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ORIGINAL ARTICLE

Evaluation of versatility of use of island first dorsal metacarpal artery flap in reconstruction of dorsal hand defects

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Summary *Background:* Posttraumatic dorsal hand defects with exposed tendons and/or bones represent a challenge to reconstructive surgeons. Many options are suggested ranging from local, regional, distant up to free flaps. First dorsal metacarpal artery island flap was commonly prescribed for reconstructing the thumb or first web space defects.
Methods: During a 30 month's period, 23 patients, 15 males aged between 17 and 48 years and 8 females aged between 18 and 36 years presented by posttraumatic dorsal hand defects. Of them 18 had both exposed tendons and bones while 5 had exposed tendons only. The defects dimensions ranged between 3 × 4 cm and 4.5 × 6 cm. All defects were reconstructed by using a single stage first dorsal metacarpal artery island flaps.
Results: All flaps survived completely without complication during the mean follow up period of 2 years. All patients were very satisfied both functionally and aesthetically by the procedure.
Conclusion: Island first dorsal metacarpal artery flap is a good option for reconstructing mild to moderate dorsal hand defects with acceptable functional and cosmetic results.
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1. Introduction

Dorsal hand has a unique structure with thin skin and less subcutaneous tissue which allows extensor tendons to glide freely under it. The best reconstructive option in hand defects is to replace the lost tissue with like tissue.[1]

Many options are available for soft tissue reconstruction of dorsal hand defects, of them; local flaps which are lacking, regional, distant and free flaps.[2–7]

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One of the commonly used flaps in hand reconstruction that described for thumb in almost all series is the first dorsal metacarpal artery flap (FDMAF).[8–10]

In current study we present another new use for the FDMAF utilizing its island form which may considered a novel use.

2. Methods

Over a two and half year's period (May 2015 to October 2017) 23 cases presented to Plastic Surgery Unit, General Surgery Department, Zagazig university Hospital, Egypt with post traumatic soft tissue defects at the dorsum of their hands. Of them 18 had exposed extensor tendons and metacarpal bones while five had exposed tendons only. All exposed tendons were devoid of their epitenons.

The defects were ranged from 3 cm × 4 cm to 4.5 cm × 6 cm. Of the 23 patients, 15 were males and their age ranging between 17 and 48 years and 8 were females aged between 18 and 36 years. All patients were formally consented after acceptance of the procedure from the university ethical committee. All defects were reconstructed by island first dorsal metacarpal artery flap (FDMAF) with 18 of them acutely while five as a delayed procedure.

2.1. Operative technique

Flap marking was firstly done (with its size 20% larger than template of the defect for delayed procedures due to fibrosis that limits skin mobility). Considering the distal limit of the flap to be the midpoint of proximal interphalangeal (PIP) joint and the proximal limit is the level of metacarpophalangeal joint (MPJ) while the radial and ulnar limits are just dorsal to the volar neurovascular bundles of the index (Fig. 1). The operations were performed under general anesthesia with the use of magnifying loupes 4× and pneumatic tourniquets. The use of magnifying loupe was helping to achieve a maximum flap dimensions without any bundle exposure.

The flap dissection was started from distal to proximal and from medial to lateral. Great care was taken to preserve the epitenon to insure later skin graft take. Once reached the MPJ after cauterizing its nutrient branch a sub dermal dissection was continued proximally along its radial side till identification of the flap pedicle. Then the dissection of the pedicle was continued till its origin from the radial artery in the anatomical snuffbox just ulnar to the extensor pollicis longus tendon (Fig. 2). A strip of 1st dorsal interosseous muscle fascia was included with the flap pedicle. There was no need to include the periosteum of second metacarpal bone. After complete dissection of the pedicle the tourniquet was deflated, the flap viability confirmed and heamostasis was secured (Fig. 3). A wide tunnel was then made and the flap was transferred to the

Figure 1 A preoperative picture shows defect, skin paddle design and S shaped incision for pedicle dissection.

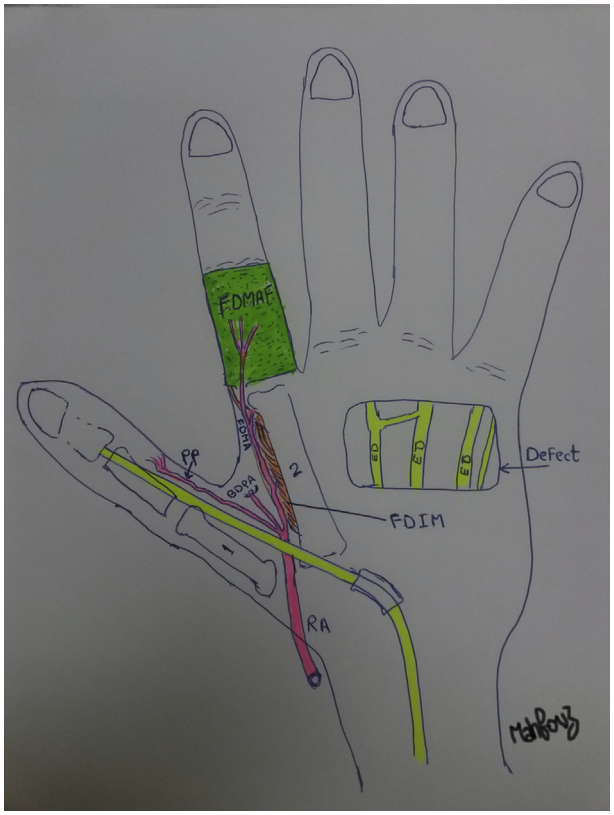

Figure 2 A handout diagram illustrates the anatomy of the first dorsal metacarpal artery flap and its relation to first dorsal interosseous muscle and second metacarpal bone. FDMAF; First dorsal metacarpal artery flap, FDMA; First dorsal metacarpal artery, FDIM; First dorsal interosseous muscle, BDPA; Branch to deep palmar arch, PP; Princeps pollicis, RA; Radial artery, ED; Extensor digitorum, 1; First metacarpal bone, 2; Second metacarpal bone.

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