

Case Series

Reconstruction of the soft tissue defects of hand and wrist with ulnar artery perforator flap-presentation of case series

Dibyendu Das*

Department of Plastic Surgery, Bankura Sammilani Medical College, Bankura, West Bengal, India

Received: 24 February 2022

Revised: 18 March 2022

Accepted: 23 March 2022

*Correspondence:

Dr. Dibyendu Das,

E-mail: dasdibyendu62@gmail.com

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Reconstruction of soft tissue defect of hand and wrist is a common problem to plastic surgeon. I reconstructed the defect, both dorsal and palmar surface with a perforator-based flap from ulnar artery. The aim of the present study is to evaluate ulnar artery perforator flap in soft tissue defect of hand and wrist. Between January 2018 to February 2021, seven cases of skin defect were reconstructed with a perforator-based flap from ulnar artery, either pedicled or propeller type flap. The study was done at NRS medical college, Kolkata, where I have evaluated the viability of the flap, post-operative complication and patient's satisfaction. All flaps survived, only in one case there was marginal necrosis that was treated conservatively. There was no post-operative complication, all flaps were doing well in six month and one year and one and half year follow up and patient's satisfactions were also good. Ulnar artery perforator based fasciocutaneous flap, pedicled or propeller provides a reliable coverage of soft tissue defects of hand as well as wrist.

Keywords: Soft tissue defect, Hand, Reconstruction, Ulnar artery perforator flap

INTRODUCTION

Soft tissue defect of hand and wrist is a common problem but occasionally poses a difficult reconstructive challenge. Distant pedicled flaps from the groin, trunk, at one time were the main stay of reconstruction that requires at least two stages with an intervening period of immobilization and dependency. The development of micro-vascular techniques draws us to a new era but requires expertise and resource. Reconstruction using adjacent tissue is preferable, and as such radial artery perforator flap is most commonly used. Accordingly, there is a vast amount of literature on radial artery perforator flap, whereas reports on ulnar artery perforator flaps are less.¹⁻¹² Ulnar forearm fasciocutaneous flap based on ulnar artery perforator can be used as a pedicled or propeller flap to cover the defect both on the dorsal and palmar surface of the hand. The aim of the present

study is to describe the use of ulnar artery perforator flap for coverage of defect of hand and wrist, its effectiveness, and patient's compliance.

CASE SERIES

The study was conducted at department of plastic surgery, NRS medical college, Kolkata. From January 2018 to February 2021 seven cases of skin defect of hand and wrist were reconstructed with distally based ulnar artery perforator flap. Four cases were male and three cases were female, age ranging between twenty-six to sixty years and follow up at one month, three-month, six month and one year and one and half year period. Aetiologies were post traumatic (RTA), post electric burn, post infective, and following excision of soft tissue tumour.

Case 1

A 38-year male patient presented with defect at right wrist on dorsum extending from ulnar border to midline following RTA, the defect was resurfaced with distal ulnar pedicled perforator flap and donar area covered with skin graft. The flap was good in post-operative period and in 18 months follow up.



Figure 1 (A and B): Defect on dorsum of hand and defect covered by ulnar artery perforator flap and donar area covered by skin graft.

Case 2

A 45-year male patient presented with ulcer on right palm near base of hypothenar eminence 3×2 cm, developed an infection around this area following a mild trauma that was not properly treated initially. The ulcerated area was

covered by a pedicled ulnar perforator flap and donar area was closed primarily. The area healed well and flap was in good condition after 2 years follow up.



Figure 2 (A and B): Defect at base of hypothenar eminence and defect covered with ulnar artery perforator flap and donar defect primarily closed.

Case 3

A 60-year female patient presented with growth in center of palm near wrist joint. There was a defect of 5×5 cm following excision of growth. The area was covered with ulnar perforator propellar flap and donar area was resurfaced by skin grafting. The flap survived completely and patient was in good condition even after 1 year follow up.



Figure 3 (A and B): Defect after excision of soft tissue tumour and defect covered with ulnar artery perforator flap and donar area skin grafted.

Case 4

A 42-year female patient with ulcer on ulnar border of wrist following an infection, defect was 4×3 cm that was covered with ulnar perforator propellar flap, donar area was closed by skin grafting. There was marginal necrosis which was healed with secondary intention.



Figure 4: Defect on ulnar border of wrist covered by ulnar artery perforator flap-there is necrosis of the distal margin.

Case 5

A 26-year female patient presented with ulcer on ulnar border of hand following an electric burn, the defect was 4×2 cm. It was covered with pedicled ulnar perforator flap and donar area by skin grafting. The patient was well in 18 months follow up.



Figure 5: Ulnar artery perforator flap covering the defect and donar area skin grafted.

Case 6

A 35-year male patient presented with a defect of 5×3 cm dorsum of wrist and hand towards ulnar border following an electric burn. The area was covered with distal ulnar pedicled perforator flap. The donar area was skin grafted. The flap was good in 18 months follow up.



Figure 6: Defect on dorsum of hand covered with pedicled ulnar perforator flap and donar area covered by skin graft.

Case 7

A 33-year male patient with defect on dorsum of wrist 4×3 cm following an RTA that was covered with ulnar artery perforator flap and donar area covered with skin grafting. The flap was good up to 1 year follow up.



Figure 7: Defect on dorsum of wrist covered with ulnar perforator flap.

RESULT

In all cases except one, the flaps survived completely without any vascular crisis. In one case there was marginal necrosis that was treated by removal of sutures and dressings. The follow up period was three months to eighteen months. All patients were satisfied with coverage and function of the hand. All though cosmetic results of operation were excellent in two cases, good in three cases, and fair in two cases.

DISCUSSION

Many surgical techniques are available for reconstruction of soft tissue defect of hand and wrist. These include pedicled local, regional and distant flaps.¹³

Loco-regional flaps are reverse radial forearm flap, retrograde radial artery perforator flap, retrograde posterior interosseous artery flap, ulnar artery perforator flap.

Reverse radial forearm flap provides a reliable skin paddle, but requires the sacrifice of a major artery, a poor tissue match in terms of bulk and color for tissue replacement in the hand. Also, there is a conspicuous donar site which can be subjected to poor skin graft take and delayed healing.¹⁴

Retrograde radial artery perforator flap is based on the septocutaneous perforators from the radial artery and a

longitudinally oriented adipofascial plexus in the distal forearm that in turn is supplied by perforators of distal radial artery, forms the vascular pedicle of the flap.^{4,9} Because retrograde flow is dependent on a plexus rather than major vascular axis, the maximum dimension of the flap that can be reliably transferred are smaller than the true axial flap.¹⁴

The distally based posterior interosseous artery flap is good for hand defect, particularly defect on dorsum of hand. But the dissection of the vascular pedicle is frequently quite complex and tedious.¹⁵ If the distal perforators of the posterior interosseous artery and its branches are injured, the flap should be abandoned.¹⁶

Ulnar artery perforator flap is a good option for coverage of hand and wrist defect. There is no sacrifice of major vascular axis, quick and easy to perform. It is distally based, can be pedicled or propeller. The propeller flap is a local island fasciocutaneous flap, based on a single dissected perforator, so that it can be rotated up to 180° to cover the defect that allows more distal reach of the flap.¹⁷

Distant pedicle flaps including groin, hypogastric, abdominal flaps, provide enough tissue for reconstruction but involves multiple stages of operation and prolonged immobilization and dependency.^{14,15}

Free flap is also a good option for coverage but it requires a technically demanding microsurgical procedure which is time consuming. On the contrary ulnar artery perforator flap is easy to harvest, less time consuming, so surgeon can opt to perform a local perforator flap instead of time-consuming microsurgical flap.¹⁸

A disadvantage of ulnar artery perforator flap is location of the scar on the weight bearing surface of the forearm, which can be minimized by raising the flap suprafascially and grafting the donar area with full thickness skin graft.¹⁹

CONCLUSION

The distally based ulnar artery perforator flap is a safe, reliable technique for closure of hand and wrist defect. It provides a single stage reconstruction without the sacrifice of a major artery of the forearm. It is easy to perform and also less time consuming.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: Not required

REFERENCES

1. Yamakswas S. Hayashida K. Dorsal Hand Reconstruction with radial artery perforator based adipofascial flap. *Plast Aesthet Res.* 2020;7;24.

2. Andrew MHo, Chang J. Radial Artery Perforator Flap. J Hand Surg. 2010;35(2):308-11.
3. Zhang YT. The use of reversed forearm fasciocutaneous flap in the treatment of hand trauma and deformity (report of 10 cases). Zhonghua Zheng Xing Shaoshang Wai Ke Za Zhi. 1988;4(1):41-2.
4. Chang SM. The distally based radial forearm fascial flap. Plast. Reconst Surg. 1990;85(1):150-1.
5. Yang D, Morris SF, Tang M, Geddes CR. Reversed forearm island flap supplied by the szeptocutaneous perforator of the radial artery; anatomical basis and clinical application. Plast Resonstr Surg. 2003;112(4):1012-6.
6. Kanellakos GW, Yang D, Morris SF. Cutaneous vasculature of the forearm. Ann Plast Surg. 2003;50(4):387-92.
7. Weinzweig N, Chen L, Chen ZW. The distally based radial forearm fasciocutaneous flap with preservation of the radial artery; an anatomic and clinical approach. Plast Reconst Surg. 1994;94(5):675-84.
8. Koshima I, Moriguchi T, Etoh H, Tusda K, Tanaka H. The radial artery perforator based adipofascial flap for dorsal hand coverage. Ann Plast Surg. 1995;35(5):474-9.
9. Jeng SF, Wei FC. The distally based forearm island flap in hand reconstruction. Plast Reconst Surg. 1998;102(2):400-6.
10. Medalic DA. Perforator based forearm and hand adipofascial flaps for the coverage of difficult dorsal hand wounds. Ann Plast Surg. 2002;48(5):477-83.
11. Safak T, Akyurek M. Free transfer of radial forearm flap with preservation of radial artery. Ann Plast Surg. 2000;45(1):97-9.
12. Chang SM, Hou CL, Zhang F. Distally based radial forearm flap with preservation of radial artery; anatomic, experimental and clinical studies. Microsurg. 2003;23(4):328-37.
13. Jang HS, Lee YH, Kim MB, Chung JY, Seok GH. Fasciocutaneous propellar flap based on perforating branch of ulnar artery for soft tissue reconstruction of hand and wrist. Clin Orthop Surg. 2018;10:74-9.
14. Page R, Chang J. Reconstruction of hand soft tissue defects; Alternatives to the radial forearm fasciocutaneous flap. J Hand Surg. 2006;31A:847-56.
15. Karki D, Sing AK. The distally based island ulnar artery perforator flap for wrist defects. Indian J Plastic Surg. 2007;40:12-6.
16. Costa H, Soutar DS. The distally based posterior interosseous flap. Br J Plast Surg. 1988;41:221-7.
17. Teo TC. The propeller flap concept. Clin Plastic Surg. 2010;37:615-26.
18. Ignatiadis IA, Mavrogenis AF, Avram AM. Treatment of complex hand trauma using distal ulnar and radial artery perforator flaps. Injury. 2008;39(3):S116-24.
19. Unal C, Ozdemir J, Hasdemir M. Clinical application of distal ulnar artery perforator flap in hand trauma. J Reconstr Microsurg. 2011;27(9):559-65.

Cite this article as: Das D. Reconstruction of the soft tissue defects of hand and wrist with ulnar artery perforator flap-presentation of case series. Int Surg J 2022;9:858-62.