SCIENTIFIC ARTICLE

Syndactyly Web Space Reconstruction Using the Tapered M-to-V Flap: A Single-Surgeon, 30-Year Experience

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Purpose To describe the technique and results of the tapered M-to-V flap for syndactyly web space construction.

Methods We reviewed a single-surgeon, single-institution experience of all syndactyly reconstructions performed between 1982 and 2013. Demographic data and patient characteristics were recorded. Complications included flap loss, graft loss, web creep, infection, restricted range of motion, and digit deviation.

Results A total of 138 web spaces were reconstructed in 93 patients. There were 89 primary congenital hand and 32 foot syndactylies. Four patients had an acquired simple incomplete syndactyly and 13 patients had secondary reconstructions. The complication rate was 14%. The most common complication was web creep resulting from partial skin graft loss (12 web spaces; 9%). There were no total flap losses. Univariate analysis revealed no factor to be predictive of an elevated complication rate. Average follow-up was 2.6 years (range, 6 mo to 26 y).

Conclusions The tapered M-to-V flap proved to be a reliable and versatile technique for web space reconstruction, offering several advantages over the standard rectangular flap method of repair, such as ease of intraoperative adjustment, a z-plasty at the palmodigital crease to minimize scar contracture, and better color match. *(J Hand Surg Am. 2015;■(■):■−■.*

Type of study/level of evidence Therapeutic IV.

Key words Syndactyly, web space, M-to-V flap.

SYNDACTYLY IS THE MOST COMMON congenital hand difference, with an incidence of 1:2,000.[1] Various methods of reconstructing the syndactyly web space have their own advantages.[2–6] Numerous local flaps have been developed, often combined with digital sidewall coverage using skin grafts. The central concepts employed in digital separation and web contracture release have long been established and include constructing a sturdy, deep web space and pliable digital sidewalls. The ideal reconstruction should be reliable, durable, easily reproducible, and adaptable to the spectrum of the disorder.

The tapered M-to-V flap can be employed in reconstructing either hand or foot syndactyly, congenital or acquired. The length of the flap can be adjusted during the procedure, unlike the standard rectangular flap. The tapered shape mirrors the anatomic dimensions of a typical web space. Scar contracture is minimized because the design creates a nonlinear scar along the palmodigital crease. Finally, the color match is greatly improved because the flap length can

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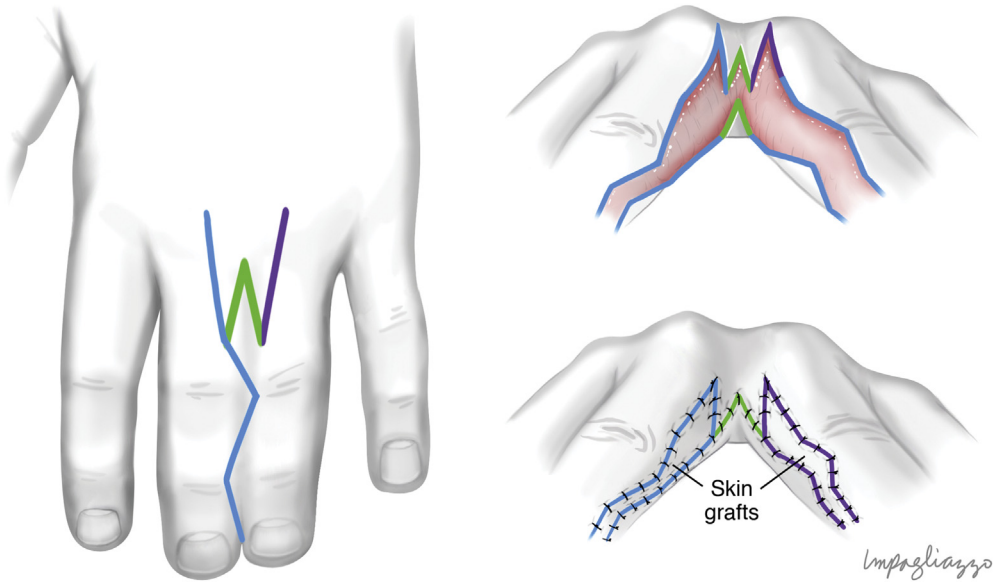

FIGURE 1: Illustrated stepwise technique of the tapered M-to-V flap for syndactyly web space reconstruction. The release begins proximally along one side of the M flap (blue line). The partially incised M flap is advanced toward the palmar surface to determine the length needed. The central portion of the M flap and corresponding palmar V-shaped flap are incised to match the height of the V to the depth of the M (green line). Finally, the flap width is determined by incising the third portion of the M flap (purple line).

be adjusted intraoperatively. Therefore, it can be planned so the darker skin of the dorsal web space is not placed volarly.

MATERIALS AND METHODS

We conducted a retrospective analysis of all hospital and office-based charts for all patients who underwent syndactyly web space reconstruction using the tapered M-to-V flap between 1982 and 2013. Our institution's review board approved this study. The senior author (RFM) performed all reconstructions. Patients were excluded if web space reconstruction was not performed with the M-to-V flap. Demographic information, mechanism (congenital vs acquired and primary vs secondary), syndactyly subtype, and location were recorded.

Complications were recorded and included flap loss, graft loss, web creep, infection, restricted range of motion, and digit deviation. Web creep was assessed clinically and defined using the volar base of the web as a baseline as well as compared with the adjacent normal web creases. Length of follow-up was calculated as the period of time between the date of surgery and the most recent clinic evaluation.

Descriptive statistics were calculated, including frequencies for categorical and ordinal variables and means, medians, and ranges for continuous variables. Univariate analyses included independent (unpaired) samples *t* test or analysis of variance for continuous data and Fisher exact test for categorical outcome measures. Statistical significance was set at a *P* value of .05.

Surgical technique

After the induction of general anesthesia, a tourniquet is placed and the extremity is prepped and draped in sterile fashion. The extremity is exsanguinated. An M-shaped flap is designed on the dorsum of the hand tapering distally and centered on the future web space. A corresponding V-shaped flap is designed on the volar surface with the apex of the V at the proposed future site of the palmodigital crease. This is confirmed by the arc of the remaining palmodigital crease. The syndactyly is released distally in a typical zigzag fashion, mirrored dorsally and volarly. Traction sutures placed through the distal aspect of the involved digits aid with the release. Dissection of the M and V flaps and determination of their exact dimensions is a 3-step process (Fig. 1). This cut-as-you-go approach is imperative to provide a reconstruction tailored to the patient's unique syndactyly. The syndactyly release begins proximally along one side of the M flap. The partially incised M flap is advanced toward the palmar surface to determine the length needed to restore normal web space architecture. The central portion of the M flap and corresponding palmar V-shaped flap are incised to match the height of the V to the depth of the M. This is adjusted based on skin tone difference related to the desired visibility of incisions on the dorsal surface of the web space (Fig. 1). Finally, the flap width is determined by incising the third portion of the M flap. This limb is divergent to complete the tapered design