SOA Presidents’ Resident Award Winner Virtual Reality Use in Pediatric Patients for Orthopedic Clinical Procedures: A Randomized Prospective Trial of Efficacy

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INTRODUCTION: Pediatric orthopedic patients are frequently exposed to procedures that result in pain and anxiety. Distraction therapies (DT) such as virtual reality (VR) have been studied in other specialties, however, this technology is novel in the pediatric orthopedic field. In this study we use subjective and objective metrics to evaluate VR efficacy to reduce anxiety and pain in a pediatric orthopedic cohort.

METHODS: A prospective randomized controlled trial was conducted on patients between age 5 and 17 years, presenting to a tertiary care pediatric orthopedic clinic. Parallel groups underwent orthopedic procedures utilizing immersive and interactive VR DT (intervention group) vs. standard of care (control group). Procedures included cast application, cast removal, bone pin removal, and fracture reduction. All pre-procedure parameters were similar between the groups. The primary outcome was the difference between maximum procedural heart rate (HR max) and baseline. Secondary outcomes included Visual Analog Scale (VAS) scores for pain and anxiety.

RESULTS: 95 patients (66 M, 29 F) met inclusion criteria (48 intervention, 47 control). Procedures included 59 cast removals, 26 cast applications, 7 percutaneous pin removals, and 3 fracture reductions. Distribution of procedures was similar in both groups. Average patient age in the VR and Control cohorts was 10.1 (5-17) and 10.6 (5-17) respectively. Average change in maximum HR in the VR and control groups was 10.6±10.1 vs. 18.4±11.0 (p=0.00048). The VR group also demonstrated trends toward both lower perceived anxiety (1.7±2.8 vs. 2.9±3.6, p=0.0666) and pain (0.9±2.2 vs. 1.8±2.6, p=0.0675) when compared to controls.

DISCUSSION AND CONCLUSION: This level 1 study is the first to utilize objective biometric measurements to evaluate use of interactive VR during multiple types of pediatric orthopedic procedures in the clinical setting. The findings suggest that an interactive and immersive VR experience can be effective in reducing pain and anxiety for these procedures.