SCIENTIFIC ARTICLE

The Use of an Hourglass Dorsal Advancement Flap Without Skin Graft for Congenital Syndactyly

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Purpose To investigate the efficacy of congenital syndactyly correction with flexion crease and web space reconstruction using a dorsal hourglass-shaped flap without skin graft.

Methods We studied 116 syndactylies in 96 patients. Surgical strategy focused on flexion crease and web space reconstruction using an hourglass-shaped dorsal advancement flap. We assessed for flap necrosis, height and width of the webs according to the criterion of D'Arcangelo, and total active digital motion compared with the normal side. Scar formation was measured by the Vancouver Scar Scale score. We also administered a parent-based satisfactory questionnaire.

Results Mean follow-up was 4.2 years. All syndactylies could be corrected without skin grafts. Dorsal flap plasty facilitated the reconstruction of commissure with a slope of 45° in an hourglass shape. Two cases encountered partial flap loss but healed without surgical intervention. There were no recurrences. According to the criterion of D'Arcangelo, the height and width of 98 webs were good, 16 webs were fair, and 2 webs were poor. Mean total active motion of the index, middle, ring, and little fingers of the affected side was 160, 158, 153, and 150, respectively. Mean Vancouver Scar Scale score was 1.4. After surgery, all parents were satisfied with the appearance and function of the separated fingers.

Conclusions Reconstruction of the flexion crease and web space simultaneously with an hourglass-shaped dorsal advancement flap can achieve good aesthetic and functional outcomes. *(J Hand Surg Am. 2015;■(■):■−■. Copyright © 2015 by the American Society for Surgery of the Hand. All rights reserved.)*

Type of study/level of evidence Therapeutic IV.

Key words Congenital syndactyly, flexion crease, web space, hourglass-shaped dorsal advancement flap.

Additional material is available online.

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SYNDACTYLY IS THE SECOND MOST common congenital anomaly in the hand, appearing approximately in 1:2,000 live births.[1] Key points of syndactyly reconstruction are separation of joined fingers during early life and creation of a web space comparable to normal.[2] The normal web is characterized by an hourglass shape and a 45° slope from proximal-dorsal to distal-palmar (Fig. 1).[3] The consistency of the flexion crease has an important role in the movement of the metacarpophalangeal joints.[4]

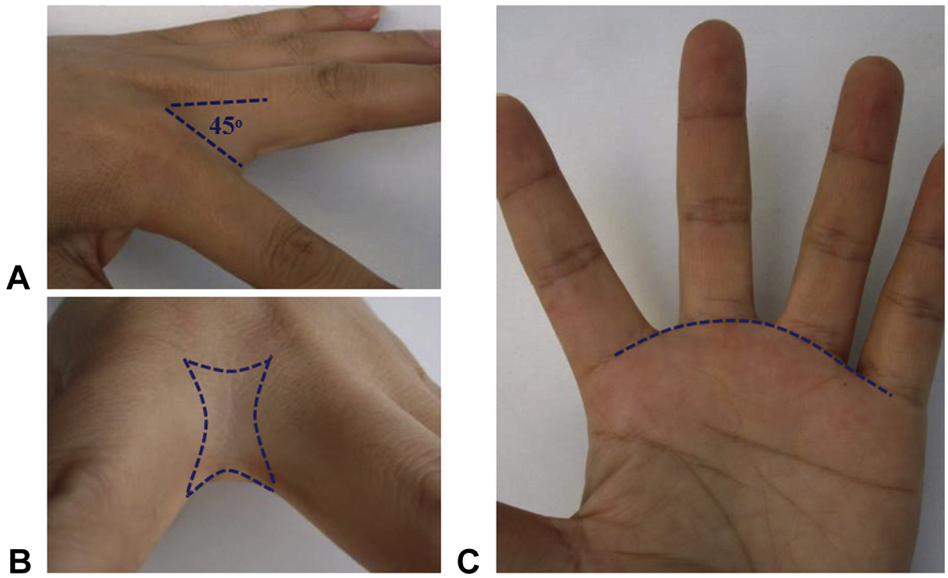

FIGURE 1: Aesthetic landmarks of web space and flexion crease in normal hand. Normal web is characterized by **A** a 45° slope from proximal-dorsal to distal-palmar and **B** an hourglass shape. **C** The consistency of flexion crease has an important role in the movement of metacarpophalangeal joints.

There are multiple techniques to reconstruct the web space: dorsal triangular flap,[5] dorsally based rectangular flap,[6] modified V-Y dorsal metacarpal flap,[7] combined interdigitating dorsal and palmar triangular flaps,[8] and dorsal pentagonallocal flap.[9] However, most of these flaps cannot reconstruct an hourglass-shaped web and require skin grafts to cover the resultant defects on the base of separated fingers or the lateral sides of the web. Consequently, scar contracture or web creep can occur. Physiological reconstruction of the web space and flexion crease has been universally overlooked, which in turn often results in poor configuration and an improper separation level.[7,10] However, these 2 aesthetic landmarks should receive equal and simultaneous emphasis on syndactyly separation.

In this study, we applied an hourglass-shaped dorsal advancement flap as a random skin flap in the treatment of simple syndactyly to secure physiological reconstruction of the flexion crease and web space. Furthermore, skin graft-free reconstruction was also achieved in these cases, thereby avoiding donor site morbidity and reducing scar contracture of the fingers.

PATIENTS AND METHODS

In this retrospective study, we investigated 116 simple syndactylies in 96 patients aged 8 months to 7 years (average, 26 mo) who underwent syndactyly release by the same surgeon between 2003 and 2010. Among these 116 syndactylies, 82 were complete syndactylies and 34 were incomplete syndactylies. Fifty-eight were boys and 38 were girls. The third web was affected in 73, the fourth in 23, and the second in 20. We excluded patients with Poland syndrome, Apert syndrome, amniotic band syndrome, burn syndactyly, and other complex syndactyly, to provide homogeneity to the study group. Syndactyly of the first web space was also excluded because this technique was not always fit for it. All parents of these patients gave informed consent before surgery and also gave consent to publish the data. Our institutional review board approved the study.

Surgical technique

All syndactyly release in this sample group was performed under general anesthesia with the use of a tourniquet. Figure 2 shows a schematic of the current surgical design of the hourglass-shaped dorsal advancement flap. Figure 3 illustrates the detailed surgical steps of syndactyly separation on an 11-month-old boy. A dorsal hourglass-shaped advancement flap was designed on the dorsum of the hand at the intermetacarpal space to reconstruct the web, which started from the level of metacarpophalangeal joint, with its distal top extending to two-thirds of the length of the proximal phalanx. The proximal transverse digital stria at the flexion crease level was then marked between the centers of the affected fingers on the palm where the distal margin of the dorsal flap would reach. The finger incisions was designed in the