

Functional Bracing of Femur Fractures in Young Children Avoids Anesthesia and Spica Casting with Equivalent Outcomes: A Randomized Prospective Study

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Abstract:

Purpose: AAOS Clinical Practice Guidelines recommend spica casting for pediatric femur fractures ages 6 months to 5 years. Kramer et al. reported the use of custom made functional braces as an alternative; however, custom making braces presented many logistical challenges. We hypothesized braces could be pre-fabricated ahead of time in multiple standardized sizes then customized to fit the patient. The purpose of this study was to compare outcomes of patients treated with prefabricated functional braces to spica casting.

Methods: A randomized prospective study was performed at two pediatric centers of patients 6 months to 5 years with diaphyseal femur fractures. Patients with polytrauma, medical comorbidities impacting fracture healing, or < 6-week follow-up were excluded. Spica casts were placed in the operating room under general anesthesia; functional braces were placed at bedside. Malunion was defined as 6 months–2 years: > 30° varus/valgus; >30° procurvatum; or >15 mm shortening; 2 years–5 years: > 15° varus/valgus; >20° procurvatum; or >20 mm shortening.

Results: 56 patients (29 spica; 27 brace) met inclusion criteria. Mean age was 2.3 years in both groups. Injury films had similar shortening ($p = 0.33$), varus angulation ($p = 0.09$) and procurvatum ($p = 0.54$).

At 6-weeks post-treatment, all fractures had achieved union. There were no differences in femoral shortening (spica = 17.1 mm \pm 2.6, brace = 14.9 mm \pm 2.0, $p = 0.50$) or varus angulation (spica = 2.0° \pm 1.8, brace = 3.6° \pm 1.6, $p = 0.52$). The spica group had higher mean procurvatum at 22.6° \pm 3.1 compared to 12.4° \pm 2.2 for the brace group ($p = 0.01$). There were no malunions in either group. Two brace patients had fungal skin infections.

20 patients have 1-year follow-up (11 spica; 9 brace). There were no differences in femoral shortening (spica = 2.6 mm \pm 0.9, brace = 3.7 mm \pm 2.3, $p = 0.61$), varus angulation (spica = 0.6° \pm 2.0, brace = 1.2° \pm 2.0, $p = 0.83$), or procurvatum (spica = 16° \pm 3.43, brace = 8° \pm 2.3, $p = 0.06$). All patients were ambulatory, except one with new ankle fracture.

Conclusion: In this prospective randomized trial, patients treated with functional bracing had equivalent outcomes to those treated with spica casting.

Significance: Standardized functional braces provide a viable treatment alternative to spica casting, avoiding cost and anesthesia associated with operating room cast placement.

Level of Evidence: High-quality randomized trial or prospective study, testing of previously developed diagnostic criteria-Level I

FDA: The FDA has cleared all pharmaceuticals and/or medical devices for the use described in this presentation.

Disclaimer: The authors have no conflicts of interest to disclose.