 contractions daily while another 14 participants did not perform the exercise and were considered as controls (NE).



Handgrip device



RESULTS

- Twenty-four CKD patients were included and analyzed.
- The mean age was 15.8 (+/- 1.9) years.
- Majority were Females (66.7%).
- Ten (41.7%) were underweight (<18 kg/m²), 23 (95.8%) right-handed, 12 (50%) with chronic glomerulonephritis, and 10 (41.7%) with stage 2 CKD.
- Both the intervention and control group revealed a statistically significant increase in the caliber of the cephalic (ante-cubital) vein at four- and eight-weeks post-intervention
- (PIE 4.0mm +/- 1.128 p0.009; NE 4.0 mm +/- 1.04; p0.005); (PIE 3.67 +/- 1.15 p 0.024; NE 4.0 +/- 1.3 p0.032) compared to baseline, respectively.

DISCUSSION

- This study provided valuable insights by exploring the effect of PIE suggesting that it might not significantly impact vessel diameter in pediatric CKD population in contrast to adult CKD patients.
- Sonography is highly operator dependent, intra-observer variability might have played a role and contributed to the considerable change in the diameter of cephalic veins in both the intervention and control group.
- Another aspect to explore is the possibility of a natural occurrence of blood vessel enlargement corresponding to the physical growth and maturation experienced by a developing child. However, studies have shown that postnatally, growth of blood vessels are dependent mainly on changes of blood flow leading to vascular adaptation.

KEYWORDS

Pre-operative Isometric Exercise, Vascular Caliber, Chronic Kidney Disease