The Use of External Fixation for Tissue Expansion in Desyndactylization of the Toes

Chad M Howze DPM, MS [1], Robert Shields DPM [1], Robert Brarens DPM, FACFAS [2]

[1] Chief Resident The Jewish Hospital of Cincinnati, [2] Residency Director The Jewish Hospital of Cincinnati

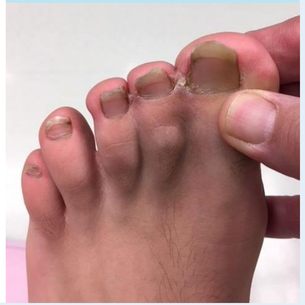
Purpose and Literature Review

Desyndactylization of the digits can be a complicated and technical undertaking. Current surgical techniques include Z-plasty, Skin flaps, and free grafts. Acute correction carries risks associated with poor outcomes.[1] Current literature advocates a tissue expansion technique to facilitate desyndactylization of the toes.[2-5] This case study presents the utilization of this technique in a patient with bilateral syndactyly deformities of toes 1-3. The purpose of this case study is to confirm the viability of the surgical technique.

Case Study

A 16 year old male presented with bilateral syndactylization of digits 1-3 (Fig 1). Past medical history was non contributory. The patient's mother reported previous foot surgery when the patient was 6 months old for correction of preaxial polydactyly. The patient had no complaints of pain at rest; however, pain was present with activity. The patient presents seeking surgical intervention for cosmetic defect of digits 1-3 bilateral.

Fig. 1 Preoperative Photo



Physical exam revealed non tender syndactylized digits 1-3. Neurovascular status intact to all digits. X-rays were negative for abnormal bony pathology. The patient had moderate pain with ambulation and was limited in shoe gear.

Cast Study and Surgical Procedure

Stage #1

The patient was brought to the operating room and placed on the operating table in supine position. General LMA anesthesia was administered. The left extremity was prepped and draped in the usual sterile manner. Attention was directed to the application of a mini rail external fixator to facilitate expansion of tissues. A .062 K-wire was driven from distal to proximal through digits 1-3 incorporating their respective phalanges. The center k-wire was anchored into the corresponding metatarsal for stability. Positioning was confirmed with intraoperative fluoroscopy (Fig 2). Acute distraction was performed intraoperatively, the tissue was stretched until there was blanching noted and the tension was reduced until good capillary fill time was noted to the skin and digits. Postoperative care included gradual distraction of the syndactyly at 1-2 mm/day as tolerated beginning on post-operative day 3, for a total of 34 days (Fig 3).

Fig 2 (Post Op X-ray) / Fig 3 (Post Op Day 34)

Stage #1

Fig 4, 5 (Intraoperative Photos)

Stage # 2

Case Study and Surgical Procedure

Stage # 2

Soft tissue expansion totaled 35mm which was reached in 25 days. Once adequate expansion was achieved the external fixator was kept in position for an additional 9 days. The patient was then taken back to the OR for removal of external fixator and desyndactylization of digits 1-3. The k-wires were left in place initially to help facilitate separation of tissue (Fig 4). A #15 blade was used to separate the toes and a combination of sharp and blunt dissection was used to complete separation. Care was taken to identify and protect neurovascular structures. Using 4-0 Nylon, simple interrupted suture technique was used to approximate the corresponding plantar and dorsal aspects of the skin incision at the medial and lateral aspects of the corresponding digits. The process was continued until the skin edges were reapproximated, creating the interdigital web spaces (Fig 5).

Results / Fig 6 (6 Month Post OP)

The patient was placed in a posterior splint non weight-bearing. Sutures were removed at 3 weeks. Healing was uneventful and the patient gained full range of motion at respective digits. The same procedure was schedule for contralateral foot 6 months later.

Discussion

The most common method for desyndactylization of digits today is full-thickness skin flaps. There are a variety of complications that can occur with skin grafts including tissue contracture, graft sloughing, and hypertrophic scar formation. [1-2] Gradual soft tissue expansion with external fixation offers an alternative means of addressing desyndactylization with potential for fewer complications. In this case study the technique proved to provide cosmetic and functional benefits to the patient with minimal complications. Requiring moderate technical skill; tissue expansion via external fixation appears a viable alternative to other desyndactylization methods.

References

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