



DORSAL ULNAR ARTERY FASCIOCUTANEOUS FLAP IN RECONSTRUCTION OF SOFT TISSUE DEFECTS OF THE HAND – A CASE SERIES

Plastic Surgery

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ABSTRACT

Soft tissue defects of hand with exposed structures such as tendons, joints, nerves and bone present a challenging problem to the reconstructive surgeon. These defects, both post-traumatic and post-infective require early flap cover to protect underlying vital structures, preserve hand functions and to allow for early rehabilitation. Becker and Gilbert first described flap based on the dorsal branch of the ulnar artery for defects around the wrist. We evaluated the use of a dorsal ulnar artery flap in five patients with soft tissue defects of hand. Four flaps survived completely, with marginal necrosis in one flap which settled conservatively. Donor areas which were skin grafted, healed with acceptable cosmetic results. The dorsal ulnar artery flap is a reliable, easy and a single-stage procedure for reconstructing soft tissue defects of the hand.

KEYWORDS

Becker Flap, Dorsal ulnar artery, Hand defects, Reconstruction

INTRODUCTION

Providing adequate and a durable cover with minimal scarring is a fundamental principal in the management of soft tissue defects of hands. Reconstruction of soft tissue defects of the hand is a formidable challenge to the plastic and reconstructive surgeons. Good quality skin cover of soft tissue defects of hands with a fasciocutaneous flap seems to be an ideal option. The dearth of locoregional flaps that are thin and pliable, allows the surgeon to perform skin grafts or distant flaps with their inherent drawbacks and suboptimal outcomes. The dorsal ulnar artery fasciocutaneous flap was first described by Becker and Gilbert in 1988, which is supplied by the ascending branch of the dorsal ulnar artery, one of the major branches of the ulnar artery in the distal forearm.¹⁻⁴ The importance of this flap lies in the possibility of mobilization of tissue for reconstruction of the hand without losing a major vascular pedicle. The dorsal ulnar artery fasciocutaneous flap can be raised as a peninsular or as an island flap. Here, we evaluated the applications of dorsal ulnar artery fasciocutaneous flap in reconstruction of soft tissue defects of hand.

Material & Methods

This was a retrospective observational study from January 2018 to June 2019. Five patients were included in the study, four of them were of post-infective and one patient was of post-traumatic etiology. There were three male and two female patients. The age group varied from 23 years to 60 years with a mean age of 42 years. Dorsal ulnar artery perforator was first localized with the help of a hand held Doppler. Surgery was done under regional anaesthesia with tourniquet control and loupe magnification. Soft tissue defect of hand was debrided and flap marking was done. The flap was raised as an island flap. The dissection started from the ulnar side of the wrist and forearm from proximal to distal including the deep fascia. The pedicle was exposed by retracting the flexor carpi ulnaris radially. The pedicle emerged from the ulnar artery 2 to 5cm proximal to the pisiform bone. The dorsal branch of the ulnar nerve was preserved. The dorsal ulnar artery was dissected at its origin from the ulnar artery which permitted 180° rotation of the flap. Tourniquet was released and haemostasis was secured. The flap was transferred to the defect and inset given. The subcutaneous pedicle of the flap was skin grafted to avoid tension. The donor site was skin grafted and dressing was done. The hand was immobilized in neutral position for about a week.

Results

The flaps survived in all patients. Marginal loss over the distal edge of the flap was noted in one patient and this was managed conservatively. Mild edema developed in all patients and subsided over 10 days. Post-operative the flaps were well settled and the donor graft site was also aesthetically well settled. Long term follow-up of around 8 months showed good flap durability and elasticity with good movements.

Case 1



Fig. 1 – Defect ulnar aspect of left palm

Fig. 2 – Flap marking done



Fig. 3 – Immediate post-operative picture

Fig. 4 – Late follow-up picture

Case 2

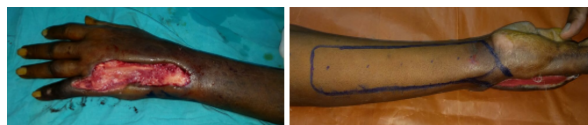


Fig. 1 – Defect over dorsum of hand & wrist

Fig. 2 – Picture showing flap marking



Fig. 3 – 1 week post-operative picture

Fig.4 – 2 month post-operative picture**Case 3****Fig. 1 – Post-infective raw area dorsum of right hand****Fig. 2 – Late photograph showing well settled flap & SSG with distal necrosis****DISCUSSION**

Soft tissue defects of hands require early coverage to prevent stiffness and early return to work. Coverage is necessary to replace missing skin and to protect exposed structures. Various local, regional and distant flaps have been described. The reverse radial island flap or reverse ulnar island flap have the disadvantage of sacrificing a major vascular axis. Distant flaps are not comfortable and require long immobilization. They are bulky and need thinning by a second procedure. Free flaps require microsurgical skills and are lengthy procedures. The posterior interosseous artery flap is a distally-based flap and avoids interference with the two main arteries of the forearm. But the dissection of the vascular pedicle is complex and tedious and the wrist joint should be uninjured and healthy to maintain the distal perforators, else the flap should be abandoned. 5,6 The dorsal ulnar artery fasciocutaneous flap provides a well vascularised and durable flap which is thin, pliable and mostly hair free and gives good functional outcome allowing early rehabilitation and thereby decreasing morbidity and hospital stay. The dorsal ulnar artery fasciocutaneous flap was first described by Becker and Gilbert in 1988, as a local flap for covering small skin defects of hand. 1,2 Both Becker and Gilbert and Holevich-Madjarova et al., have indicated that the maximum size of the dorsal ulnar artery flap should be only 10 by 5cm. 2,4 In 1991, Holevich and Madjarova suggested that it should only be used for coverage of small defects over the volar or dorsal aspect of the wrist and palmar surface of the ulnar aspect. Other workers described the use of dorsal ulnar artery flap variations as osteocutaneous flap, neurocutaneous flap, etc. 3,7,8-12 Niranjana and Shibu in 1994 mentioned the use of the dorsal ulnar artery flap for the ulnar side of the lower third of the forearm and the hand. 13 The anterior limit of the flap could safely be placed up to the palmaris longus tendon, and posteriorly the flap may be extended to the extensor digitorum communis tendon of the fourth finger giving a width of 5 to 9 cm. 10 The longer length of the flap allowed covering the defects of the wrist, palm, radial border of the hand and the first web space. The length of the flap is determined by the major axis of the tissue loss but can extend up to 20 cm. 10 In 1997, Antonopoulos designed large flaps of dimensions 20 cm long by 9 cm wide supplied by the dorsal ulnar artery. 10

CONCLUSION

The distally-based dorsal ulnar artery fasciocutaneous flap is versatile, safe and reliable for reconstructing defects of the wrist and hand with exposed vital structures. It avoids sacrificing the major artery of the forearm and provides cosmetic good results and it is a single stage reconstruction. The flap is suitable for closure of small or medium-size defects with minimal donor site morbidity.

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