REVERSE ULNAR PARAMETACARPAL ARTERY FLAP FOR SOFT TISSUE DEFECTS OF HAND

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Background: Burn injuries and post burn contractures of the little fingers and areas around are quite common. Release of these contractures may lead to full thickness soft tissue defects which need soft tissue cover. Similarly, mechanical trauma and also road traffic accidents, quite often lead to soft tissue defects of hand. Objective of this study was to evaluate the role of reverse ulnar parametacarpal artery flap in providing soft tissue cover for various full thickness soft tissue defects at the base of little finger and adjacent areas on palmar and dorsal aspects. **Methods:** It was an observational study, conducted at Department of Plastic Surgery, Services Hospital, Lahore. Study included ten cases with three females and seven male patients. Six of the patients had severe post-burn contractures of little finger, two had the involvement of the adjacent palm areas as well and one case had contracture along the mid palm crease. One case had post mechanical trauma soft tissue defect at dorsal aspect of 4th web space. Contractures were released and resulting soft tissue defects were reconstructed with reverse ulnar parametacarpal artery flap. Age ranged from 9 to 42 years with a mean age of 20.3 years. **Results:** This flap was utilised in ten cases. All flaps survived, one of the cases developed epidermolysis of whole of the flap which healed uneventfully. **Conclusion:** Flap is a local option to cover the soft tissue defects of little finger and areas around thus involves the same operative field. Skin texture and features of the donor site also resemble the recipient area. The defect site is closed primarily.

Keywords: Contractures, little finger, reconstruction, metacarpal artery flaps

INTRODUCTION

Burn injuries and post burn contractures of the little fingers and areas around are quite common. Release of these contractures may lead to full thickness soft tissue defects which need soft tissue cover. Similarly, mechanical trauma and road traffic accidents also, quite often, lead to soft tissue defects of hand.[1]

Dorsal metacarpal arteries, because of their abundant communications with the palmar arterial system, form a vast armamentarium of local flaps to be utilised for soft tissue defects of hand.[2] Local flaps are always preferred over regional and distant options as they come from the same operative field, save time, skin features have more resemblance, and donor site defect may be closed primarily.[3,4] Another added benefit of reverse ulnar parametacarpal artery flap is that resultant scar is at ulnar border of the hand and thus quite hidden one.

Ten cases of soft tissue defects at different areas of hand, especially in the vicinity of little finger, were dealt with reverse ulnar parametacarpal artery flap. Review of the local literature revealed that either this option has not been much practised here or has not been reported. Experience is presented in this article along with literature review.

MATERIAL AND METHODS

This study was carried out at the Department of Plastic Surgery, Services Hospital Lahore, from January 2006 to December 2009. Soft tissue defects, resulting from release of contractures of little finger or those resulting from trauma and treated by reverse ulnar parametacarpal artery flap were included in this study. Patients from both sex and all ages were included.

This flap was based on 5th metacarpal artery which arises from the dorsal carpal branch of ulnar artery. It frequently has an anastomosis with 5th ulnar collateral artery at the level of metacarpophalangeal joint. Reverse flow through this anastomosis from the palmar arterial system formed the basis of this flap. Tight flexion contractures of little finger were released resulting soft tissue defect at contracture site (Figure-1, 2). Skin territory, parallel to the metacarpal bones, supplied by the 5th metacarpal artery was marked and raised based on this pedicle (Figure-3). Soft tissue defect was covered with flap and donor site defect was closed primarily (Figure-4). This flap safely covered the defects at base of little finger on palmar aspect, proximal phalanx, proximal half of middle phalanx, defect at mid palmar crease and similar defect at dorsal side. Use of flap to cover the defects resulted in dog ears which were quite prominent in few of the cases. These were left as such because their excision might have resulted in compromise of the blood supply of the flap. These dog ears settled down with passage of time and in none of the cases these needed revision. The stitches were removed on seventh post operative day. The resultant scar on donor site was on ulnar border of the hand and was cosmetically acceptable to the patients.

Figure-1: Tight flexion contracture involving little and ring fingers along with a linear contrcature on ulnar border of middle finger.

Variable angel z palsties have been marked to release the contractures at middle and ring fingers along with a straight incision at base of little finger.

Figure-2: All contractures have been released.

Defect at middle and ring fingers are covered with transposition flaps and there is a soft tissue defect at little finger.

Figure-3: Reverse ulnar parametacarpal artery flap has been marked.

Figure-4: Defect at proximal and middle phalanx of little finger has been covered with the flap

RESULTS

Soft tissue defects of hand, little finger and adjacent areas, were dealt with reverse ulnar parametacarpal artery flap in ten cases, during period of four years. Three were females and seven of the patients were male. Youngest patient was 9 years of age and oldest was 42 years. Five of the cases were teenage. Six of the cases had severe post burn contractures of the little finger and once released these led to full thickness soft tissue defects. Two cases had contracture of the little finger along with the scar on adjacent palm. One case had a soft tissue defect as a result of mechanical trauma. Six of the defects were located at proximal phalanx, two at the base of little finger at the palm, other at mid palmar crease and one case had defect at dorsal aspect at fourth web space, (Table-1). All defects were covered with reverse ulnar parametacarpal artery flap.

All flaps survived. There was epidermolysis in one of the flaps used at the proximal phalanx but it healed with conservative treatment.

Table-1: Various aetiologies and areas covered by the reverse ulnar parametacarpal flap.

Age/sex	Aetiology	Area covered by the flap
42/M	Post Burn contracture	Palmar base of the little finger
19/M	Mechanical Trauma	4th web space area
12/M	Post Burn contracture	Proximal phalanx -little finger
09/M	Post Burn contracture	Proximal phalanx -little finger
14/F	Post Burn contracture	Proximal phalanx -little finger
11/M	Post Burn contracture	Proximal phalanx -little finger
23/M	Post Burn contracture	Proximal phalanx -little finger
34/F	Post Burn contracture	Proximal phalanx -little finger
22/M	Post Burn contracture	Palmar base of little finger
17/F	Post Burn contracture	Palm-transverse crease level

DISCUSSION

Post burn contractures of hand and fingers are common and their release often leads to full thickness defects. Mechanical trauma of the hand is also quite frequent.[1] Often these soft tissue defects involve little fingers as well. Quite a good number of options are available to cover the soft tissue defects in this area. Skin grafts do not work if tendons are bare. Cross finger flaps do the job but are staged procedures. And of course, regional and distant options are considered after the local flaps.

Metacarpal artery flaps have been extensively studied. Several cadaver and clinical studies have found these flaps quite a useful addition to the armamentarium of reconstruction of these defects.[5–8]

All metacarpal arteries have rich connections with the palmar arterial system. Metacarpal arteries have two communications with the palmar arterial network. One is situated at proximal part of the metacarpal artery and other one is distal; at the level of metacarpophlangeal joint in case of fifth metacarpal artery. This distal communication with the palmar

arterial system forms the basis of reverse ulnar parametacarpal artery flap.[2,9,10]

This flap effectively covers the defects at proximal phalanx and proximal half of middle phalanx on volar aspect. It is also very effective in covering the defects resulting along the distal palmar crease. On dorsal aspect, it covers the defects at the fourth web and the adjoining areas as well.[4]

This flap brings in the skin from the ulnar and dorsal aspect of the hand and thus skin features resemble to those around the defect site. Also scar is along the ulnar border and thus hidden, making it cosmetically more suitable. It is a local option, a single stage procedure, and easy to carry out.

This flap can be used with some of the modifications depending upon the requirements of the reconstruction. Bakhach used a direct subcutaneous flap to cover the metacarpal bones to produce the gliding surface for the extensor tendons.[5]

Although this series witnessed the success of all the flaps, some of the cadaver studies have mentioned that fifth metacarpal artery was not constantly present. Similarly, same study mentioned that communications between the fourth and fifth dorsal metacarpal arteries and the palmar arterial system were present in 65% and 40% of specimens only.[11]

Based on the experience gained by the use of this flap in this series, flap may be recommended for soft tissue defects at little finger, distal palmar crease and area adjoining the fourth web space. Keeping various anatomical variations in mind, a good precaution may be confirmation of the distal communication of the fifth metacarpal artery with the palmar arterial system with the help of hand held Doppler.

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