

Split-skin Paddle Anterolateral Thigh Flap for Reconstruction of Giant Dermatofibrosarcoma Protuberans in Groin

Taro Fukuta, MD*
Yuichi Ichikawa, MD*
Hiroshi Mizuno, MD, PhD*
Ayato Hayashi, MD, PhD*†

Summary: Dermatofibrosarcoma protuberans (DFSP) is a slow-growing superficial sarcoma. Due to its high late local recurrence, thin skin graft is usually recommended for reconstruction after resection of the tumor. In this report, we present a case of giant DFSP in the groin region of young woman. Reconstruction of large groin defect after DFSP resection was performed by “split-skin paddle anterolateral thigh flap” instead of skin graft considering that the patient was a 29-year-old woman. This method enabled the primary closure of the donor site and provided the positive functional and esthetic outcomes. In the present case, the surgical scar is less conspicuous and the patient can climb and descend stairs without any trouble at 4 years after the surgery. With careful monitoring of the tumor recurrence, this technique may become a reliable reconstruction option for patients with large groin defect after resection of the malignant tumor. (*Plast Reconstr Surg Glob Open* 2019;7:e2528; doi: 10.1097/GOX.0000000000002528; Published online 12 December 2019.)

Dermatofibrosarcoma protuberans (DFSP) is a slow-growing malignant skin tumor that rarely metastasizes but is locally invasive and is likely to recur even after wide excision. Accordingly, a split-thickness skin graft (STSG) is usually recommended for reconstruction after DFSP resection for easy detection of recurrence. Here, we present a case of giant DFSP on the groin region of a young woman. After wide tumor resection, a skin flap instead of a skin graft was intentionally used, which subsequently provided good functional and esthetic outcomes.

CASE REPORT

A 29-year-old woman presented with a long-standing history of a painless mass in her right groin. The mass, which was a tiny pink-colored nodule with pigmentation when the patient was aged 15 years, continued to enlarge as it occupied the majority of her right groin.

Upon initially visiting our hospital, 3 domal masses (7.4, 4.6, and 5.6 cm) were linearly located above the inguinal ligament. The lateral mass took on a multinodular

pattern, whereas the medial mass produced purulent effusion with overlying skin necrosis (Fig. 1).

Contrast-enhanced magnetic resonance imaging demonstrated a heterogeneous increase in the signal intensity of the tumor, which infiltrated all the layers of the subcutaneous adipose tissue.

Following skin biopsy, the patient was diagnosed with DFSP. Positron emission tomography/computed tomography revealed no obvious metastasis.

Following the pathologic diagnosis, wide tumor resection was subsequently performed. Three-centimeter margin from the edge of the mass and surrounding pigmentation was obtained. Superficial and deep inguinal lymph nodes



Fig. 1. A 29-year-old woman presented with enlarging domal groin masses.

From the *Department of Plastic and Reconstructive Surgery, Juntendo University School of Medicine, Tokyo, Japan; and †Department of Plastic and Reconstructive Surgery, Juntendo University Urayasu Hospital, Chiba, Japan.

Received for publication July 13, 2019; accepted October 3, 2019.

Copyright © 2019 The Authors. Published by Wolters Kluwer Health, Inc. on behalf of The American Society of Plastic Surgeons. This is an open-access article distributed under the terms of the [Creative Commons Attribution-Non Commercial-No Derivatives License 4.0 \(CCBY-NC-ND\)](https://creativecommons.org/licenses/by-nc-nd/4.0/), where it is permissible to download and share the work provided it is properly cited. The work cannot be changed in any way or used commercially without permission from the journal.

DOI: 10.1097/GOX.0000000000002528

Disclosure: The authors have no financial interest to declare in relation to the content of this article.

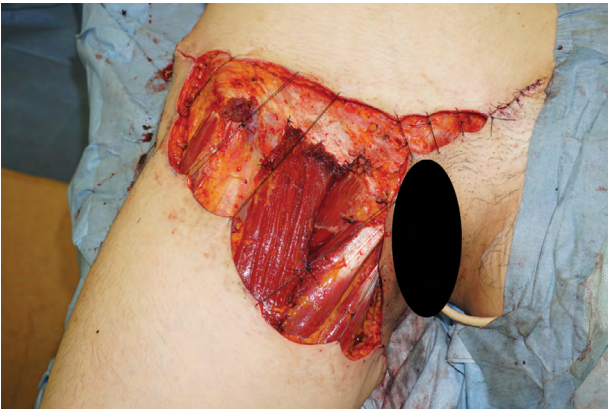


Fig. 2. Intraoperative appearance after resection of DFSP of the groin.

were also dissected with the tumor because the mass was located immediately above the dissected nodes.

To minimize the defects, the wound ends were sutured as much as possible, whereas the sartorius muscle was transferred over the exposed femoral artery and vein. The remaining defect, 26cm × 15cm in size, was covered by artificial dermis (Pelnac, Kyoto, Japan), and reconstruction was planned after the pathologic evaluation of the surgical margin (Fig. 2).

The pathologic diagnosis indicated DFSP, whereas tumor margins were assessed as all negative. Moreover, no inguinal lymph node metastasis was observed.

We planned to cover the defect using a split-skin pedicled anterolateral thigh (ALT) flap from right thigh. Before the surgery, at least 2 separate cutaneous perforators of the descending branches of the lateral circumflex femoral

artery (LCFA) were located using Doppler ultrasonography. The overall shape of the flap was designed to be vertically elongated to enable direct closure of the donor site, whereas 2 skin paddles were designed corresponding with the perforator entry points. Flap elevation was performed by identifying the perforating branches of the descending LCFA through intramuscular course. Tensor fasciae latae with ascending and transverse branches of LCFA was added to the ALT flap to increase the blood supply to the harvested flap. The flap was then divided between the 2 perforators. After harvesting this flap, the cranial donor site partially required STSG given the risk of pedicle compression during the primary closure of the entire donor site (Fig. 3).

No signs of local recurrence were present 4 years post-operatively by confirming magnetic resonance imaging scans on groin every 6 months. (Fig. 4). The patient can climb and descend stairs and go on smooth day-long walks without any trouble. She can also sit using the Japanese “Seiza” style (her feet tucked underneath her) and does not suffer from urinary problems despite the flap reconstruction adjacent to the perineal area.

DISCUSSION

The National Comprehensive Cancer Network Guidelines recommend the use of STSG for reconstruction after DFSP resection to monitor local recurrence. In the present case, however, we opted to utilize a pedicled flap for reconstruction after verifying negative histological margins considering the risk for restricting hip joint movement and spread of urinary stream because of the extensive scar contracture following STSG. Additionally,

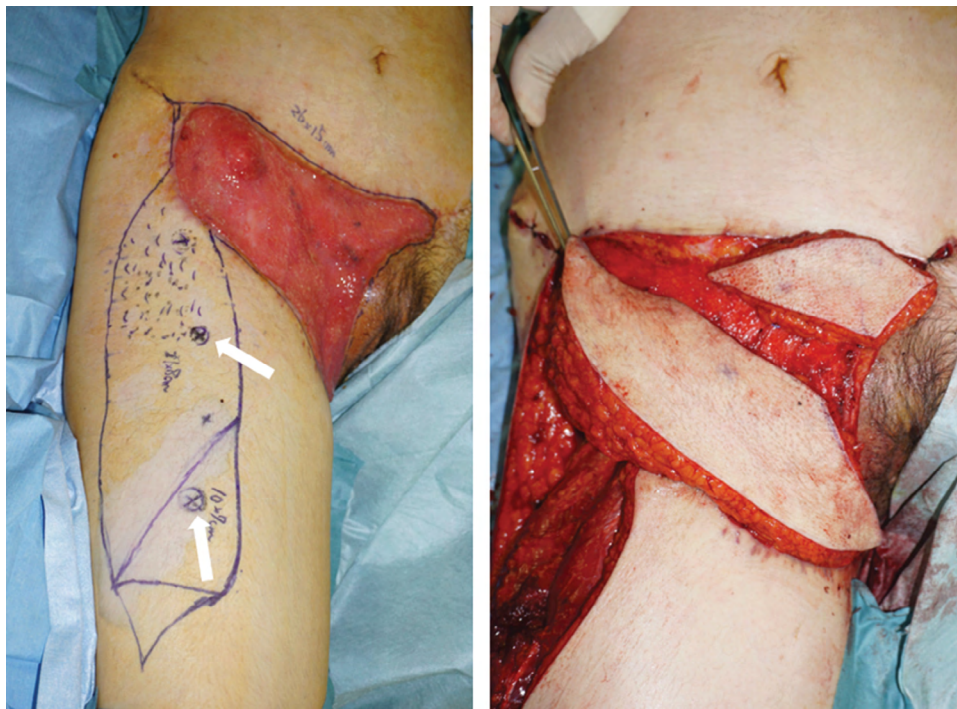


Fig. 3. Intraoperative appearances (left, flap design; right, split-skin Paddle flaps). The long vertical ALT flap was designed. Two skin paddles were split corresponding with the perforator entering points (white arrows) and transferred to the groin defect.



Fig. 4. Postoperative result at 4 years demonstrates mature scars and no contractures of groin or vulva area.

esthetic outcomes in both the recipient and donor sites had to be considered given that the patient was a young woman. We discussed these matters with the patient, and a split-skin paddle ALT flap was finally chosen. Rectus abdominis myocutaneous or perforator flap was also considered as another reconstructive option; however, for future childbearing, we avoided operation to her abdominal area. Although a few reports are available regarding flap reconstruction following DFSP resection,¹ no report has considered both esthetic and functional consequences.

Split-skin paddle ALT flap was first reported by Marsh and Chana in 2010² and was subsequently termed the “kiss” flap and divided into 3 major styles and 5 different types according to the pattern of vascularization.³ The primary concept of this technique is to convert 2 long and narrow flaps into a single unified wide flap. This would allow the reconstruction of considerably large defects while maintaining direct linear closure of the donor site and minimizing its morbidity.^{4,5}

DFSP itself is a slow-growing tumor and usually exhibits a single nodular pattern. In the present case, however, the patient did not visit any medical institution for 13 years because she hesitated to reveal her condition to other individuals. There have been several case reports regarding “giant” DFSPs. To the best of our knowledge, the largest DFSP was 25 cm × 27 cm × 18 cm in size on the upper back of a 63-year-old man.⁶ Nonetheless, none of the studies have involved a young woman such as the 1 in the present case.

Lymph node resection was another issue that required consideration. In the present case, resection included the tumor and inguinal lymph nodes to obtain a safe surgical margin. Lymph node metastasis of DFSP has been quite

rare,^{7,8} with even the present case showing no metastasis despite the large tumor, early onset, and tumor location immediately above the lymph node. Therefore, lymph node dissection should be considered only when evident regional lymph node swelling is present and/or a high probability of metastasis is determined after imaging study.^{8,9}

CONCLUSIONS

We herein reported a case of a giant DFSP in the groin region of a young woman. Reconstruction of the large groin defect through a split-skin paddle ALT flap showed positive esthetic and functional outcomes in both the recipient and donor sites. Nonetheless, STSG remains the generally recommended reconstruction method following DFSP resection. Accordingly, skin flap reconstruction should be carefully planned according to the lesion and patient characteristics.

Ayato Hayashi, MD, PhD

Department of Plastic and Reconstructive Surgery
Juntendo University Urayasu Hospital
279-0021, Chiba, Japan
E-mail: ayhayasi@juntendo.ac.jp

REFERENCES

1. Umemori Y, AO M, Kawasaki N, et al. A case of malignant dermatofibrosarcoma protuberans that needed reconstruction of abdominal wall. *Jpn J Clin Dermatol.* 1998;52:1143–1145.
2. Marsh DJ, Chana JS. Reconstruction of very large defects: a novel application of the double skin paddle anterolateral thigh flap design provides for primary donor-site closure. *J Plast Reconstr Aesthet Surg.* 2010;63:120–125.
3. Zhang YX, Hayakawa TJ, Levin LS, et al. The economy in autologous tissue transfer: part 1. The kiss flap technique. *Plast Reconstr Surg.* 2016;137:1018–1030.
4. Wang F, Pradhan P, Li N, et al. Tripaddled anterolateral thigh flap for the reconstruction of extensively full-thickness cheek defects by stacking two skin paddles as kiss pattern. *J Craniofac Surg.* 2018;29:651–654.
5. Xiong L, Guo N, Gazyakan E, et al. The anterolateral thigh flap with kiss technique for microsurgical reconstruction of oncological scalp defects. *J Plast Reconstr Aesthet Surg.* 2018;71:273–276.
6. Nakatani C, Kitaoka M, Okazaki T, et al. A case of giant DFSP. *Skin Research.* 1989;31:234–237.
7. Rutgers EJTh, Kroon Bin BR, Albus-Lutter CE, et al. Dermatofibrosarcoma protuberans treatment and prognosis. *Eur J Surg Oncol.* 1992;18:241–248.
8. Lal P, Goel A, Mandal AK. Dermatofibrosarcoma protuberans of scalp with cervical lymph node metastasis. *Sarcoma.* 2004;8:43–45.
9. Yamada M, Suzuki N, Inasaka Y, et al. A case of dermatofibrosarcoma protuberans with regional lymph node metastasis. *Jpn J Clin Dermatol.* 2010;64:687–690.