Outcomes of Traumatic Pediatric Finger Amputations and Demand for Tissue Engineered Digits
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Introduction
Traumatic finger amputation in the pediatric age group presents a variation in the extent of tissue loss. Irrespective of the extent of injury, efforts are focused towards re-implantation; however if unsuccessful, stump closure with shortening of the digit remain as the alternative. The purpose of this study was to evaluate traumatic pediatric finger amputations and estimate the demand for tissue engineering of digits in these patients. This monogram also intends to present the complexity of tissue involved in digit tissue engineering.

Materials and Methods
Traumatic finger amputations were identified from the hospital database and retrospectively evaluated with regards to the age of the patient, mechanism of injury, extent of injury and surgical management. Also, assessment of the complex number of tissue involved in the formation of digits was evaluated to determine the feasibility of complete replacement.

Results
Over a period of 10 years (1999-2009), 236 patients with 282 finger amputations were identified. Outcomes were evaluated according to the “Disabilities of the Arm, Shoulder and Hand Score” (DASH-Score) with successful re-implantation was documented in 191 patients; however in 45 patients re-anastomosis was either not performed or unsuccessful.

Primary amputations were necessary in 18 patients in whom it was not possible to replant or the condition of the amputated digit did not permit replantation. In 27 patients where replantation was attempted, viability of the replanted digit was poor and secondary amputations were performed to excise the replant. In case of distal digit amputations a VY-plasty was opted in 27 patients for the closure of the amputated stump. Local flap plastic reconstructions were necessary in 6 patients in whom a VY-plasty was technically not feasible. When skin mobilization for stump reconstruction was not possible, full thickness skin transplantation were performed and were successful in the 4 patients that had undergone this procedure. Thenar or hypothenar flaps were used for plastic reconstruction in 3 patients and tissue granulation in case of adequate bone coverage was adequate in a group of 5 patients.

The complexity of digit tissue engineering is not limited to success of bone tissue engineering only. Complete regeneration of the digits requires integration of regenerative medicine techniques in the following tissues: bone, cartilage, tendon, muscle, skin and nerves in order to achieve complete functionality of the replaced tissue.

Discussion and Conclusions
Pediatric traumatic finger amputations are associated with loss of digit in approximately 19% of the affected patients that require tissue engineered replacement options. The status of bone tissue engineering research for replacement options is being explored vigorously in the area of regenerative medicine, however the complex structure of the digits requires an array of tissues that need immaculate integration for proper functioning if the tissue engineering option has to be successful.

Disclosures
Authors have nothing to disclose.