Understanding the Clinical Dilemmas of Complex Pediatric Feet Trauma - Areas where Tissue Engineering Substitutes are of Critical Importance

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Introduction
Approximately 13% of all fractures in children account for fractures of the foot. The injuries could be enormous that the severity of the soft tissue and skeletal injury is sometimes difficult to evaluate in the growing child. Compartment syndrome which may accompany such traumas must be taken into consideration. Restoration of the axis and anatomic reconstruction of the joints is of high importance for functional outcome. The aim of this study is to present the clinical conditions and outcomes in complex pediatric foot trauma and identify areas where tissue engineered substitutes could play a critical role.

Materials and Methods
A complex trauma of the foot was defined by the scoring system (range 5 to 9 points) according to Zwipp. This system relates to the soft tissue and skeletal injury. The medical records of all patients treated from 1995 to 2007 were reviewed. Data was evaluated with regards to gender, age, mechanism of injury and associated injuries. The course of treatment was analyzed and the outcomes evaluated. The outcome measurement included the Foot-Function-Index (FFI) Score (0-69: with 69 as the worst score) and the American Orthopedic Foot and Ankle Society (AOFAS) Score (0-100: with 100 as the best score).

Results
A total number of 28 patients were identified. The mean score according to Zwipp was 5.7 points (range 5 to 8). 22 (78.6%) of the patients were male and 6 (21.4%) were female. The average age was 12.1 years (2 to 16). A closed fracture was diagnosed in 19 (67.9%) patients. Open fractures were found in 9 patients (32.1%). The injury was isolated to the foot in 14 cases (50%). Eight patients (28.6%) presented additional injuries and another six patients (21.4%) suffered polytraumas. Operative intervention was necessary in 23 patients (82.1%). The mean number of operations was 2.9 (range 0-11). Two patients developed a compartment syndrome which was treated by dorsal incision. The mean interval between injury and latest follow-up examination was 4.1 years. The mean functional outcome was 15.1 (0-69) points for the FFI and 82.3 (59-100) points for the AOFAS Score.

Severe loss of tendons, muscle and skin were managed by surgical reconstruction, however such procedures have their limitations in full reconstructive and plastic restoration.

Discussion and Conclusions
Complex injuries of the foot are rare in pediatric patients. Avoidance of infection, fracture healing and restoring of function should be foremost in the surgeon’s treatment objectives. A careful clinical examination, accurate handling of the soft tissues and considering the capacity for spontaneous fracture remodeling are essential for good functional outcome.

In children with severe traumas, loss of skin, bone, tendons and bone are encountered, tissue losses which can profit from tissue engineering technologies.

Disclosures
Authors have nothing to disclose.