



Contents lists available at [ScienceDirect](https://www.sciencedirect.com)

JPRAS Open

journal homepage: [www.elsevier.com/locate/jpra](http://www.elsevier.com/locate/jpra)



## Case Report

# Use of digital artery perforator flaps for repairing soft tissue defects after fasciectomy for Dupuytren's contractures in the ring and little fingers: A case report

Yukiko Morimoto\*, Megumi Ishiko, Akira Kawabata, Kiyohito Takamatsu

Department of Orthopaedic Surgery, Yodogawa Christian Hospital, 1-7-50 Kunizima, Higashiyodogawa-ku, Osaka 533-0024, Japan

## ARTICLE INFO

### Article history:

Received 22 June 2022

Accepted 30 September 2022

Available online 6 October 2022

### Keywords:

Dupuytren's contracture

Digital artery perforator flap

Skin defect

Fasciectomy

Ulnar palmar digital artery perforator flap

## ABSTRACT

Fasciectomy is the standard treatment for Dupuytren's contracture, but, in many cases, skin defects may occur after fasciectomy. If the preoperative contracture is severe, the skin defect is large, which makes covering the defect difficult. We describe a case of severe skin defects after fasciectomy of Dupuytren's contractures in the ring and little fingers covered with multiple digital artery perforator (DAP) flaps. A 58-year-old man with extension restrictions of the ring and little fingers on his left hand was diagnosed with Dupuytren's contracture. The angles of insufficient extension were 70° and 40° for the metacarpophalangeal and proximal interphalangeal joints, respectively, of the little finger and 42° for the metacarpophalangeal joint of the ring finger. DAP flaps were used to cover the defect on the ring finger's metacarpophalangeal joint and little finger's proximal interphalangeal joint, whereas an ulnar palmar DAP flap was used on the defect on the little finger's metacarpophalangeal joint. The flaps survived without any complications, and, at 6 months postoperatively, satisfactory results were obtained. The extension angles were 0° for the metacarpophalangeal and proximal interphalangeal joints of the little finger and -5° for the ring finger's metacarpophalangeal joint. Such

\* Corresponding author.

E-mail address: [cherryblossom\\_guerlain@yahoo.co.jp](mailto:cherryblossom_guerlain@yahoo.co.jp) (Y. Morimoto).

flaps can be designed to fit the width of the skin defect and can be applied to a large skin defect by combining the perforator flaps. Thus, the use of DAP flaps after fasciectomy to cover defects is considered helpful, even in cases of Dupuytren's contracture with severe extension restriction.

© 2022 The Author(s). Published by Elsevier Ltd on behalf of British Association of Plastic, Reconstructive and Aesthetic Surgeons.

This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>)

## Introduction

Dupuytren's disease is among the fibroproliferative conditions affecting the palmar and digital fascia. When the condition worsens, joint extension is restricted. Fasciectomy is the most common operative procedure performed for Dupuytren's contractures. However, as the joint contracture becomes severe, the skin defect after fasciectomy would be considerably larger, which makes covering it difficult. In the operative procedure for Dupuytren's contracture, zigzag incision, Z plasty, and YV plasty are commonly used to cover the skin defect after fasciectomy. Complications are not observed even if primary closure is performed using these methods,<sup>1</sup> but a previous report mentioned that skin grafting was required to cover the defect.<sup>2</sup> Additionally, even if a one-stage covering procedure is possible, extending the affected part immediately postoperatively may be difficult due to a strong skin tension. Therefore, covering the defect with a flap was also introduced. Anwar et al. reported that the use of digitolateral flaps resulted in good treatment outcomes with fewer complications.<sup>3</sup>

We describe herein a case of severe skin defects after fasciectomy of Dupuytren's contractures in the ring and little fingers covered with multiple digital artery perforator (DAP) flaps. To the best of our knowledge, this is a first case in which multiple DAP flaps were used for covering skin defects on the volar side after fasciectomy of the Dupuytren's contracture.

## Case report

A 58-year-old man with extension restrictions of the ring and little fingers of his left hand that gradually progressed for 5 years was diagnosed with Dupuytren's contracture. The angles of insufficient extension were 70° and 40° for the little finger's metacarpophalangeal (MP) and proximal interphalangeal (PIP) joints, respectively, and 42° for the ring finger's MP joint (Figure 1). To resolve the extension restriction, he underwent a fasciectomy.

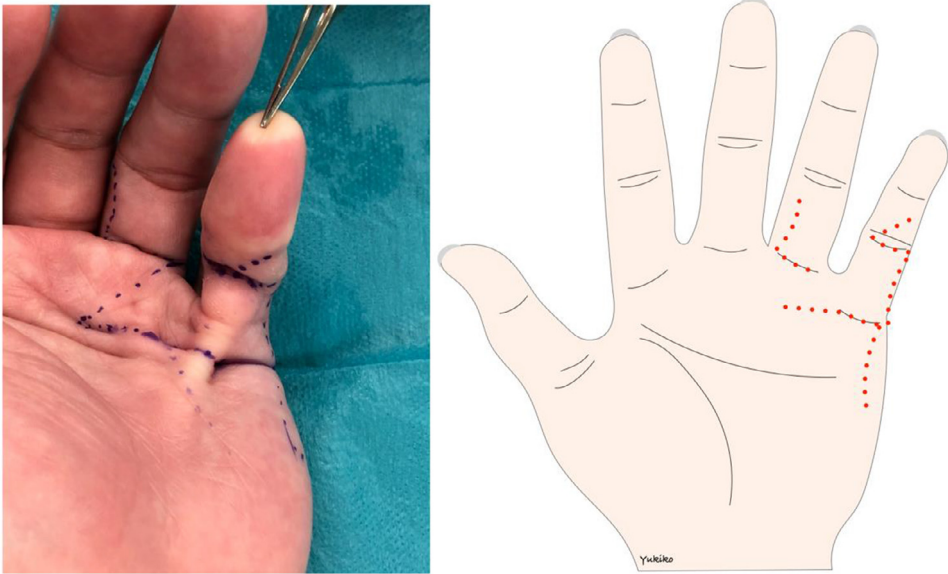
A skin incision was made along the joint crease on the contracted joint. After the fasciectomy, skin defects were observed on the contracted joint. We plan to use multiple DAP flaps for the skin defects. Preoperatively, the localization of the perforator from the digital artery was confirmed using ultrasonography (Venue 40, GE Healthcare Japan, Tokyo) around the contracted joint.

A skin incision was made along the palmar crease of the contracted joint. An ulnar palmar DAP flap was designed on the ulnar side of the palm to match the defect on the volar side of MP joint of the ring and little fingers. Also, a DAP flap was designed on the ulnar side of the proximal phalanx to match the defect on the volar side of PIP joint of the little finger. In addition, another DAP flap was designed on the radial side of the proximal phalanx to match the defect on the proximal digital crease of the ring finger. Then, the flaps were connected to the skin incision on the digital crease, thereby forming an L-shaped incision. The skin incisions were extended to connect with the L-shaped incisions to cross the digital crease diagonally (Figure 2).

After fasciectomy, the skin defect size on the volar side of the contracted joint was measured. A spindle-shaped DAP flap was designed on the side according to the width and length of the skin defects. The DAP flaps were elevated from the neurovascular bundle from the far side to the center of the flap's rotation axis, carefully avoiding separating the skin flap from the subcutaneous tissue



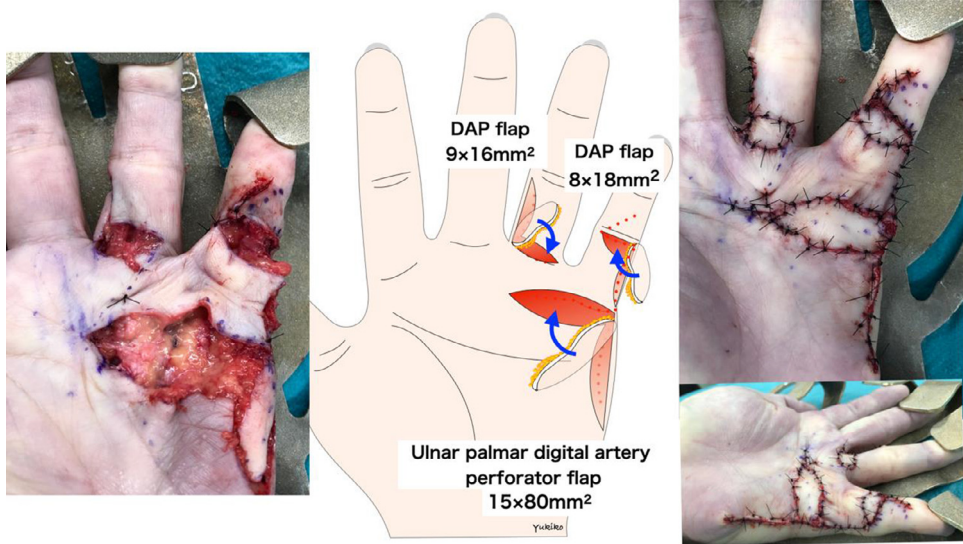
**Figure 1.** Preoperatively, severe Dupuytren's contractures are observed when extending the ring and little fingers.



**Figure 2.** A skin incision is made along the skin line of the contracted joint.

and fat. To preserve the blood flow around the perforator, which was close to the center of flap's rotation axis, only the skin incision was made. The flaps were rotated 90° around the perforator and transferred to the skin defects. After flap transfer, only the skin of the flaps was sutured. For the ring finger's MP joint, a 9 × 16-mm<sup>2</sup> DAP flap was transferred to the skin defect (width, 7 mm; length, 16 mm). The skin defect on the little finger's PIP joint (width, 6 mm; length, 18 mm) after fasciectomy was covered with an 8 × 18-mm<sup>2</sup> DAP flap. For the skin defect on the little finger's MP joint (width, 12 mm; length, 80 mm) after fasciectomy, a 15 × 80-mm<sup>2</sup> ulnar palmar DAP flap was used (Figure 3).

All donor sites were linearly closed. Complications, such as skin necrosis or flap contraction, were not observed during the 18-month follow-up period. At 6 months postoperatively, the patient achieved



**Figure 3.** The digital artery perforator (DAP) flaps are designed according to the width of the skin defect.



**Figure 4.** There is no skin pigmentation or contraction of the flaps.

a sufficient range of motion of his fingers. The angle of extension was 0° for the little finger's MP and PIP joints and -5° for the ring finger's MP joint (Figure 4).

### Discussion

Here, we considered that it would be better to cover the skin defect with a local flap because the skin tension after releasing the contracted joint may be too strong after YV plasty for skin defects. Thus, after fasciectomy of the Dupuytren's contracture, we covered the skin defects with DAP flaps.

The use of a DAP flap for fingertip reconstruction was first described by Koshima et al.<sup>4</sup> Given that it is a pedicled flap that does not require dissection of neurovascular bundles, surgery can be performed safely and relatively easily. Recently, DAP flaps have often been used for post-traumatic skin defects, such as dorsal, lateral, and palmar skin defects.<sup>5,6</sup> To the best of our knowledge, this is the first report of tissue defects after fasciectomy of Dupuytren's contractures covered with multiple DAP flaps.

The ulnar palmar DAP flap is also a perforator flap, which has the same advantages as those of the DAP flap. There are some anatomical reports on perforators. They are present proximal to the A1 pulley and MP joint.<sup>7,8</sup> We considered that they could be used as flaps for skin defects on the MP joint. Additionally, the flap is designed on the hypothenar, and the donor site can easily be closed linearly.

This operative technique using DAP flap to cover the skin defect has several advantages; surgical scarring is unlikely to occur because the incisions were made along the palmar digital crease on the contracted joint. The spindle-shaped flap also closely matched the soft tissue defect shape after dissecting the contracted tissues. Although the transposition flap typified by the digitolateral flap has skin lines similar to those of the DAP flap, it is a random pattern flap that twists the pedicles, the DAP flap repair is considered a useful technique in terms of securing a stable and reliable blood flow and avoiding twisting of the skin pedicle.

In the little finger with severe MP and PIP joint contractures, the skin defect was larger than that of a single joint contracture; however, it could be covered using multiple DAP flaps. It is considered that one advantage of the DAP flap is that it can cover large defects by using multiple perforator flaps.

## **Conclusion**

A DAP flap was used to cover the skin defects on the volar side of a Dupuytren's contracture after fasciectomy. In this approach, the flap can be designed to match the skin defect size and can be applied to a large skin defect by combining multiple perforator flaps. Complications, such as skin necrosis or flap contraction, were not observed during follow-up. Thus, this technique is considered useful for Dupuytren's contracture cases with severe extension restriction.

## **Informed consent**

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

## **Funding**

None.

## **Data statement**

The data that support the findings of this study are available from the corresponding author, upon reasonable request

## **Ethical approval**

Not required.

## **Declaration of Competing Interest**

No potential conflicts of interest are disclosed.

## Acknowledgment

The authors would like to thank Y. Sogabe for collaboration on the early stages of this work. Finally, we are grateful to him for useful comments and advices.

## References

1. Uemura T, Kazuki K, Egi T, Yoneda M, Takamatsu K, Nakamura H. Clinical outcomes of primary skin closure with Y-V and Z-plasties for Dupuytren's contracture: Use of one-stage skin closure. *J Plast Surg Hand Surg.* 2010;44:306–310.
2. Khan PS, Iqbal S, Zaroo I, Hayat H. Surgical treatment of Dupuytren's contracture; results and complications of surgery: Our experience. *J Hand Microsurg.* 2010;2:62–66.
3. Anwar MU, Al Ghazal SK, Boome RS. The lateral digital flap for Dupuytren's fasciectomy at the proximal interphalangeal joint - a study of 84 consecutive patients. *J Hand Surg Eur Vol.* 2009;34:90–93.
4. Koshima I, Urushibara K, Fukuda N, et al. Digital artery perforator flaps for fingertip reconstructions. *Plast Reconstr Surg.* 2006;118:1579–1584.
5. Usami S, Inami K, Hirase Y. Coverage of the dorsal surface of a digit based on a pedicled free-style perforator flap concept. *J Plast Reconstr Aesthet Surg.* 2018;71:863–869.
6. Shen XF, Xue MY, Mi JY, Qian L, Rui YJ, Chim H. Innervated digital artery perforator propeller flap for reconstruction of lateral oblique fingertip defects. *J Hand Surg Am.* 2015;40:1382–1388.
7. Toia F, Marchese M, Boniforti B, Tos P, Delcroix L. The little finger ulnar palmar digital artery perforator flap: Anatomical basis. *Surg Radiol Anat.* 2013;35:737–740.
8. Uchida R, Matsumura H, Imai R, Tanaka K, Watanabe K. Anatomical study of the perforators from the ulnar palmar digital artery of the little finger and clinical uses of digital artery perforator flaps. *Scand J Plast Reconstr Surg Hand Surg.* 2009;43:90–93.