Combined Use of the Latissimus Dorsi Musculocutaneous Flap and the Anterolateral Thigh Flap to Reconstruct an Extensive Shoulder Defect in an NF-1 Patient

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Summary: Soft tissue coverage after the resection of a large malignant peripheral neural sheath tumor (MPNST) is a challenge. We report the successful reconstruction of an extensive shoulder defect after MPNST resection in a patient with a type 1 neurofibromatosis with a novel combination of flaps. A 70-year-old man with type 1 neurofibromatosis presented with a recurrent MPNST on his right shoulder. He underwent a wide excision of the tumor, which resulted in a huge soft tissue defect around the shoulder joint. The resultant defect was reconstructed with a pedicled latissimus dorsi musculocutaneous flap and a free anterolateral thigh flap. The flaps survived, and the wounds healed uneventfully. His affected arm was useful. The combination of a pedicled latissimus dorsi musculocutaneous flap and a free anterolateral thigh flap is a versatile option for the reconstruction of an extensive shoulder defect. (Plast Reconstr Surg Glob Open 2016;4:e670; doi: 10.1097/GOX.0000000000000644; Published online 4 April 2016.)

Malignant peripheral neural sheath tumors (MPNSTs) are rare. The risk of an MPNST is approximately 4,600 times higher in patients with type 1 neurofibromatosis (NF-1), with 3% to 13% of people with NF-1 developing a MPNST. Clinically, a MPNST is known to be aggressive, locally invasive, and highly metastatic. The mainstay of treatment for a MPNST is a wide margin surgical excision. Soft tissue coverage after a large MPNST resection in NF-1 patients is challenging because the defect tends to be extensive and available donor sites for flap and skin grafts are limited because of extensive soft tissue neurofibromas.

Herein, we report on the successful reconstruction of an extensive shoulder defect after MPNST resection in an NF-1 patient with the combined use of a pedicled latissimus dorsi musculocutaneous (LDMC) flap and a free anterolateral thigh (ALT) flap.

CASE REPORT

A 70-year-old man with NF-1 presented with a recurrent MPNST on his right shoulder. He had undergone a wide excision of the tumor with a skin graft 2 years earlier. The reexcision was performed with the patient in the lateral decubitus position. The wide excision of the tumor resulted in a 27×25-cm skin and soft tissue defect around the shoulder joint (Fig. 1). A 27×13-cm pedicled LDMC flap was elevated from the patient’s ipsilateral back and transposed...
to the defect through the axillary route. However, the medial side of the defect could not be covered with this flap (Fig. 2). Therefore, we harvested a 24×10-cm ALT flap from the ipsilateral thigh with 2 musculocutaneous perforators (Fig. 3). The artery of the ALT flap was anastomosed to the right thoracoacromial artery in an end-to-end fashion. The vein of the ALT flap was anastomosed to the right subclavian vein in an end-to-side fashion (Fig. 4). After revascularization, the skin defect over the flap was closed in layers (Fig. 5). Both donor sites were closed primarily. The wounds healed uneventfully. The patient underwent postoperative radiotherapy (60 Gy). At 30 months after surgery he remained locally disease free but had developed bone metastases. His affected arm was useful despite a limited range of motion at the shoulder joint (Figs. 6 and 7). His International Society of Limb Salvage score was 56.7% (17/30).

**DISCUSSION**

Oncologic resection around the shoulder joint often results in large complex soft tissue defects. Vital soft tissue or skeletal structures may be left exposed. Stable and durable soft tissue coverage is critical to a successful limb salvage.² If treated inadequately, the function of the shoulder and the entire upper extremity is impaired.³ The re-creation of the anatomic contour of the shoulder girdle is also important from both a functional and aesthetic standpoint.
A pedicled LDMC flap is the flap of choice for soft tissue reconstruction around the shoulder. Several authors have previously reported on the usefulness and reliability of the LDMC flap for shoulder reconstruction after oncologic resection. The advantages of a pedicled LDMC flap include a consistent anatomy, a wide rotation arc, an ease of flap elevation, and minimal donor-site morbidity. The latissimus dorsi muscle has the largest surface area of any peripheral muscle of the body and can provide ample, well-vascularized soft tissue for the reconstruction of large defects. However, in our patient, the medial side of the defect could not be covered with the latissimus dorsi muscle alone, which attests to how large the defect in this patient was. The situation was even more complicated because the patient had NF-1. It was therefore difficult to find a donor site for harvesting an additional flap or skin graft because of the proliferation of neurofibromas.

To the best of our knowledge, there has been no previously published report of the combined use of an LDMC flap and an ALT flap. The ALT flap is the most suitable flap to be used in combination with the LDMC flap because both flaps can be harvested with the patient in the lateral decubitus position. A 2-team approach is therefore possible without changing the position of the patient. A free ALT transfer requires a microvascular anastomosis. However, it is not difficult to find a sizable recipient vessel around the shoulder. The vessels in the lateral neck are also viable candidates because the ALT flap has a long vascular pedicle. Although the use of a free ALT flap for shoulder reconstruction has been rarely reported, the pliability and thickness of the ALT flap are suitable for this purpose.

In conclusion, we successfully reconstructed an extensive shoulder defect after MPNST resection in an NF-1 patient with the combined use of a pedicled LDMC flap and a free ALT flap. A clinical scenario like this one appears to be rare. However, this combination of flaps can be a versatile option for the reconstruction of an extensive shoulder soft tissue defect.

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