Spare-Parts Technique for Concurrent Treatment of Ectrodactyly of the Feet and Syndactyly of the Hands in a 2-Year-Old Boy: A Case Report

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Abstract

Syndactyly is the most frequently occurring congenital malformation of the limbs. Although common, few studies have reported treating syndactyly using Z-plasty with and without full-thickness grafting. We present a 2-year-old boy who presented to our clinic with ectrodactyly of the feet and simple complete syndactyly of two fingers on each hand. After ectrodactyly reconstruction, we used the excess foot skin to cover finger defects. The patient recovered well postoperatively, with matching skin and no trouble with hair growth. Use of a spare-parts technique can help avoid complications associated with harvesting grafts from other donor sites. The results reinforce the importance of coordinating reconstructive techniques when necessary for operative treatment of syndactyly of the hands.

Introduction

Syndactyly, the most common congenital malformation of the limbs, occurs in about one in 2000 live births and is associated with more than 28 syndromes.[1] The condition is typically classified into a combination of complete, incomplete, simple, and complex categories, based on the degree of tissue involvement and the length of fusion.[2] Both medical and aesthetic considerations are taken into account when considering the best type of surgical intervention.[3,4]

A limited number of studies have explored methods of treating syndactyly using Z-plasty[5] with and without full-thickness grafting.[6,7] Specific management protocols have not been well established in addressing postoperative complications associated with web creep, scarring of the hand and harvest site, loss of autograft, changes in skin flap color, hair growth, and nail deformities.[8] We describe a patient from whom excess skin remaining after treating ectrodactyly of the feet was used as full-thickness skin grafts in treating syndactyly of his left and right hands. The patient recovered well postoperatively, without complications, and his hands and feet healed to near normal function.

Case Report

A 2-year-old boy presented to our pediatric hand clinic, born with syndactyly of the middle and ring fingers of both hands and ectrodactyly of both feet. His parents were concerned with the future function and appearance of the child's hands and feet. The patient was initially sent to our clinic for evaluation at 4 weeks of age by his pediatrician. These deformities were isolated anomalies, and he was otherwise healthy, with no other medical problems or known syndromes.

We first saw the child at 4 weeks of age, at which time he had anomalies of both hands and feet. Simple complete syndactyly of the long and ring fingers of the left hand was noted. In the right hand, complete synbrachydactyly of the long and ring fingers was observed, with a mild contracture of the proximal interphalangeal joint flexion that did not limit function. In the same hand, incomplete syndactyly of the ring and small fingers was noted. Radiographs of his hands indicated no bony abnormalities, confirming simple syndactyly. Both feet had three toes and a wide, deep central cleft. His right foot had simple complete syndactyly of the fourth and fifth toes. Imaging of the right and left feet revealed five metatarsals and three toes (first, fourth, and fifth digits; first, second, and fifth digits, respectively). The child was to return in 1 year for operative treatment of his hands and feet.

For reasons unknown, the follow-up appointment was not kept and the patient returned at about 2 years of age. His parents felt that the syndactyly and camptodactyly now impaired the use of his right dominant hand and that the ectrodactyly impaired his ability to wear shoes. The patient wore soft oversized slippers because no other shoes would fit. To minimize anesthetic exposure, we decided to surgically repair his hands and feet in the same setting.

Operative procedures with the patient under general anesthesia were performed without complication. An orthopaedic hand surgeon and pediatric surgeon worked concurrently to treat the hands and feet, respectively.

The patient's legs, arms, and left side of the groin were prepped and draped (Figures 1A and 1B). Syndactyly reconstruction was done using standard techniques with dorsal commissure flap and Z-plasties. In treating the feet, no bone was removed; instead, the intermetatarsal ligaments were reconstructed, skin was closed in the clefts on each side, and excess skin was removed. Use of this remaining skin avoided the need to harvest skin from the groin and covered the medial proximal finger defects resulting from finger separation during syndactyly release (Figures 2A and 2B). In respect to the hand skin, the foot skin was of near identical color, had no hair, and matched in dermal thickness. Sterile dressings and short-arm casts were applied to all extremities at the completion of the procedures.

Postoperatively, the patient recovered well. The casts were used to maintain the feet in a narrowed position for 6 weeks. His hands and feet healed well without complications (Figures 3A and 3B). Improved function was noted, and the child's parents were pleased with the results. The patient was able to move all fingers independently and use both hands with dexterity and prehensile function. He was able to wear normal shoes with no trouble walking or running.

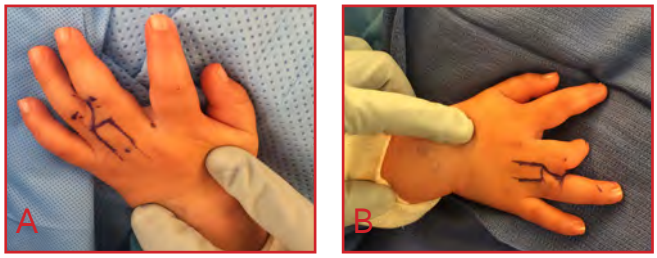

Figure 1. Intraoperative, posterior views of the (A) left and (B) right hands, showing syndactyly between the long and ring fingers.

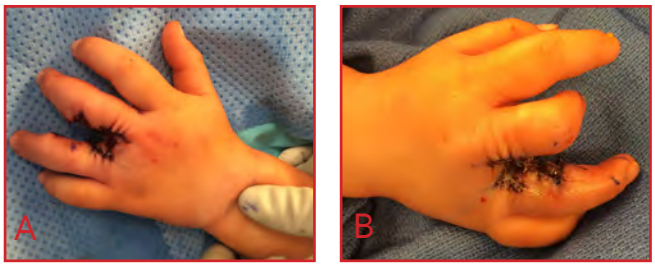

Figure 2. Intraoperative, posterior views of the (A) left and (B) right hands, showing covered areas of skin after using remaining full-thickness grafts from the feet.

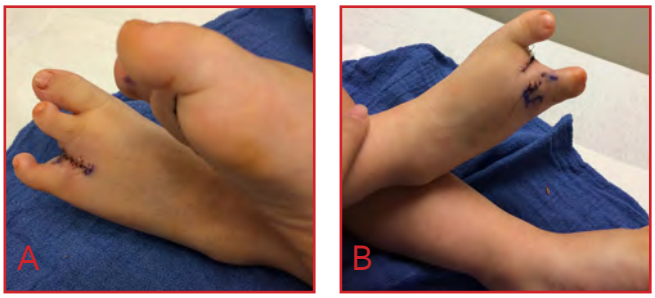

Figure 3. Postoperative, posterior view of the (A) left and (B) right feet, showing promising healing of incisions.

Discussion

Digit separation in humans occurs between the sixth and eighth week of embryogenesis[9] from cell differentiation, apoptosis, and enzyme degradation of limb webbing. A number of genetic and environmental influences can alter this process, leading to the development of incomplete or complete syndactyly in newborn limbs.[10-13] Treatment of this malformation typically requires use of full-thickness skin autografts; however, common complications associated with grafts obtained from the groin, wrist, and medial arm include hair growth on the fingers and pigmentation of the grafts.[7] Furthermore, the penile foreskin has been abandoned as a donor site owing to differences in skin color and integrity. We present the current case as a promising example of using a spare parts technique in reconstructive procedures for treating syndactyly of the hands.

In a retrospective study on full-thickness grafts used for treating 39 patients with syndactyly between 1991 and 2008, Mallet et al[8] reported hyperpigmentation and hair growth in 22% and 5% of cases, respectively. These outcomes may have been avoided in our patient because of the similarity between skin from the donor site and the recipient location. Furthermore, Comer and Ladd[5] reviewed operative treatment of patients with syndactyly and reported a general intervention time between 12 to 18 months old to avoid web creep. More recent studies suggest waiting until the child is 2 years old to avoid long-term anesthesia complications.[14] Yet the results of our case reinforce the fact that grafting technique and severity of syndactyly, in addition to age, may notably impact postoperative complications in children.

Use of excess, well-matched foot skin in covering finger defect may be an excellent option for treating patients with ectrodactyly of the feet and syndactyly of the hands. Most published data on syndactyly management focus on surgical technique,[15] with extensive discussion about using different flaps for reconstructing the digits. However, in treating syndactyly, none report the use of a spare-parts method to minimize the problems associated with graft-site morbidity. It is important to coordinate between

different subspecialties to minimize the risks of anesthesia exposure and repeated operative interventions. The results of our case support future research on long-term effects of coordinating reconstructive procedures using a spare-parts technique for operative treatment of syndactyly.

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Conflict of Interest

The authors report no conflicts of interest.

Informed Consent

The patient's family was informed that the data concerning the case would be submitted for publication, and they provided verbal consent.

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