Infection of the inguinal region treated by musculocutaneous flaps

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ABSTRACT

This study documented the treatment of the inguinal dead space with chronic infection using musculocutaneous flaps. The average age of the patients (5 males and 2 females) was 50.0 years. Six cases of reconstruction after malignant tumor resection and one case after total hip arthroplasty were treated. Six rectus abdominis flaps and 2 vastus lateralis flaps were used. Previous radiation therapy had been performed on five patients. The duration of chronic infection averaged 2.3 months, excluding a 4-year long case. All flaps survived and the average follow-up period was 2.8 years. Five cases had no relapse of the infection but two cases relapsed 18 months and 2 years respectively after the surgery. These two did not have tumor prostheses removed prior to the surgery.

Key words: deep infection, musculocutaneous flap, dead space

INTRODUCTION

An inguinal defect associated with poor wound healing is a rare condition because usually there are thick soft tissues with rich blood circulation. If dead space occurs because of trauma, it heals quickly. However, deep infection after total hip arthroplasty (THA) or dead space after malignant tumor excision with radiation therapy causes difficult problems. Chronic osteomyelitis has been effectively treated by radical debridement of infected tissue followed by vascularized tissue. The principle of the treatment of the infection of the inguinal region is the same. The infected tissue is completely resected and the dead space is filled with musculocutaneous flap. We used a free latissimus dorsi flap for reconstruction with prosthesis after tumor resection in primary cases. However, in such cases, we are already aware of the large soft tissue defects before closing the wounds. If the wound can be closed at the primary surgery stage, it is sometimes unpredictable whether the dead space induces infection or not. In this study, we evaluated seven patients with inguinal dead space with chronic infection treated by musculocutaneous flaps.

MATERIALS AND METHODS

Over a 7-year period from 1993 until 1999, we studied seven patients who were treated with rectus abdominis and vastus lateralis flaps (Table 1). One surgeon (K Ikeda) performed all flap surgery. Selection of the flaps was decided upon as follows: the rectus abdominis flap was selected when dead space was mainly located around the inguinal ligament and the vastus lateralis...
<table>
<thead>
<tr>
<th>Cases</th>
<th>Age (yrs.) / Gender</th>
<th>Original disease / Location</th>
<th>Content of dead space / Flap</th>
<th>Preoperative radiation</th>
<th>Bacteria</th>
<th>Duration of chronic infection (mos.)</th>
<th>Follow-up</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>59 / F</td>
<td>Chondrosarcoma Ilium and Hip Joint</td>
<td>Tumor prosthesis RA</td>
<td>None</td>
<td>Enterococcus</td>
<td>1.5</td>
<td>Hemipelvectomy (18 mos. after) because infection relapsed. Death (6 mos. after infection relapsed)</td>
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<tr>
<td>2</td>
<td>55 / M</td>
<td>Multiple myeloma Ilium and Hip Joint</td>
<td>Artificial Pelvis (ceramic) RA</td>
<td>50 Gray</td>
<td>Unknown</td>
<td>8.0</td>
<td>Infection relapsed. (2 yrs. after) Death (6 mos. after infection relapsed)</td>
</tr>
<tr>
<td>3*</td>
<td>37 / M</td>
<td>Synovial cell sarcoma Inguinal region</td>
<td>Lymphatic fluid RA</td>
<td>40 Gray</td>
<td>St. epidermidis</td>
<td>0.5</td>
<td>No recurrence (3 and a half yrs.) Disease free</td>
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<tr>
<td>4</td>
<td>29 / M</td>
<td>Rhabdomyosarcoma Gluteus medius</td>
<td>Necrotic gluteal muscle RA</td>
<td>50 Gray</td>
<td>MRSA</td>
<td>1.0</td>
<td>No relapse (1 yr. and 6 mos.) Disease free</td>
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<td>5</td>
<td>64 / M</td>
<td>Liposarcoma Iliac region</td>
<td>Grafted auto iliac bone RA</td>
<td>None</td>
<td>St. epidermidis</td>
<td>2.0</td>
<td>No relapse (7 yrs.) Disease free</td>
</tr>
<tr>
<td>6*</td>
<td>35 / M</td>
<td>Embrional carcinoma Ilium and Hip Joint</td>
<td>Tumor prosthesis VL</td>
<td>50 Gray</td>
<td>MRSA</td>
<td>0.5</td>
<td>No relapse Death (6 mos. after tumor recurrence)</td>
</tr>
<tr>
<td>7</td>
<td>70 / F</td>
<td>Infected THA Hip Joint</td>
<td>None</td>
<td>40 Gray for Uterus Ca.</td>
<td>Pseudomonas</td>
<td>48.0</td>
<td>No relapse (2 yrs. and 10 mos.)</td>
</tr>
</tbody>
</table>

* Case presentation
MRSA: Methicillin-resistant Staphylococcus aureus
RA: Rectus abdominis
VL: Vastus lateralis
flap for dead space near the acetabulum. Of the two vastus lateralis muscle flaps, one was covered with split-thickness skin graft. In the other patients, the surrounding skin and cutaneous flap was sufficient to cover the wounds and enable primary skin closure. The contents of the dead spaces included three tumor prostheses, lymphatic fluid, necrotic gluteal muscle and scar tissue after cement bead insertion. Tumor prostheses were not removed prior to the flap surgery. The average age of the patients (5 males and 2 females) was 50.0 years. There were six inguinal infection cases of reconstruction after malignant tumor resection and one case after infected THA. Previous radiation therapy averaging 46 Gray had been performed on the inguinal lesion in five patients. Duration of chronic infection averaged 2.3 months, excluding one 4-year long case. Two methicillin-resistant staphylococcus aureus (MRSA), two staphylococcus epidermidis, a pseudomonas, and an enterococcus were cultured. One infection was due to an unknown organism. Systemic antibiotics were administered pre-operatively and post-operatively. Oral administration of the antibiotics continued until culture of the effusion showed the bacteria had disappeared. The average follow-up period was 2.8 years.

RESULTS

All seven flaps healed primarily and the patients could be bathed within 2 months. Since it took an average of one month and a half (1 week to 6 months) for the effusion of the dead space to disappear completely, drainage or puncture was necessary during this period. Five cases maintained good local control without any relapse of the infection, but two cases relapsed 18 months and 2 years respectively after the flap surgery (Case 1, 2). Both of these patients did not have tumor prostheses removed prior to the flap surgery and died 6 months after the relapse.

ILLUSTRATIVE CASES

Case 3

A 37 year-old male noticed a tumor at the right inguinal region. Pathological diagnosis was synovial cell sarcoma. Radiation therapy of 40 Gray was performed before tumor resection, and primary skin closure was possible after tumor resection. A wound separation occurred one month after (Fig. 1a) following lymphatic effusion in the dead space. The volume of the dead space was 400 ml. One and half months thereafter, staphylococcus epidermidis was cultured from the effusion. General administration of antibiotics failed to cure the wound. Two months after the primary surgery, a rectus abdominis musculocutaneous flap was performed. The flap was elevated from the side opposite the wound because an ipsilateral pedicle flap could have become twisted and thus difficult to fit into the shape of the wound. The wound achieved primary healing (Fig. 1d). The lymphatic effusion decreased gradually (Fig. 1b, c) and disappeared completely 6 months after the surgery. Continuous drainage and general administration of antibiotics were performed for one month after the flap surgery. Staphylococcus epidermidis was not cultured from the drainage effusion at this point. Three times a puncture for drainage of the effusion was performed in the three months after removing the continuous drainage tube. The retention of the effusion did not relapse in the 2 years and 6 months follow-up period.

Case 6

A 35 year-old male was treated for embrional carcinoma (testicular tumor) of the right testis. A radiogram of the pelvis showed metastatic lesion at the hip joint. Radiation therapy of 50 Gray was performed before tumor resection. Resection of the metastatic lesion and reconstruction using tumor prosthesis was performed (Fig. 2a), and primary skin closure was possible. One and a half months thereafter, the wound was separated (Fig. 2b) and methicillin-resistant staphylococcus aureus (MRSA) was cultured from the effusion. Administration of vancomycin did not cure the wound. Two months after primary surgery, a vastus lateralis musculocutaneous flap was performed (Fig. 2c, d). The flap was elevated from ipsilateral thigh and part of the muscle was covered with split-thickness skin graft. The wound achieved primary healing. The effusion decreased gradually and disappeared completely two weeks after the surgery (Fig. 2e). The administration of vancomycin continued for one month. The retention of the effusion did not relapse for six months, and the patient died due to multiple metastasis.

DISCUSSION

Deep infection at the inguinal lesion is rare but, if it occurs, these wounds frequently become life-threatening and are difficult to correct.1,6 Four cases of inguinal region wounds (two of radiation necrosis, a scaring, and a neurofibrosarcoma resection) were reconstructed primarily using a rectus abdominis flap,
Figure 1 (Case 3, 37 year-old male) (a) Radiation therapy of 40 Gray was performed after resection of the synovial cell sarcoma at the inguinal region. Primary skin closure could be achieved but wound separation occurred. Staphylococcus epidermidis was cultured from the effusion. The volume of the dead space is 400 ml. (b) MRI shows effusion beneath the rectus abdominis musculocutaneous flap (asterisk) even one month after surgery. The volume of the effusion is 100 ml. (c) The dead space decreases 5 months after the surgery. (d) The wound is healed and retention of the effusion does not relapse within the 3 and a half year follow-up period.
Figure 2 (Case 6, 35 year-old male) (a) Radiation therapy of 50 Gray was performed after resection of the metastatic lesion and reconstruction of the pelvis. (b) Primary skin closure could be achieved but wound separation occurs (asterisk). Methicillin-resistant staphylococcus aureus (MRSA) was cultured from the effusion. (c) Two months after primary surgery, a vastus lateralis musculocutaneous flap is performed to fill the dead space (asterisk). (d) Part of the muscle is covered with split-thickness skin graft. The wound has achieved primary healing. (e) The effusion decreases gradually and the flap (asterisk) fills the dead space completely two weeks after the surgery.
so they did not become infected. Although primary reconstruction using a myocutaneous flap is ideal, the surgery is too invasive to perform in all patients. It is difficult to predict which wounds would separate and become infected. In our series, 5 out of 7 cases had received radiation therapy. Hence, radiation therapy is one of the risk factors for wound separation and in the stage following infection. However, it does not prohibit survival of the flap because wounds healed primarily in all our cases. Since muscle flap has rich blood circulation, the skin around the flap seems to become healthy, too. In addition, muscle flap delivers antibiotic agents to the wounds. This effect cures the infection that could not be cured when there was dead space. Post-operative chemotherapy against the malignant tumor can not start until wound infection is cured because pancytopenia following chemotherapy may cause sepsis. From this point of view, muscle flap should be performed as soon as wound infection is recognized. Secondary closure usually fails because of the dead space.

Here is an important point to be remembered. We have a tendency to think that dead space will quickly disappear after flap surgery. However, this is incorrect as the effusion continues for a while. We must follow up carefully using an MRI or a CT scan to estimate the retention of effusion until it is absolved by grafted muscle. Drainage and puncture must be performed effectively to detect the existence of bacteria. Contaminated prostheses and methacrylate bone cement may cause a relapse of infection. Jones reported no recurrence in 7 cases after THA infection for the period of 6 months to 3 years using musculocutaneous flaps because they completely removed the artificial part. Removal of a large prosthesis is necessary to cure any infection. However, regarding the patients who were expected to receive a poor prognosis, as in our cases 1, 2, and 6, removal of the prosthesis severely interfered with their quality of life. In these selected cases, we did not remove the prosthesis but wrapped the muscle flap around the prosthesis. We were able to control infection for at least one year, as in our cases 1 and 2. However, if the patient’s prognosis seems to be good, artificial materials must be removed prior to the flap surgery.

The selection of the muscle flap for inguinal region is various. Rectus abdominis flaps and vastus lateralis flaps are common. We used a free latissimus dorsi flap for reconstruction with prosthesis after tumor resection in primary cases, because soft tissue defects were too substantial to make primary closure possible in those cases. A free latissimus dorsi flap is the final choice when pedicle flaps are impossible. Tensor fascia flaps and gluteus medius muscle flaps seem to be less desirable, because the muscle volume is less and the pedicle length is not enough to fill the inguinal defect.

In conclusion, infection in dead space of the inguinal region is effectively treated using a rectus abdominis or a vastus lateralis flap. If the patient’s prognosis is good, artificial materials in the dead space must be removed.

ACKNOWLEDGEMENT
The authors thank Professor Marcus Cornelius, Department of Foreign Languages, Hokuriku University, Kanazawa, for assistance in presenting and completing this study.

REFERENCES