Comparison of the Outcome of Above-Knee and Below-Knee Cast for Isolated Tibial Shaft Fractures in Children: A Randomized Trial

Rajiv Maharjan, MBBS, MD*; Amit Limbu, MBBS, MD; Shiva Paneru, MBBS, MD*
BP Koirala Institute of Health Sciences, Koshi, NEPAL

Purpose: Conventionally, pediatric closed isolated tibial shaft fractures were immobilized in an above-knee cast with or without manipulation. We evaluated the effectiveness of application of a below-knee plaster of Paris (POP) cast (BKC) comparing with above-knee POP cast (AKC) for isolated tibial shaft fractures in terms of union time, residual malunion and disability, range of motion, associated complications, and cost of treatment by prospective randomized controlled trial.

Methods: 60 children age 6 months to 15 years with closed and Gustilo grade one/two isolated traumatic extra-articular middle-third and distal-third tibial shaft fracture were randomized (30 in each group) into AKC and BKC groups, who were followed weekly for 3 weeks then each at 6 weeks, 3 months, and 6 months and were compared. Total of 5 children (3 torus, 1 undisplaced, 1 displaced fracture) were lost to follow-up during 6 months and were analyzed with missing value data analysis.

Results: Out of 60 children, 48 were boys and 12 were girls; Right leg was injured more commonly. All fracture united (8.30 ± 2.693 weeks in AKC group, 7.70 ± 2.54 weeks in BKC group). The average prereduction angulations were varus (2°-8°), valgus (4°-8°), anterior angulation (4°-9°), posterior angulation (2°-10°), internal rotation (3°-6°), external rotation (3°-6°), and shortening (6.46 mm). Residual angulation at 6 months were varus (2.83° ± 0.85° in AKC group, 2.60° ± 0.84° in BKC group), valgus (3.20° ± 0.44° in AKC group, 2.50° ± 0.52° in BKC group), anterior angulation (2.83° ± 1.32° in AKC group, 3.00° ± 1.00° in BKC group), posterior angulation (2.67° ± 0.84° in AKC group, 2.93° ± 1.32° in BKC group), internal rotation (3.40° ± 0.54° in AKC group, 3.00° ± 1.41° in BKC group), external rotation (2.83° ± 0.75° in AKC group, 2.33° ± 0.57° in BKC group), and shortening (2.67 ± 1.15 mm in AKC group, 2.00 ± 0.00 mm in BKC group). Reinforcement of plaster was higher in BKC group ($P = 0.014$) as these children were eager to bear weight on plaster earlier. Range of motion at knee was significantly higher in BKC group ($P < 0.001$). There were no refractures, residual disabling pain, and plaster-related complications in either group.

Conclusion: BKC was as effective as AKC for treatment of middle and distal-third isolated tibial shaft fractures in children. In terms of cost and range of motion of knee, BKC was superior ($P < 0.05$).