Reconstruction of cutaneous dorsal finger defects

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Abstract

Background: Reconstruction of surgical defects on the dorsal finger can be challenging because of a lack of adjacent tissue reservoirs, poor laxity, and often thin, atrophic skin surrounding the defect.

Objective: To present reconstructive options for cutaneous dorsal finger defects.

Methods: We describe our five preferred approaches to reconstructing cutaneous dorsal finger defects based on the amount of available underlying tissue and location of the defect on the finger.

Results: In the authors' opinion, for smaller defects between and including the metacarpophalangeal joint extending to the proximal interphalangeal joint, a transposition flap or unilateral advancement flap is preferable. For proximal finger defects that are wider, a unilateral rotation flap is appropriate. A Burow full-thickness skin graft can be used for any proximal defect with underlying soft tissue present. For defects with underlying bone or tendon present, a reverse cross-finger interpolation flap can be utilized.

Conclusions: The unilateral advancement flap, unilateral rotation flap, transposition flap, full-thickness skin grafts, or the reverse cross-finger interpolation flap can be used to reconstruct the majority of cutaneous dorsal finger defects.

Keywords: cutaneous, dermatologic, dorsal, finger, local flaps, Mohs micrographic, reconstruction, skin cancer, surgery

Introduction

The fingers are critical for everyday activities and functional impairment can have profound physical and emotional impacts. Given this important role in normal daily living, reconstruction of surgical defects following Mohs micrographic surgery (MMS) should minimize loss of function while providing wound coverage. The dorsum of the hands and fingers are subject to chronic ultraviolet radiation, thus skin malignancies are common in these locations. Reconstruction of MMS defects on the dorsal fingers can be challenging owing to the paucity of tissue reservoirs and commonly thin, fragile skin adjacent to the defect. In addition, recruitment of local tissue is challenging because of the relative fixation of tissue to the underlying interphalangeal joints by transverse septae [1]. When choosing repair options for a defect on the dorsum of the finger, the size, depth, and location should be considered. Secondary intention healing is viable for large and small defects, whereas primary closure is possible for small proximal defects [2]. Based on the authors' experience, we present our preferred methods for reconstruction of dorsal finger defects.

Unilateral advancement flap

The unilateral advancement flap is ideal for defects on the dorsal finger proximal to and involving the proximal interphalangeal (PIP) joint. The flap is designed by making parallel incisions extending proximally from the defect onto the web space near the metacarpophalangeal (MCP) joint (**Figure 1A**) with Burow triangles often placed in the webspaces. Blunt undermining is performed in the loose subcutaneous tissue to mobilize the flap and recruit laxity from the dorsal hand. The flap is then advanced onto the defect, with placement of the "key stich" using simple interrupted epidermal 4-0 Polyglactin 910 to align the advancing flap edge. The remaining defect is closed using the rule of halves (**Figure 1B**). Sutures are then removed after 14 days. Often only epidermal sutures are used as to avoid placing

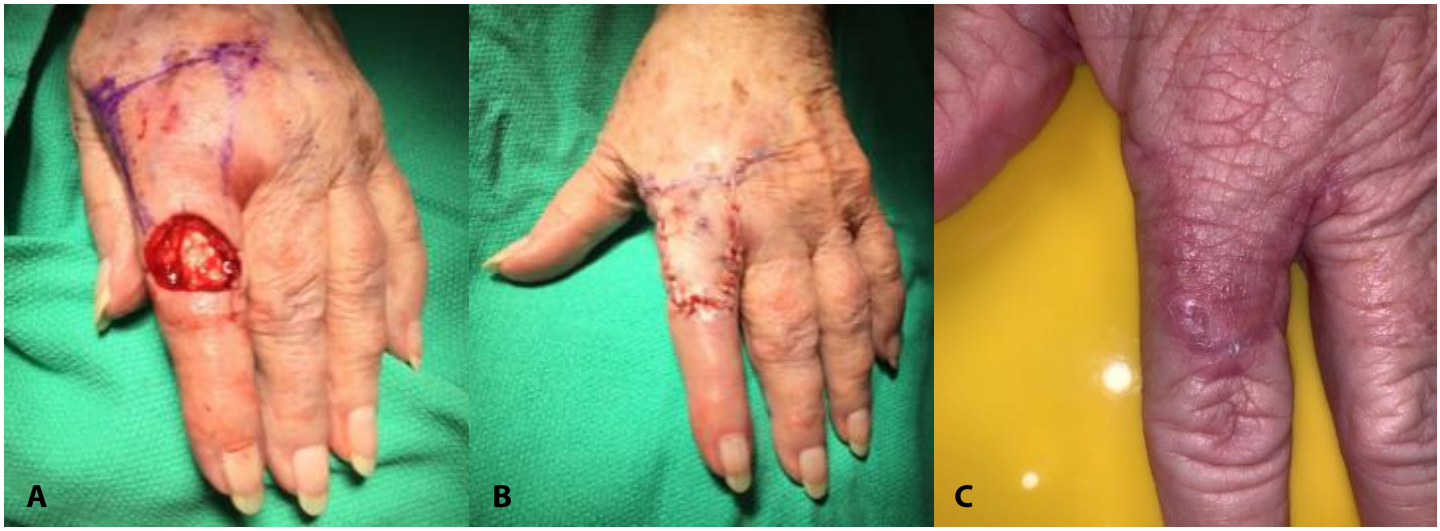

Figure 1. ***A)****. Unilateral advancement flap of a defect on the dorsal proximal finger.* ***B)****. Immediate post-operative view of the unilateral advancement flap using simple, interrupted Polyglactin 910 sutures.* ***C)****. Two-month post-operative follow up. The mild post-operative erythema observed will continue to fade.*

buried sutures, especially in patients with thin, fragile skin. Polyglactin 910 is the preferred suture as it adequately secures atrophic skin and has similar long term scar appearance compared to readily used non-absorbable sutures (**Figure 1C**), [3,4].

Rotation flap

A unilateral rotation flap is a reconstruction option for wider proximal defects that are between the MCP and PIP joints. From the defect, incisions are extended in a curvilinear fashion onto the proximal webspace or proximal dorsal hand skin, depending on the size of the defect. After blunt undermining, the flap is then rotated onto the defect. Similar to the advancement flap, simple interrupted epidermal 4-0 Polyglactin 910 sutures are used to close the wound and these sutures are removed after 14 days.

Transposition flap

Transposition flaps are ideal for small, proximal defects between the MCP and PIP joints. Incisions are extended proximally from the defect to allow for transposition of the flap from the proximal webspace or dorsal hand, depending on defect size (**Figure**

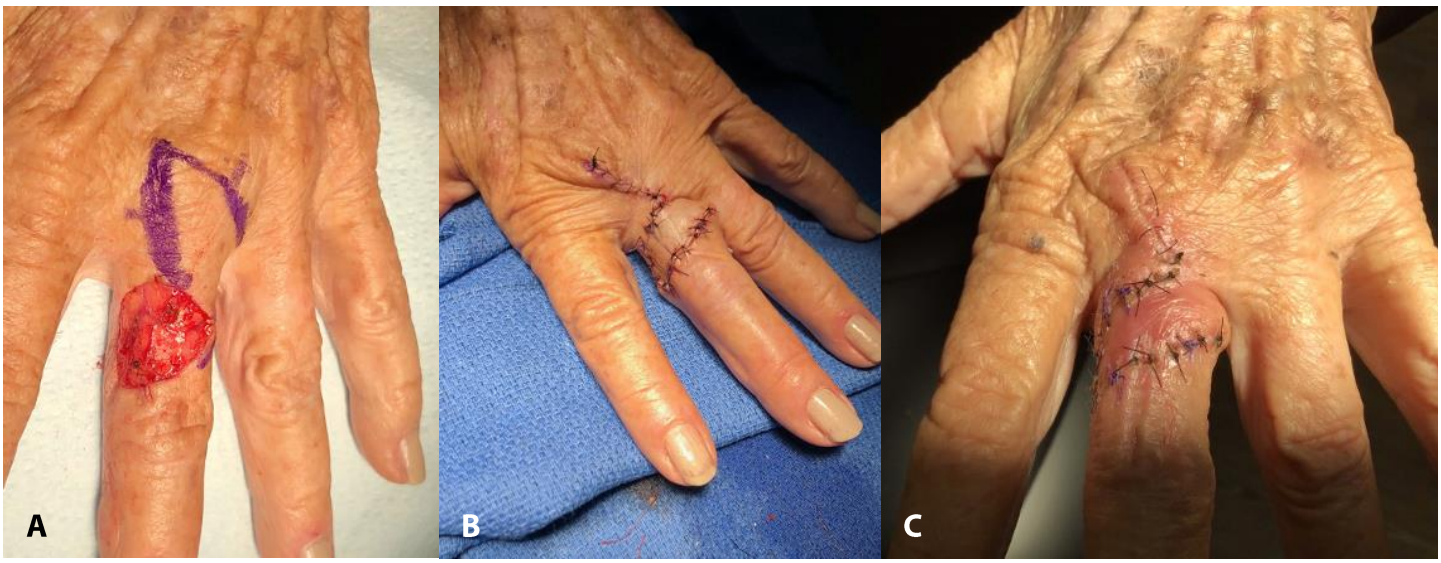

Figure 2. ***A)****. Pre-operative design of a transposition flap for reconstruction of a proximal dorsal finger defect.* ***B)****. Immediate post-operative view.* ***C)****. Two-week post-operative follow up at suture removal visit.*

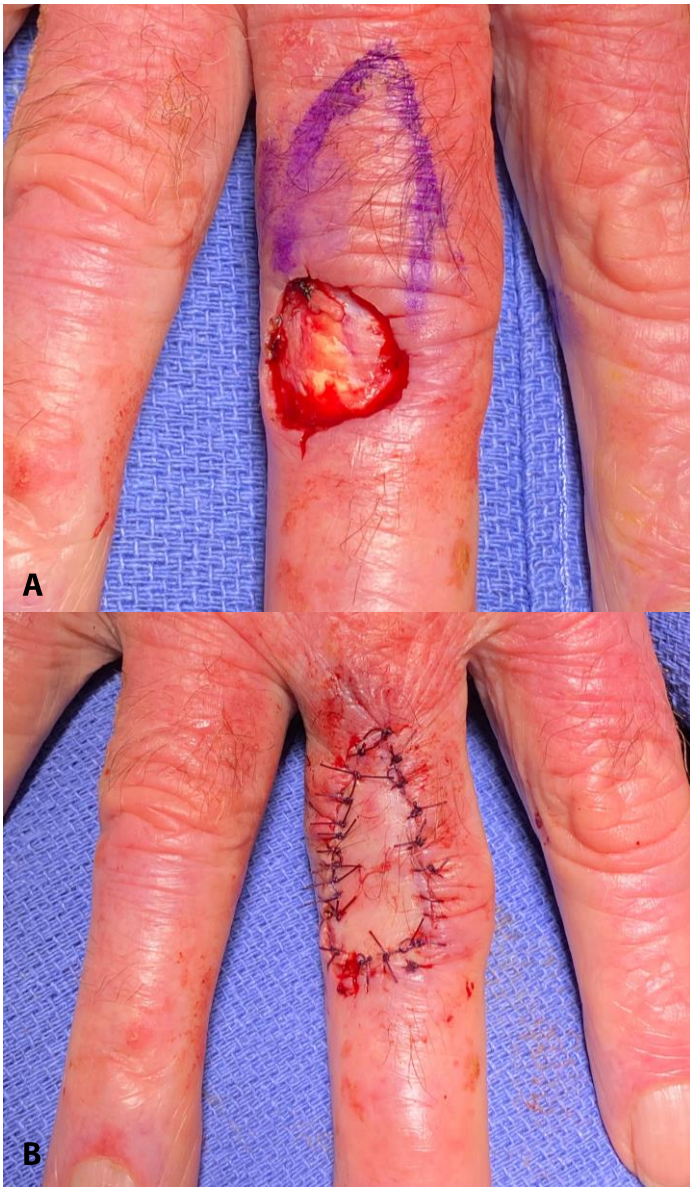

Figure 3. ***A)****. Using a Burow full-thickness skin graft to reconstruct a defect overlying the proximal interphalangeal joint.* ***B)****. Post-operative view.*

2A). After blunt undermining, the flap body is then lifted onto the primary defect. Simple interrupted epidermal 4-0 Polyglactin 910 sutures are placed to repair the wound. After sutures are placed, a standing cone on the ipsilateral web space is excised and repaired to minimize blood supply loss (**Figure 2B**). Sutures are then removed after two weeks (**Figure 2C**).

Full-thickness skin graft

For both large and small proximal dorsal finger defects a Burow full-thickness skin graft (FTSG) taken immediately proximal to the defect can be utilized (**Figure 3A**). Using an adjacent Burow graft, as compared to a distant site, minimizes wound care and allows for excellent cosmetic tissue match. After blunt undermining, 4-0 Polyglactin 910 closes the secondary defect initially to decrease the required graft size. The authors use a central deep absorbable suture to appose the defect bed to the inner portion of the FTSG for better adherence and to decrease dead space. Simple interrupted epidermal sutures secure the graft (**Figure 3B**). For defects distal to the PIP joint, FTSG from distant locations, usually the ipsilateral dorsal hand, is best. Using this location as the donor site is preferred due to the cosmetic match and laxity of tissue. When placing a graft over exposed tendons and bones one must exercise thoughtfulness to avoid potential pitfalls. First, caution should be taken when grafting over large defects with bone or tendon exposed as risk of graft failure increases with larger defects. In addition, when grafting over a tendon with missing tendon sheath, grafts can adhere to the tendon and potentially restrict finger moment. However, in our experience, well-wrapped FTSG can survive over exposed tendons and bones, which is especially helpful after nailbed and distal finger surgery.

Reverse cross-finger interpolation flap

For deep defects with exposed tendon and/or bone, the reverse cross-finger interpolation flap is occasionally used. A finger adjacent to the defect finger is selected. On the donor finger, a thin, 3-sided rectangular-shaped full-thickness flap is elevated, leaving the edge opposite side of the defect intact. A 3-sided, rectangular-shaped full-thickness subcutaneous flap is then elevated, leaving the side adjacent to the defect attached. The subcutaneous flap is then folded over onto the defect, where subsequently a FTSG is placed. The flap on the donor finger is then sutured in its original position to cover the donor defect. The flap is then taken down after 14 days [5].

Wound care

After reconstruction, we apply petrolatum ointment followed by placing a non-adherent dressing, gauze, and a Coban™ self-adherent wrap. For FTSG, a petrolatum-impregnated gauze replaces the

Table 1. *Key points in cutaneous dorsal finger reconstruction.*

Type of closure	Ideal defect location	Key sutures / steps	Other key steps	Suture type	Type of undermining	Wound dressing* and suture removal#
Unilateral advancement flap	Dorsal finger proximal to and involving the PIP joint	Aligns distal advancing flap edge	Rule of halves	Epidermal 4-0 Polyglactin 910	Blunt	1 week* 2 weeks#
Rotation flap	Wide defects between the MCP and PIP	Aligns distal rotated flap edge	Rule of halves			
Transposition flap	Small defects between the MCP and PIP	Close secondary defect first	Standing cone removed at end of repair			
Burow full-thickness skin graft	Dorsal finger with underlying soft tissue present	Close secondary defect first	Align graft to distal point and each side of the defect. Alternate interrupted sutures to distribute tension			
Reverse cross-finger interpolation flap	Deep proximal > Distal dorsal finger with underlying tendons/ bone exposed	Donor subcutaneous tissue provides vascular base for FTSG	Take down flap at 14 days			

FTSG, full-thickness skin graft; PIP, proximal interphalangeal; MCP, metacarpophalangeal.

non-adherent dressing. This wrap protects the finger from environmental effects, reminds the patient to limit finger use, and reinforces the wound. For flaps and grafts we recommend the dressing stay in place for 48 hours and 7 days, respectively. The patient can then remove the dressing and continue with gentle wound care with re-wrapping until suture removal. Care should be taken to avoid obstructing blood supply with the wrap and patients are instructed to monitor for loss of movement, sensation, or blue color changes.

Conclusion

Defects on the dorsal finger can be technically challenging owing to the limited tissue laxity, lack of nearby tissue reservoirs, and often thin, atrophic skin that surrounds defects. In this article, we present our preferred reconstruction techniques to overcome these challenges. Important technical considerations for each technique are summarized in **Table 1**.

Potential conflicts of interest

The authors declare no conflicts of interest

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