CASE REPORT

Lateral arm perforator flap as an island advancement flap for posterior elbow soft-tissue reconstruction

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ABSTRACT

Many flap designs for coverage of soft-tissue defects of the posterior elbow have been reported, and the lateral arm flap is considered reliable. With the advantages of less donor site morbidity and preservation of the continuity of the source artery, perforator flaps have taken the place of lateral arm flap recently. The lateral arm perforator flaps for elbow soft-tissue coverage have a propeller design. In this report, we describe a case of posterior elbow defect that was reconstructed with posterior radial collateral artery perforator island advancement flap. Lateral arm perforator island advancement flap is a good alternative for a propeller flap for coverage of soft-tissue defects of the posterior elbow.

Keywords: Advancement; elbow; island; lateral arm flap; perforator; posterior radial collateral artery.

INTRODUCTION

The posterior elbow is a common site of wound complications, and management of such wounds is a common problem for orthopedic and reconstructive surgeons. The elbow's location and prominence make it an area at risk of high-energy trauma. Surgical treatment of complex elbow fractures commonly employs the posterior approach for extensive access to the medial and lateral aspects of the joint, leaving the olecranon at risk for wound dehiscence and potential hardware exposure.[1] Exposed structures and hardware should be covered with a stable soft tissue to allow early mobilization and preservation of the range of motion. Moreover, the selected coverage method should have acceptable donor site morbidity. Among flap options reported for soft-tissue coverage of the posterior elbow region, the lateral arm flap is considered reliable.[2,3] With the advantages of less donor site morbidity and preservation of the continuity of the source artery, perforator flaps have taken the place of lateral arm flap recently. The lateral arm perforator flaps reported for elbow soft-tissue coverage have a propeller design.[4–6] Brunetti[7] reported lateral arm perforator flap with "V-Y" design for proximal arm coverage. To the best of our knowledge, no study has reported about lateral arm perforator flap using an island advancement design for elbow coverage.

Herein, we describe a case of posterior elbow defect that was reconstructed using posterior radial collateral artery perforator island advancement flap.

CASE REPORT

A 31-year-old man who fell from a height was admitted to our hospital for pain, edema, deformity, and limited movement of the left arm. The circulation on the left upper extremity was unaffected, and distal radial and ulnar arteries were palpable. The neurological examination was unremarkable. Radiologic examination revealed fractures of the left radius, ulnar distal metaphysis, and left humerus supraintercondyle (Fig. 1). The patient underwent surgery for fractures in an orthopedic clinic. On post-operative day 14, the patient consulted our clinic for wound dehiscence, drainage from the elbow region, and exposure of the surgical hardware (Fig. 2a and b). Following discussions with an orthopedicians, we judged that re-

Cite this article as: Kokacya O, Tabakan İ. Lateral arm perforator flap as an island advancement flap for posterior elbow soft-tissue reconstruction. Ulus Travma Acil Cerrahi Derg 2022;28:867-870.

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Ulus Travma Acil Cerrahi Derg 2022;28(6):867-870 DOI: 10.14744/tjtes.2020.84425 Submitted: 26.08.2019 Accepted: 23.08.2020

moving the surgical hardware was unfeasible. As a result, the patient underwent surgery for soft-tissue reconstruction and hardware coverage. Written informed consent was obtained. His wound was debrided. We access from the posterolateral skin incision that was made at a previous bone fixation operation (Fig. 2a and b) and reached the suprafascial plane. By dissecting from the lateral to medial direction, at the level of the lateral intermuscular septum, we reached a perforator of the posterior radial collateral artery. The perforator artery was isolated by making medial skin incision, and a 16×10 cm fasciocutaneous island flap was elevated (Fig. 3a). The flap was advanced 5 cm and adapted to the defect (Fig. 3b), and the donor area was closed primarily. Releasing the source artery at the lateral intermuscular septum was not necessary. The wound healed uneventfully (Figs. 4 and 5) and flap was stable at the post-operative 6th year (Fig. 6).

Figure 1. Pre-operative radiograph of the elbow.

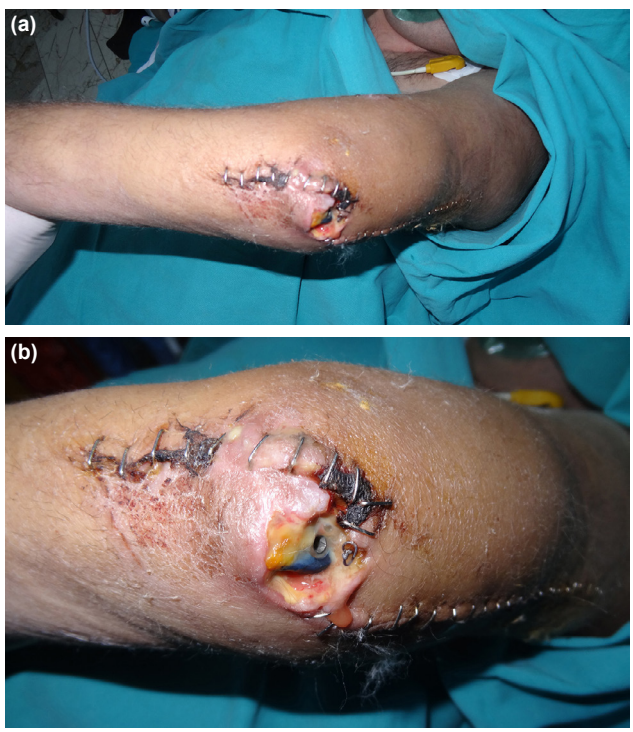

Figure 2. (a) Wound dehiscence. **(b)** Drainage from the elbow region and exposure of the surgical hardware.

DISCUSSION

The lateral arm flap was introduced by Song et al.[8] as a fasciocutaneous free flap, and Katsaros et al.[9] have elucidated the vascular anatomy and clinical applications of this flap. Since then, it has been frequently used as a free flap for re-

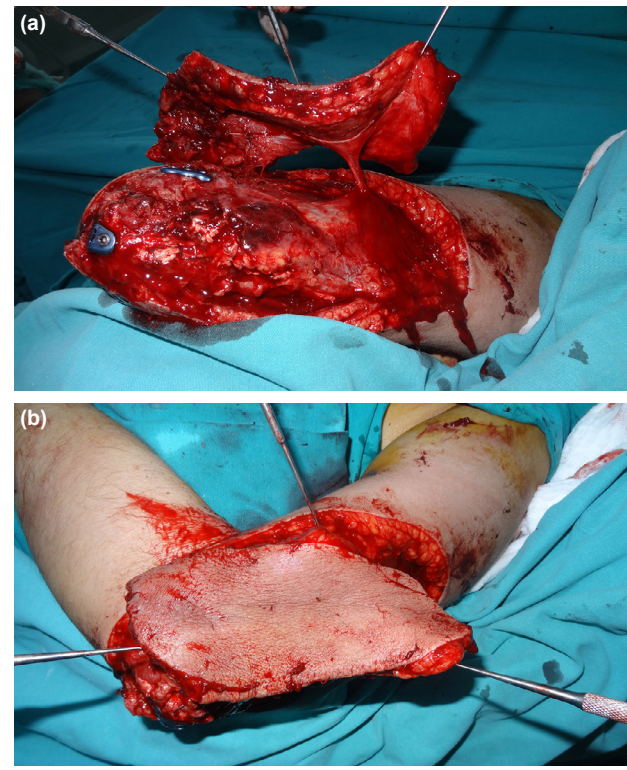

Figure 3. (a) A 16×10 cm fasciocutaneous island perforator flap is elevated. **(b)** Flap advancement to the defect.

Figure 4. Wound site on post-operative day 10.

Figure 5. Radiograph at the 3rd post-operative month.

Figure 6. Sixth year follow-up.

constructions of the head and neck[10] and upper[11] and lower[12] extremities.

Culbertson and Mutimer[2] described pedicled reverse lateral arm flap for elbow coverage. Even if it is a one-stage non-microsurgical procedure, closing the donor site is challenging. Moreover, there is need for a skin graft or another donor site or a small donor site, and an unsightly bulk is another issue. In addition, a flap is almost always subjected to some degree of venous congestion. Lai et al.[13] proposed adipofascial reverse lateral arm flap for donor site problems. Morrison et al.[3] performed a two-stage reconstruction with delay procedure to overcome venous congestion.

To overcome both donor site and venous congestion, Lazarou and Kaplan[14] used direct flow lateral arm flap by releasing the posterior radial collateral artery in the lateral intermuscular septum. They presented rotation advancement, V-Y, and island flap variations, which are all supplied by the posterior radial collateral artery. Mears et al.[15] reported ten cases of transposition lateral arm flaps for elbow coverage, and they used a skin graft for donor site closure.

With the advantage of little donor site morbidity, perforator flaps have been increasingly used for the upper extremity reconstruction, and perforator propeller flaps have taken the place of lateral arm flap recently.[5,6] Ono et al.[16] summarized the advantages of perforator propeller flaps, as follows: It can be harvested <30 min by an experienced surgeon, it is a single-stage reconstruction, and it has good esthetic appearance. The island advancement perforator flap, as described in our case, has the same advantages. Graham et al.[17] reported that the donor site cannot be closed linearly if the flap is wider than 6 cm. In island advancement design, as in the present case, the donor area of wider flaps can be closed linearly; however, tension at the perforator artery limits the distance of advancement. The closure of the donor site with high tension may result in a proximal band like appearance. Such a high tension closure may lead to severe acute and chronic pain related to radial nerve compression. In our case, there was a proximal band like appearance, but we did not see any form of symptoms related to tension closure.

With the wide spread use of microsurgical techniques, there are several thin free flap options and free microsurgical transfers can be proposed to cover any defect around the elbow. For small tissue defects in posterior elbow, local flaps also provide a good quality skin. With shorter operation time and without need for microvascular anastomosis, this novel local flap may be an option.

Conclusion

Lateral arm perforator island advancement flap is a good alternative for propeller flaps for covering posterior elbow soft-tissue defects wider than 6 cm at the short axis and not longer than 5 cm at the long axis.

Informed Consent: Written informed consent was obtained from the patient for the publication of the case report and the accompanying images.

Peer-review: Internally peer-reviewed.

Authorship Contributions: Concept: Ö.K., İ.T.; Design: Ö.K., İ.T.; Supervision: Ö.K., İ.T.; Analysis: Ö.K., İ.T.; Literature search: Ö.K., İ.T.; Writing: Ö.K., İ.T.; Critical revision: Ö.K., İ.T.

Conflict of Interest: None declared.

Financial Disclosure: The authors declared that this study has received no financial support.

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OLGU SUNUMU - *ÖZ*

Posterior dirsek bölgesi yumuşak doku defektinin lateral kol perforatör ada ilerletme flebi ile onarılması

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Posterior dirsek bölgesi yumuşak doku onarımları için birçok flep seçeneği bildirilmiştir ve bunların arasına lateral kol flebi güvenilir bir seçenektir. Donör alan morbiditesinin düşük olması ve kaynak arterin devamlılığının korunması gibi avantajları sayesinde perforatör flepler son zamanlarda lateral kol flebinin yerini almıştır. Dirsek bölgesi onarımı için bildirilmiş lateral kol perforatör flepler, propellar flep tasarımındadır. Bu yazıda, posterior radial kollateral arter perforatör ada ilerletme flebi ile onarılmış posterior dirsek bölgesi yumuşak doku defekti vakası sunuldu. Dirsek bölgesi yumuşak doku onarımlarında lateral kol perforatör ada ilerletme flebi, propellar flep için iyi bir alternatiftir.

Anahtar sözcükler: Ada; dirsek; ilerletme; lateral kol flebi; perforatör; posterior radial kollateral arter.

Ulus Travma Acil Cerrahi Derg 2022;28(6):867-870 doi: 10.14744/tjtes.2020.84425