

Reconstruction of Devastating Defects Around the Elbow Region

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ABSTRACT

Thirty-seven patients with devastating defects around the elbow were included in this study. Reconstruction of the defects was done using the proximally based radial forearm flap in 16 cases, the distally based medial arm flap in 8 cases and the latissimus dorsi musculocutaneous flap in 13 cases. The flaps survived completely in 34 patients (91.9%). Partial necrosis of the distal part of the flap occurred in 3 cases (8.1%). In 2 cases, split thickness skin grafting was done and in the remaining case, the necrosis was superficial and healed spontaneously. The overall functional results were satisfactory in 35 cases (94.6%) and moderate in 2 patients (5.4%). The aesthetic results were satisfactory in 32 patients (86.5%) and moderate in 5 cases (13.5%). The results were discussed and it was concluded that both the proximally based radial forearm flap and the latissimus dorsi musculocutaneous flap proved to be reliable and versatile flaps for reconstruction of devastating defects of the elbow. Both flaps have excellent vascularity with a wide arc of rotation.

INTRODUCTION

Devastating defects around the elbow region are those defects with exposure of vital structures, including bones, joints, major vessels and nerves which endanger the vitality of the whole limb [1].

These defects may result from trauma, burns or excision of neoplasms in this region. Reconstruction constitutes a difficult challenge for the surgeon as easy techniques like skin grafting or simple flaps cannot be used [2].

The aim of this article is to evaluate the results of using fasciocutaneous or musculocutaneous flaps in reconstruction of these devastating defects around the elbow.

PATIENTS AND METHODS

Thirty-seven patients with devastating defects around the elbow were included in this article,

twenty-eight patients were males and nine were females. Their ages ranged from twenty-four to sixty years with a mean age of thirty-six years.

The sites of the defects are shown in Table (1) and the etiologies of the defects are illustrated in Table (2).

Preoperative evaluation of the patients included plain X-ray of the elbow region for all cases. Color flow duplex scanning was done for patients in whom the proximally based radial forearm flap was selected for reconstruction (Fig. 2B).

The different methods for reconstruction were the proximally based radial forearm flap, the medial distally based arm flap and the latissimus dorsi musculocutaneous flap (Table 3).

Follow up of the cases was done for periods ranging from 1-2 years. Both the functional and aesthetic results of different flaps were evaluated.

RESULTS

The results of different reconstructive procedures for devastating defects around the elbow are illustrated in Figs. (1-5). The flaps survived completely in 34 cases (91.9%). Partial necrosis of the distal part of the flap occurred in 3 cases (8.1%); 2 cases were latissimus dorsi flaps and one case was a medial arm flap. In 2 cases, split thickness skin grafting was done and in the remaining case the necrosis was superficial and healed spontaneously (Fig. 5B).

The functional results were satisfactory in 35 cases (94.6%). In 2 patients (5.4%) with partial flap necrosis which needed split skin grafting, there were mild limitation of elbow movements.

The aesthetic results were satisfactory in 32 patients (86.5%). In the remaining 5 cases the aesthetic results were moderate, 3 cases were latissimus dorsi flaps and 2 cases were distally based medial arm flap.

Table (2): Etiology of the defects around the elbow.

Etiology	Number of cases
Post-traumatic	19
After excision of a neoplasm	5
Post-burn	11
Post-operative	2
Total	37

Fig. (1-A): Marjolin's ulcer of the posterior aspect of the elbow.

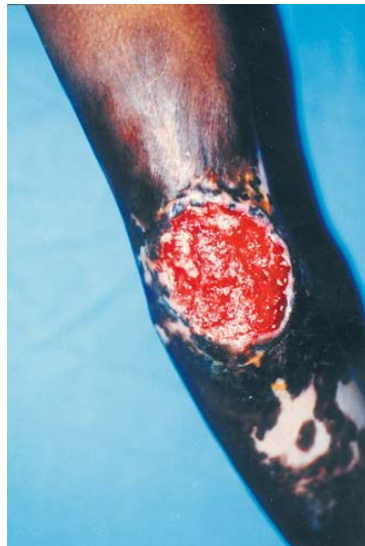


Table (1): Sites of the defects around the elbow.

Site	Number of cases
Anterior aspect of the elbow	10
Posterior aspect of the elbow	12
Anterior and medial aspects of the elbow	5
Anterior and lateral aspects of the elbow	6
Lateral aspect of the elbow	4
Total	37

Table (3): Different methods of reconstruction.

Method of reconstruction	Number of cases
<i>Fasciocutaneous flaps:</i>	
Proximally based radial forearm flap	16
Distally based medial arm flap	8
Latissimus dorsi musculocutaneous flap	13
Total	37

Fig. (1-B): The devastating defect after wide excision.



Fig. (1-C): Operative picture to show elevation of a proximally based radial forearm flap.



Fig. (1-D): Post operative picture 6 months after surgery showing excellent coverage of the elbow.





Fig. (2-A): A post-traumatic defect of the right elbow with exposure of the joint.

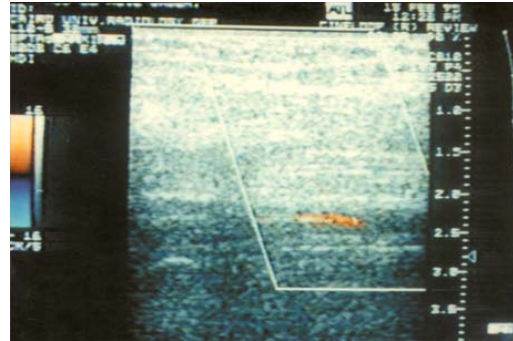


Fig. (2-B): Color flow duplex scanning of the same patient showing patency of the radial artery.



Fig. (2-C): Three months after reconstruction by a proximally based radial forearm flap.



Fig. (2-D): The same patient two years after surgery to show the subsidence of edema of the flap.



Fig. (3-A): Operative picture showing a wide devastating post-traumatic defect of the left elbow-vascular repair was done for the patient.



Fig. (3-B): Post operative picture 13 months after surgery showing complete survival of a distally based medial arm flap.



Fig. (4-A): Post-electric burn defect of the left elbow-an outline of a latissimus dorsi musculocutaneous flap is shown.



Fig. (4-B): The defect after debridement with exposure of the elbow joint.



Fig. (4-C): Operative picture showing the raised latissimus dorsi musculocutaneous flap.



Fig. (4-D): Postoperative picture 16 months after surgery to show complete survival of the flap.



Fig. (5-A): A post-traumatic devastating defect of the left elbow region with exposure of the joint.



Fig. (5-B): Postoperative picture 11 months after reconstruction by a latissimus dorsi musculocutaneous flap-note the healed superficial necrosis.

DISCUSSION

Reconstruction of devastating defects around the elbow region is a serious challenge facing the surgeon [3]. The available options include different local and distant flaps.

Among the commonly used flaps are the

fascial and fasciocutaneous flaps, these include medial and lateral distally based arm flaps [4], cephalic venous flap and the proximally based radial forearm flap [5,6].

Muscle and musculocutaneous flaps can be used also for elbow coverage, namely the latissimus dorsi flap for deep and large defects [7] and

the brachioradialis muscle for small defects [8].

Distant flaps as free flaps are demanding in all aspects. They are complex lengthy procedures and reserved only when all other options are unsuitable, which is a remote situation in elbow defects.

Also, the staged distant flaps as the external oblique fasciocutaneous flap can be used when other methods are unavailable [9]. Split skin grafts comprise a simple procedure that is not demanding in terms of time or expertise, but unfortunately these devastating elbow defects are not proper recipient sites to accept a skin graft [10].

In this article three different techniques for reconstruction of problematic defects around the elbow were evaluated in thirty-seven patients, namely the latissimus dorsi musculocutaneous flap, the proximally based radial forearm flap and the distally based medial arm flap. The latissimus dorsi musculocutaneous flap was used in thirteen patients with deep elbow defects and proved to be simple to elevate, can cover large and deep defects and helps to combat infection. Their results proved that it is a very reliable flap. The fasciocutaneous flaps were used in twenty-four patients, sixteen patients with proximally based radial forearm flap and eight patients with distally based medial arm flap. The radial forearm flap is highly reliable fitting the contour of the defect with good aesthetic results. The medial arm flap is easy with reasonable arc of rotation but it has a disfigured donor site.

Thirty-four flaps survived completely and partial necrosis of the distal part occurred in only three cases.

Both latissimus dorsi and proximally based radial forearm flaps have a very wide arc of rotation reaching all areas of elbow region. But, for lateral defects the radial forearm is superior

and for deep potentially contaminated defects the latissimus dorsi musculocutaneous flap has the advantage over all fasciocutaneous flaps.

In conclusion, meticulous planning for reconstruction of devastating elbow defects is necessary to achieve satisfactory results. The choice between different flaps depends on the nature of the defect, availability of donor tissues and the patient's needs. Proximally based radial forearm fasciocutaneous flap is the useful option when possible. For larger and deeper defects latissimus dorsi musculocutaneous flap is needed. We consider both flaps reliable with a large arc of rotation reaching all aspects of elbow region.

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