Best Trauma Paper of the 2016 POSNA Annual Meeting

Functional Bracing for Treatment of Pediatric Diaphyseal Femur Fractures: An Alternative to Spica Casting

***Andrea S. Kramer, MD**; Colin Woon, MD; David Speers, CPO, LPO*
Advocate Children's Hospital, Park Ridge, Illinois

Purpose: Closed Reduction and Spica casting (SC) is the traditional treatment of diaphyseal femoral fractures in pediatric patients ages 0 to 5years. However, there are many disadvantages to SC. SC requires general anesthesia, is cumbersome for parents/patients, and difficult to clean and maintain. Additionally, a second cast application is at times necessary when there is progressive malalignment or significant soilage. We hypothesized that diaphyseal femur fractures in this age range could be more easily managed with immediate application of functional fracture bracing (FFB). FFB allows for consistent compression of the fractured limb, is more comfortable, easier to clean, and more cost effective than SC.

Methods: Using case-control design, we compared the clinical, economic and functional outcomes of pediatric patients aged 0 to 5years with displaced and non displaced femoral shaft fractures treated with FFB versus those treated with SC. We evaluated subjective clinical outcomes retrospectively using the Pediatric Outcomes Data Collection Instrument (PODCI) and objective clinical outcomes by assessing post-treatment radiographs in orthogonal planes for angular malalignment and shortening. We evaluated economic outcomes by comparing procedural and equipment costs. Statistical comparisons between groups were performed using the Wilcoxon Mann-Whitney test and Student's T-test.

Results: There were 41 patients and 43 patients in the FFB and SC groups respectively. All patients had minimum of 2 years follow-up. The PODCI questionnaire revealed very high patient satisfaction with FBB. None of the patients had a limp or subjective leg length discrepancy at their most recent follow-up. All fractures went on to union with 6 weeks of immobilization. Comparison of fracture site angulation revealed significant correction of angulation between pre-treatment and most recent post-treatment orthogonal radiographs . There were no significant differences in magnitude of angular correction between groups ($p>0.05$). Economic comparison revealed that FB was significantly less costly overall compared with SC ($P<0.05$).FFB eliminates the need for general anesthesia, surgical and anesthesia charges.

Conclusion: FFB is equally effective to SC in correction and maintenance of fracture alignment, time to union, and functional outcomes but is better tolerated by patients and their parents. Its open design improves hygiene, skin surveillance, and eases transport / lifting as it weighs substantially less than SC. The overall cost of FFB is lower and can be applied immediately without need for general anesthesia and operating room time.

Significance: This study suggests that FFB should be considered a viable alternative to SC in isolated pediatric femoral shaft fractures age 0-5.