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옆구리 부위의 거대 연부조직 결손에 대한 역넓은등근 근육피부피판을 이용한 치험례

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Flank Reconstruction of Large Soft Tissue Defect with Reverse Pedicled Latissimus Dorsi Myocutaneous Flap: A Case Report

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Purpose: Coverage of full-thickness large flank defect is a challenging procedure for plastic surgeons. Some authors have reported external oblique turnover muscle flap with skin grafting, inferiorly based rectus abdominis musculocutaneous flap, and two independent pedicled perforator flaps for flank reconstruction. But these flaps can cover only certain portions of the flank and may not be helpful for larger or more lateral defects. We report a case of large flank defect after resection of extraskeletal Ewing's sarcoma which is successfully reconstructed with reverse latissimus dorsi myocutaneous flap.

Methods: A 24-year-old male patient had 13.0 × 7.0 × 14.0 cm sized Ewing's sarcoma on his right flank area. Department of chest surgery and general surgery operation team resected the mass with 5.0 cm safety margin. Tenth, eleventh and twelfth ribs, latissimus dorsi muscle, internal and external oblique muscles and peritoneum were partially resected. The peritoneal defect was repaired with double layer of Prolene mesh by general surgeons. 24 × 25 cm sized soft tissue defect was noted and the authors designed reverse latissimus dorsi myocutaneous flap with 21 × 10 cm sized skin island on right back area. To achieve sufficient arc of rotation, the cephalic border of the origin of latissimus dorsi muscle was divided, and during this procedure, ninth intercostal vessels were also divided. The thoracodorsal vessels were ligated for 15 minutes before divided to validate sufficient vascular supply of the flap by intercostal arteries.

Results: Mild congestion was found on distal portion of the skin island on the next day of operation but improved in two days with conservative management. Stitches were removed in postoperative 3 weeks. The flap was totally viable.

Conclusion: The authors reconstructed large soft tissue defect on right flank area successfully with reverse latissimus dorsi myocutaneous flap even though ninth intercostal vessel that partially nourishes the flap was divided. The reverse latissimus dorsi myocutaneous flap can be used for coverage of large soft tissue defects on flank area as well as lower back area.

Key Words: Reverse latissimus dorsi myocutaneous flap, Defect, Lumbar, Flank, Reconstruction

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I. INTRODUCTION

Large flank defect can be developed by trauma and resection of primary or metastatic cancers. Skin grafting of defects can be attempted, but some full-thickness defects require coverage of prosthetic material, precluding simple skin grafting. Some authors have reported muscle or musculocutaneous flaps for coverage of large flank defects, including external oblique turnover muscle flap with skin graft,[1] inferiorly based rectus abdominis musculocutaneous flap,[2] and two independent pedicled perforator flaps consist lumbar artery perforator flap and lateral intercostal artery perforator flap.[3] But these flaps can cover only certain portions of the flank and may not be helpful for larger or more lateral defects.

Latissimus dorsi muscle has dual blood supply. The dominant vascular pedicle is the thoracodorsal artery and paraspinous perforating arteries are another source of blood supply. Latissimus dorsi muscle and myocutaneous flap based on thoracodorsal artery, the dominant pedicle, has been widely used for reconstruction of head and neck, upper extremity, chest and breast. Reverse latissimus dorsi muscle flap based on the secondary segmental paraspinous perforating vessels had been introduced in 1980 by Bostwick et al. and was used for closing defects on lower back (Fig. 1).[4]

The authors successfully reconstructed a large soft tissue defect on right flank area resulted from wide excision of extraskeletal Ewing's sarcoma with reverse latissimus dorsi myocutaneous flap, and report the case with review of literature.

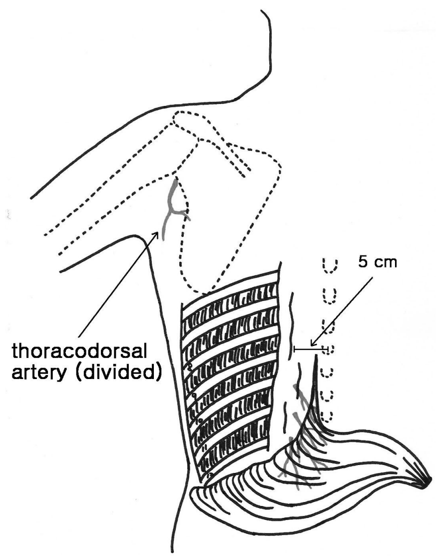

Fig. 1. Illustration of the blood supply to the reverse latissimus dorsi muscle.

II. CASE

A 24-year-old male patient visited to the department of chest surgery of the author's hospital for right flank mass that had been noticed 3 months earlier. Physical examination, radiologic evaluation and histology revealed the mass as 9.0 × 10.0 × 10.3 cm sized extraskeletal Ewing's sarcoma. VACD (vincristin, adriamycin, cyclophosphamide) regimen chemotherapy has been done for 3 weeks at the department of oncology. Nevertheless, 1 month later, follow-up radiologic study showed that the size of mass enlarged to 13.0 × 7.0 × 14.0 cm, and the mass invaded into external oblique muscle and intercostal muscle (Fig. 2). Surgical planning was established with multidisciplinary approach. Chest surgeons and general surgeons excised the mass with 5 cm safety margin. Tenth, eleventh, and twelfth ribs, latissimus dorsi muscle, internal and external oblique muscles and peritoneum were partially resected so that 24 × 25 cm sized full-thickness soft tissue defect was occured. Defect of peritoneum was repaired with double layers of Prolene mesh by general surgeons (Fig. 3). The authors designed reverse latissimus dorsi myocutaneous flap on right back area with 21 × 10 cm sized skin island (Fig. 4). Incision was made on skin island and latissimus dorsi muscle was elevated. To achieve sufficient arc of rotation,

Fig. 2. (Left) Preoperative photograph show large mass on right flank area. (Right) Computer tomographic image shows 13.0 × 7.0 × 14.0 cm sized Ewing's sarcoma on right flank area. The mass has invaded external oblique muscle and intercostal muscle.

backcut was made on cephalic border of the origin of latissimus dorsi muscle and, during this procedure, ninth intercostal artery, one of the main pedicles of reverse latissimus dorsi myocutaneous flap was divided. To validate blood circulation of the elevated flap, thoracodorsal vessels, the main pedicle of latissimus dorsi myocutaneous flap, were ligated for 15 minutes. After confirming enough blood circulation, the insertion site of latissimus dorsi muscle and thoracodorsal vessels were divided and the flap was freely elevated. The elevated flap was rotated 90° to the defect site and repaired layer by layer. The donor site was repaired with primary closure. Closed suction drains were inserted into the donor and recipient sites. Velpeau bandage was applied to right arm for immobilization to reduce the tension on the wound.

Fig. 3. Intraoperative photograph. 24 × 25 cm sized soft tissue defect on right flank area is seen after wide excision of Ewing's sarcoma. Peritoneal defect was repaired with double layer of Prolene mesh by general surgery operation team.

The next day after the surgery, mild congestion was noticed on the distal margin of the flap. Stitches with excessive tension were removed and heparin-wet dressing was done for exsanguination of congested venous blood. Two days later, congestion was improved. On postoperative 53 days, the flap has totally survived but 1.0 × 1.0 cm and 1.5 × 1.5 cm sized wound dehiscences were noted on the distal and proximal margin of skin island respectively with pus-like discharge (Fig. 5). MRSA (Methicillin-resistant staphyllococcus aureus) was cultured from the discharge.

III. DISCUSSION

Coverage of large flank defect is a challenging procedure for plastic surgeons. In the absence of exposed hardware of mesh, or anatomic structures like bones, nerves, vessels, or tendons, skin grafting can be attempted. The procedure is simple, and there are few

Fig. 4. (Left) Reverse latissimus dorsi myocutaneous flap design with 21 × 10 cm sized skin island. (Center) The flap, based on tenth and eleventh intercostal vessels, was elevated and inset. (Right) Immediate postoperative photograph. The donor site was closed primarily.

Fig. 5. Photograph on postoperative 53 days. Flap has totally survived and small wound dehiscences were identified at proximal and distal margin of skin island.

disadvantages. However, full-thickness defects often require muscle or musculocutaneous flaps.

Some authors have reported various muscle or musculocutaneous flaps for coverage of flank defects. Dumanian et al.[1] reported external oblique turnover muscle flap with skin grafting for coverage of mesh-exposed flank defect. Arco et al.[3] experienced flank reconstruction with two independent pedicled perforator flaps consist lumbar artery perforator flap and lateral intercostal artery perforator flap. But the defects in their reports were quite smaller than our case. Franzo and Nesmith[2] used inferiorly based rectus abdominis musculocutaneous flap, but the defect was anteriorly positioned than our case, close to groin area.

Latissimus dorsi muscle is Mathes & Nahai type V muscle which has dual blood supply.[5] The dominant pedicle is thoracodorsal artery which is a branch of subscapular artery. Latissimus dorsi muscle also receives blood supply from segmental vessels arising from the thoracic and lumbosacral paraspinous vessels. Paraspinous perforator vessels come from the dorsal branches of the posterior intercostal arteries of the lowest seven intercostal spaces and the dorsal branches of the four lumbar arteries. According to the anatomical studies by Stevenson et al.,[6] reverse latissimus dorsi muscle flap has three large vascular pedicles that originate from ninth, tenth, and eleventh intercostal arteries. At points 4 to 5 cm from the midline of the back, these dorsal perforating branches pierce the dense lumbar fascia overlying the sacrospinalis muscles at the caudal borders of the tenth, eleventh, and twelfth ribs.

Reverse latissimus dorsi muscle and myocutaneous flap is based on the paraspinous perforator vessels, mainly ninth, tenth, and eleventh intercostal arteries that arised from paraspinal artery.[6] It has been limitedly used for closure of spinal, lumbar and upper sacral regions.[7]

As shown by Stevenson, et al., a smaller segment of flap that can be transposed consists of only the strip of muscle overlying the two lower intercostal perforators. But Keiichi et al.[8] reported successful repair of large defects on the lower lumbar area with reverse latissimus dorsi myocutaneous flap that contains only two lower intercostal arteries. They elevated reverse latissimus dorsi myocutaneous flap with 14 × 8 cm sized skin paddle maximally.

The authors made backcut on the cephalic border of the origin of latissimus dorsi muscle after elevation of the flap to achieve sufficient arc of rotation. Therefore, the pedicle of the flap was only tenth and eleventh intercostal arteries. Moreover, our flap size with 21 × 10 cm of skin paddle was larger than previous report. So, we performed validation procedure to ensure sufficient vascular supply to the flap by temporal ligation of the thoracodorsal vessels for 15 minutes.

In this case, MRSA infection was identified. It is thought that there might remain some bacteria after preoperative surgical draping because the tumor had very irregular surface with many ulcerations. We also thought the use of Prolene mesh would increase the possibility of wound infection. However, it did not affect survival of the flap.

As above, ninth intercostal artery does not seem to be essential for survival of the reverse latissimus dorsi myocutaneous flap, even if the flap is relatively large. This result corresponds with that of Keiichi et al.[8] However, surgeons should ensure the viability of the flap by temporal ligation of thoracodorsal vessels if very large sized flap is needed.

In this case, the authors elevated the largest sized reverse latissimus dorsi myocutaneous flap as far as we know, and, based on only tenth and eleventh intercostal vessels. During the procedure, we temporarily ligated thoracodorsal vessels and confirmed enough blood circulation before dividing them to ensure the vascularity. Furthermore, many clinicians have used reverse latissimus dorsi myocutaneous flap for coverage of spinal or lumbar area, but including us, few have done for flank area. We think the reverse latissimus dorsi myocutaneous flap can be used for coverage of large soft tissue defects on flank area as well as spinal and lumbar area.

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