

A Systematic Review and Comparison of Outcomes Following Simple Syndactyly Reconstruction With Skin Grafts or a Dorsal Metacarpal Advancement Flap

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Purpose Many techniques exist for simple syndactyly reconstruction. The most commonly used techniques involve either skin grafts or a dorsal metacarpal advancement flap. Our aim was to review and compare the outcomes of these 2 techniques systematically.

Methods We reviewed articles from PubMed, MEDLINE, EMBASE, and Google Scholar published between January 1966 and January 2016. We identified studies that reported outcomes after reconstruction of simple syndactyly using skin grafts and those using only a dorsal metacarpal advancement flap. Cases of complex syndactyly and those that were not clearly differentiated by technique or type of simple syndactyly were excluded. Outcomes were then stratified by technique and type of syndactyly (complete and incomplete).

Results We identified 693 articles and selected 34 for inclusion. No standardized outcome measure was uniformly applied in the examined studies. Overall, skin grafting procedures were associated with more complications (eg, flap necrosis/graft failure, contracture, web creep, hypertrophic scarring) and a greater need for revision. When stratified by subtype, patients with simple, complete syndactyly who underwent skin grafting had a significantly higher rate of hypertrophic scarring than those who underwent reconstruction with a dorsal metacarpal advancement flap.

Conclusions Simple syndactyly reconstruction with a dorsal metacarpal advancement flap may lead to fewer complications than procedures using skin grafts. However, substantial limitations of currently available evidence do not allow for the recommendation of a specific technique. Future research should use a uniform reporting system for syndactyly classification and complications. (*J Hand Surg Am.* 2017;42(1):34–40. Copyright © 2017 by the American Society for Surgery of the Hand. All rights reserved.)

Type of study/level of evidence Therapeutic IV.

Key words syndactyly, dorsal metacarpal advancement flap, surgical flap, skin graft, surgical technique.

 Additional Material
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CONGENITAL SYNDACTYLY IS ESTIMATED to affect 1 in every 2,000 newborns^{1–3} and accounts for approximately 20% of all congenital hand malformations.⁴ Syndactyly occurs most frequently in males^{5–7} and can affect any web space with a bilateral presentation in half of all cases.⁶ Simple syndactyly denotes a web made up of only skin and connective tissue, whereas complex syndactyly involves some degree of osseous fusion. Complete syndactyly denotes a web that extends to the tip of the digit, whereas incomplete syndactyly involves fusion proximal to the distal phalanx.

Historically, skin grafting has been the reference standard for covering skin-deficient areas after web separation.⁸ However, this procedure has been associated with several complications, including web creep, hyperpigmentation, recipient site hair growth, donor site morbidity, and hypertrophic scarring.⁹ Dorsal metacarpal advancement flaps were developed to minimize these skin graft-related complications. This technical variation allows coverage of the web and lateral interdigital spaces using only local tissue.¹⁰

It is unclear how outcomes compare after simple syndactyly reconstruction with a dorsal metacarpal advancement flap or with skin grafts. Understanding the outcomes of these techniques may assist the hand surgeon in selecting the most appropriate reconstructive strategy. The purposes of this study were to (1) report and compare objective and subjective outcomes after reconstruction of simple syndactyly using 2 common techniques, and (2) differentiate published outcomes by simple syndactyly subtype.

METHODS

We performed a search of studies published between January 1966 and January 2016 using the PubMed, MEDLINE, EMBASE, and Google Scholar databases to identify citations related to simple syndactyly reconstruction. A medical librarian assisted in the formulation and verified the search strategy after consultation with the authors. We used the phrases and key words “syndactyly,” “simple OR complete OR incomplete,” “surgical technique,” “surgical flaps,” “skin graft,” “skin transplantation,” “island flap,” “pentagonal flap,” “dorsal flap,” and “metacarpal flap.” One reviewer (M.A.S.) independently conducted a title and abstract search to identify appropriate articles using criteria developed a priori (Table 1). After initial review, both authors (M.A.S. and J.M.A.) reviewed articles for final inclusion and performed a manual reference check of the retrieved

articles to capture additional references that were missed in the original search. Meeting abstracts were not included.

Inclusion and exclusion criteria

Inclusions were restricted to English language papers that reported on simple syndactyly and involved treatment by a dorsal metacarpal advancement flap or skin graft procedure. Articles that investigated multiple subtypes of syndactyly (eg, simple and complex) were excluded unless outcomes for only simple syndactyly cases were reported separately. Publications that investigated other procedures or did not include outcomes were excluded. A total of 34 reports were identified for data extraction and statistical analysis.^{11–44} Figure 1 presents a study attrition diagram of the selection process using Preferred Reporting Items for Systematic Review and Meta-analysis Guidelines.⁴⁵

Data extraction and analysis

After study selection, one reviewer (M.A.S.) independently extracted data. These data included the study type, syndactyly type(s) evaluated, sample size (of patients and webs), patient demographics, procedure performed, length of follow-up, type and results of any outcomes instrument, clinical examination findings (where available), and postoperative outcomes. Data were initially extracted for all articles reporting simple syndactyly surgical outcomes. Results of each study were further stratified by the procedure performed and type of simple syndactyly. In studies evaluating multiple techniques or syndactyly types, these data elements were extracted for each simple syndactyly subtype (complete and incomplete) where possible. If the simple syndactyly subtype could not be ascertained or the outcome under review was not reported, that web or patient was excluded from further analysis. To simplify and standardize the analysis, we assigned the term “flap” for dorsal metacarpal advancement flap reconstruction or “graft” for procedures using skin grafts.

Outcomes of syndactyly repair

Extracted outcomes included early postoperative complications (graft failure, flap necrosis, and infection) and the longer-term outcomes of web creep, scar contracture, scar hypertrophy, and revision surgery. We calculated odds ratios (ORs) to compare complication rates after each technique. Simple bivariate contrasts were used to calculate ORs with chi-square analysis to compare categorical

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