

The Digital Dorsal Adipofascial Turn-Over Flap in Managing Injuries of the Dorsum of the Distal Phalanx

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ABSTRACT

Background: Finding an appropriate local flap for coverage of tissue loss at the dorsum of the distal phalanx, especially with exposure of tendon, bone, and DIP joint, can be a challenging task. There are many local flap options to solve this problem, with advantages and drawbacks of each option. The dorsal adipofascial turn-over flap is a valuable option in these situations.

Aim of the Study: To evaluate the efficacy and reliability of the homodigital dorsal adipofascial turn-over flap based on the dorsal cutaneous branches (DCB) of the proper palmar digital arteries (PDA) arising in vicinity of DIP joint, in reconstruction of soft tissue loss over the dorsum of the distal phalanx.

Patients and Methods: This study was done in Menoufia University Hospitals from 2012 to 2014 and included 11 male patients with 12 affected digits. Twelve homodigital dorsal adipofascial turn-over flaps were done to reconstruct soft tissue loss over the dorsum of the distal phalanx, along with reconstruction of lost tendon, joint capsule, ect as necessary. Very thin split-thickness skin grafts were applied over the adipofascial flaps.

Results: Twelve adipofascial turn-over flaps were done. All the flaps survived except two flaps showed loss of the distal third which healed spontaneously with conservative treatment. Skin graft loss occurred in the above 2 patients over the lost parts of the flaps. No infection had occurred. The flap ranged in size from 4x1.5cm to 5x2cm. The flaps covered the defects satisfactorily.

Conclusion: The homodigital dorsal adipofascial turn-over flap is a simple, reliable, single-stage procedure, with minimal donor site morbidity, capable of replacing soft tissue defects over the dorsum of the distal phalanx.

Key Words: *Digital dorsal adipofascial – Turn-over flap – Injuries – Distal phalanx.*

lack of locally available tissue. The principles of reconstruction in this area include achieving early wound closure, using local tissue whenever possible, and avoiding unsightly donor deformities [1].

INTRODUCTION

The loss of dorsal tissue at the level of the distal phalanx, along with exposure of the extensor tendon or distal interphalangeal (DIP) joint, represents a challenging reconstructive problem because of the

cluded 11 patients with 12 digits affected (as one patient had injury to 2 adjacent digits). All the patients were males, their age ranged from 22 to 47 years. All the patients presented with post-traumatic skin loss over the dorsum of the distal phalanx and DIP joint. Patients presented with extensive injury at sides of DIP joint making the blood supply to the flap questionable are excluded from the study. Associated with the skin loss, there were variable accompanying injuries to the extensor tendon, DIP joint capsule, nail matrix, and fractures of the distal phalanx.

Surgical technique:

All the procedures were done under general or regional anesthesia and tourniquet control with loupe magnification. Preoperative antibiotic was given before tourniquet inflation. Once the skin defect and other associated injuries were defined, the dorsal skin overlying the flap was carefully incised down to the dermal layer in a mid-dorsal straight line with a curvilinear fashion around PIP joint (Figs. 1,2). When planning the length of the flap, we included the size of the defect, the pedicle of the flap, and an additional 10mm to compensate the loss of flap length when the flap was turned over. The dorsal skin over the flap was very meticulously dissected in the subdermal level using sharp no. 15 blade to the lateral sides of the finger (Fig. 3). Then, proximal and lateral incisions were done in the subcutaneous tissue, and the adipofascial flap was raised, from proximal to distal, including all tissue between the dermis and the paratenon (Fig. 4). The tourniquet was deflated and flap viability was checked. The flap was then turned over to cover the defect, where the flap was sutured to edges of the defect using simple vicryle

sutures (Figs. 5-7). The dorsal skin over the flap donor site was sutures repositioned over the paratenon and a thin split-thickness skin graft was applied to the raw surface of the turned over flap (Fig. 8). Associated injuries were dealt with accordingly, where phalangeal fractures were reduced with k-wires, tendon loss reconstructed with tendon grafts, and open DIP joint injury repaired. The hand was immobilized for 5 to 7 days and for about 4-6 weeks in cases of phalangeal fractures.

RESULTS

This study included 11 patients with 12 digits affected, all patients were males, their age ranged from 22 to 47 years, with post-traumatic digit affection. Twelve homodigital dorsal adipofascial turn-over flaps were done to reconstruct the soft tissue loss. All the flaps survived except 2 flaps showed necrosis of the distal third and healed with conservative treatment. The skin graft take was complete in all the cases except in the above mentioned 2 cases with graft loss over the lost flap parts. No infection was recorded in all the patients. As the dorsal sensory branches of the proper digital nerve were severed bilaterally during elevation of the adipofascial flap, so post-operatively the flap sensation was similar to areas received skin grafting, with crude sensation. The average size of the flap ranged from 4x1.5cm to 5x2cm. There was no necrosis of the skin flaps redraped over the paratenon at flap donor site or adhesions between these skin flaps and the extensor mechanism as the paratenon was kept intact. The affected digits showed no signs of venous insufficiency and had normal sensation at the finger pulp. Five patients had dissatisfaction with the conspicuous scar over the donor site and graft discoloration (Figs. 9,10).



Fig. (1): Preoperative photo, with loss of skin and extensor tendon over the distal phalanx and damaged nail plate.



Fig. (2): Skin marking of the incision as a straight mid-dorsal incision with a curvilinear part over PIP joint.

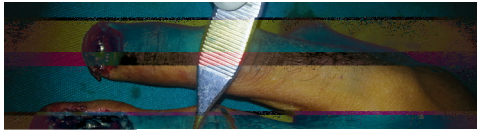


Fig. (3): Skin flaps very meticulously dissected in subdermal level to mid-lateral sides of the finger.

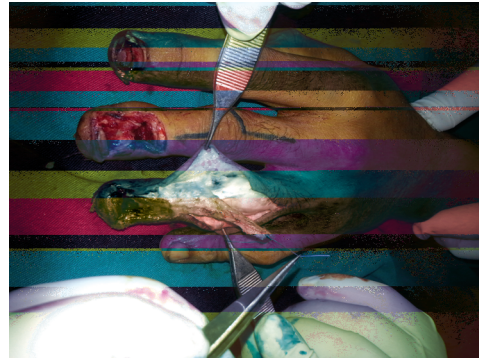


Fig. (4): Adipofascial flap was raised including all tissue between the dermis and paratenon.



Fig. (5): Adipofascial flap, based on DCB of the PDA arising about the DIP joint, turned-over to cover the defect (ring finger).

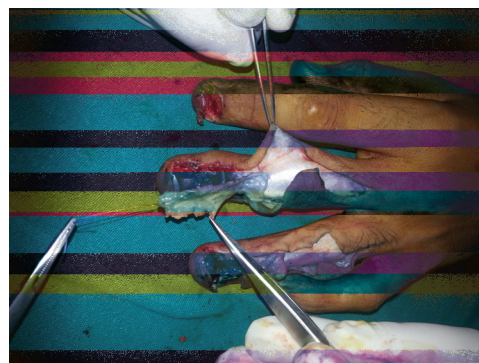


Fig. (6): Adipofascial flap turned-over to cover the defect (middle finger).



Fig. (7): Tourniquet was deflated, both flaps were well vascularized, and sutured to edges of the defect. Skin flaps were re-draped over the flap donor site.



Fig. (8): Thin split-thickness grafts were applied over the flaps. Fractures of distal phalanges were pinned with K-wires.



Fig. (9): Early result 3 weeks post-operative.



Fig. (10): Late result 3 months post-operative.

DISCUSSION

The loss of dorsal tissue at the level of distal phalanx, along with exposure of the tendon or DIP joint, represents a challenging reconstructive problem because of the lack of locally available tissue. The available local flaps as transposition and advancement flaps have random vascularity, limited range of mobility, and limited amount of tissue available from areas adjacent to the defect [2,3]. Distally based cross-finger flap and the deepithelialized cross-finger flap require staged procedure, immobilization with possible joint stiffness [4,5]. The reverse digital artery flap and the axial pattern digital transposition flap, based on the proper palmar digital artery sacrifice that artery which may jeopardize the already injured digit [6,7].

When comparing the homodigital adipofascial turn-over flap to other local coverage options, it is simple, reliable, single stage procedure, with no significant donor site morbidity or distant scars [14].

Karacalar used the adipofascial turn-over flap to resurface finger defect in seven cases. The flaps survived completely except one flap which had a 20% loss [16].

Muller et al., used the dorsal adipofascial turn-over flap in treatment of painful nonunion of distal phalanx with bone graft and reconstruction of nail plate using the above mentioned flap. They treated 3 patients in their series. The 3 flaps survived and provided well vascularized soft tissue coverage of the bone graft to promote bone healing [17].

Braga-Silva used the adipofascial turn-over flap in forty patients with highly successful results. He based this work on his sound anatomical study of the vascular supply of the dorsal finger skin. He proved this flap as a reliable one [14].

The results in this study were comparable to the above mentioned studies as 12 flaps were done in 11 patients, with all the flaps survived except 2 flaps showed loss of the distal third and healed with conservative treatment.

In conclusion: The homodigital dorsal adipofascial turn-over flap appeared to be simple, reliable, single-stage procedure, provide adequate coverage of exposed tendon, bone, and DIP joint, with minimal donor site morbidity.

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