**The Treatment of Complex Pediatric and Adolescent Tibial Fractures with the Ilizarov Method**

*Juergen Messner, MD[1]; **Louise Johnson, Clinical Psychologist**[1]; Namal Perera, MBBS[1]; Paul J. Harwood, MBBS[1]; Martin Taylor, MBBS[1]; Simon Britten, MBBS[1]; Patrick Foster, MBBS[1]*
*[1]Limb Reconstruction Unit, Leeds Major Trauma Centre, Leeds, Yorkshire, UNITED KINGDOM*

**Purpose:** We analyzed the functional and psychological outcomes in children and adolescents with complex tibial fractures treated with the Ilizarov method at our major trauma center.

**Methods:** Patients aged ≤17 years treated with a circular frame for an acute tibial fracture between 2013 and 2016 were identified from our prospective database. Information from this database was supplemented by retrospective review of clinical notes and radiographs as well as routinely collected functional and psychological assessments. The patient-reported outcome measures administered 6 months post frame removal were the Pediatric Quality of Life Inventory (PedsQL) and a global health visual analog scale (VAS) to assess how they rated their overall health on a scale of 0-100 (0 = worst possible health, 100 = best possible health).

**Results:** 74 patients (59 male, 15 female) aged between 4 and 17 years with 75 tibial fractures were identified. The average weight was 51 kg (range, 16-105 kg). 26 patients had open fractures (6 with segmental bone loss) and 18 had associated physeal injuries. The remainder were closed fractures with unstable fracture patterns or significant soft-tissue compromise. 11 patients were included after failing alternative treatment. There was a 100% union rate with a median hospital stay of 4 days (interquartile range [IQR], 2-7) after frame application and a median frame time of 108 days (IQR, 93-137). Malunions (>5° in any plane) were not observed and no serious complications occurred. Health-related quality of life measures (Peds QL), where available (78%), indicate return to high levels of function 6 months post frame removal (median PedsQL 88.04; IQR, 70.32-100). The median global health VAS score was 95 (IQR, 80-99).

**Conclusion:** This largest series to date demonstrates the safety and effectiveness of the Ilizarov method in treating complex pediatric tibial shaft fractures, with 100% union and a low serious complication rate. Furthermore, patient-reported outcomes indicate high physical and psychosocial functioning following treatment.



See pages 401 - 442 for financial disclosure information.