The Fibula Osteocutaneous Flap in Head and Neck Reconstruction

A Critical Evaluation of Donor Site Morbidity

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Objectives: To (1) compare the complications and functional outcome of primary closure vs split-thickness skin grafting of the fibula osteocutaneous flap donor site, (2) identify patient-mix or treatment factors related to donor site complications, and (3) address early detection and management of donor site complications.

Design: Retrospective review and questionnaire study.

Setting: Two university tertiary referral centers.

Patients: Fifty-three patients (31 men and 22 women, ages 20 to 80 years) who underwent fibula osteocutaneous free tissue transfer between February 1992 and January 1997.

Main Outcome Measures: Minor complications; major complications; and postoperative function, including sensory and motor deficits, pain, swelling, temperature intolerance, and activities of daily living.

Results: Four patients developed major wound complications (group 1), 11 patients developed minor wound complications (group 2), and 38 patients had no wound complications (group 3). The donor site was closed primarily in 26 patients and with a split-thickness skin graft in the remaining 27 patients. Major wound complications developed in 3 patients (12%) who underwent primary closure and 1 patient (4%) who underwent split-thickness skin grafting. Minor wound complications developed in 7 (27%) of the patients who underwent primary closure and 4 patients (15%) who underwent split-thickness skin grafting. Three patients who had major complications had residual sensory or motor deficits that resulted in impaired gait or alteration in their daily activities. Comparing all patients with complications (groups 1 and 2) to patients with no complications (group 3) demonstrated an increased incidence of donor site complications in heavy smokers (P<.05) and a strong trend toward higher donor site complications in patients who underwent primary closure (P=.10). Although trends were identified, no significant differences were found in age, co-morbid illnesses, alcohol use, preoperative laboratory values, operating time, tourniquet time, or skin paddle width.

Conclusions: A variety of patient-mix and operative factors are likely related to the development of donor site wound complications. Width of the skin paddle alone is not a reliable criterion for determining the need to skin graft the donor site. Primary closure tended to result in a higher rate of both major and minor wound complications compared with split-thickness skin grafting. Primary closure of fibula donor site defects should be undertaken if this can be accomplished with no tension along the suture line. If tension at the suture line is present, a skin graft should be strongly considered to minimize the possibility of a wound complication.

Arch Otolaryngol Head Neck Surg. 2000;126:1467-1472

The fibula osteocutaneous free flap has become increasingly popular in recent years as a method of reconstructing segmental mandibular defects. The advantages of this flap include a long length of available bone, adequate length and diameter of the vascular pedicle, the ability to support osseointegrated implants, the ability to restore contour with osteotomies, and the potential for sensory innervation of the skin paddle. Although the flap is versatile and relatively easy to perform, both early and long-term donor site morbidity have been reported with this flap. The reported incidence of donor site complication with the fibula free flap has been variable, ranging from 0% to 33%. Most of these studies were based on small numbers of patients. In addition, predisposing factors that may lead to wound complications and loss of function, such as preexisting medical conditions, nutritional status, operative parameters, and method of donor site closure, have not been critically evaluated in previous reports. Method of donor site closure is controversial. Some sources indicate that skin defects less
PATIENTS, MATERIALS, AND METHODS

The medical records of all patients who underwent head and neck reconstruction with the fibula free flap at the University of Southern California, Los Angeles–affiliated hospitals and the University of Iowa Hospitals, Iowa City, were retrospectively reviewed. Fifty-three patients, 31 men and 22 women, underwent fibula osteocutaneous free flap harvesting between February 1992 and January 1997. Ages ranged from 20 to 80 years, with a mean of 54 years. Re- construction was performed for head and neck defects that resulted from tumor resection (47 patients), trauma (3 patients), and osteoradionecrosis (3 patients).

The vascular supply to the lower extremity was evaluated preoperatively in all cases using magnetic resonance angiography or conventional angiography. In all patients, patent anterior tibial, posterior tibial, and peroneal arteries were identified. Flaps were not performed unless the lower leg had a patent 3-vessel blood supply. Patients with identifiable atherosclerotic disease and potentially compromised lower extremity blood flow or an anomalous vascular pattern did not undergo fibula flaps. All of the legs had excellent dorsalis pedis and/or posterior tibial pulses as well as good capillary refill in the toes throughout the postoperative period.

The precise skin paddle location varied depending on the position of fasciocutaneous perforators. However, the skin paddle was generally located over a point at the junction of the lower and middle third of the lower leg. In most cases, septocutaneous perforators were identified passing through the lateral intermuscular septum into the skin paddle. In all cases, the fibula was harvested with a small cuff of soleus and flexor hallucis longus to capture any musculocutaneous perforators. An 8- to 10-cm stump of fibula was preserved distally to maintain ankle stability. Skin paddle widths were 6 cm or less in all cases except in 5 patients, 2 with paddle widths of 7 cm and 3 with paddle widths of 8.0 cm.

In 26 patients, the fibula donor site was closed primarily, usually under some tension. In the remaining 27 patients, a split-thickness skin graft was placed directly on the donor site defect over the soleus muscle and the peroneus musculature and tendon after these muscles had been approximated with 3-0 Vicryl sutures. 4-0 Vicryl or chromic sutures were used to tack the skin graft to the edges of the donor defect. Posterior leg splints were placed for immobilization in 40 patients, all 27 of the legs that had been skin grafted and 13 of the legs that had been primarily closed. Postoperatively, the patients were kept on a non-weight-bearing status for 4 to 7 days. During this time, the leg was kept elevated on 2 pillows. At the end of 4 to 7 days, patients who had healed donor sites were allowed to ambulate with assistance, non–weight bearing or minimal weight bearing on the operated-on leg for 1 week. After that, the patients were allowed to ambulate with full weight bearing on both legs.

The time between actual flap dissection and closure of the donor defect was variable. In many cases, the donor site closure began within 1 to 2 hours of flap dissection and removal of the flap from the lower leg. In some cases, however, the tumor extirpation required several hours to complete after the flap had been mobilized except for pedicle division. In these instances, donor site closure did not occur for several hours following flap dissection.

In addition to the method of wound closure, a variety of patient-mix and treatment factors potentially related to wound complications were evaluated. Data were collected on demographics, preexisting comorbidities (pulmonary disease, cardiovascular disease, and diabetes), smoking and alcohol use, preoperative laboratory values (total protein, albumin, hemoglobin, hematocrit, and glucose), length of surgery, tourniquet time, skin paddle size, and recipient site wound complications. Donor site wound complications were classified as major (group 1), minor (group 2), or none (group 3). A major donor site wound complication was defined as a wound in which extensive wound breakdown and muscle necrosis had occurred, resulting in a deep cavitary wound with exposed bone and/or tendon. A minor donor site wound complication was defined as a wound in which a small area of skin or skin graft was lost without compromise of underlying soft tissue.

Data on wound complications and functional deficits were obtained from patient charts, patient questionnaires, patient interviews, and physical examination. Patients were also asked to rate what effect the donor site surgery had on their preoperative level of activities of daily living (ADL) using a rating scale of 1 (minimal) to 10 (debilitating). The patients were also asked whether they experienced any of the following problems: chronic pain (rated from 1 [none] to 10 [severe]), extremity swelling, temperature intolerance, numbness or paresthesia of the extremity, weakness of the ankle or foot, or impaired gait. The patients available for follow-up underwent a sensory and motor evaluation of the donor leg.

Using SPSS software (SPSS Inc, Chicago, Ill),10 Fisher exact tests were used in comparison of categorical data, and t tests were used to compare the means of continuous data. Statistical comparisons between the 3 different groups was precluded because of the small numbers of patients in the complications groups. For this reason, groups 1 and 2 were combined for statistical comparisons between patients who had a donor site complication of any kind and those who had no donor site complication (group 3).

than 6 cm in greatest width can be closed primarily, whereas others advocate skin grafting to cover the soft tissue defect. Guidelines for management of donor site complications, should they occur, are scarce in the literature. Donor site morbidity of the fibula free flap has been evaluated in a large series of orthopedic patients.9 However, that experience reflected morbidity associated with osseous flaps used for extremity reconstruction rather than osteocutaneous flaps used for head and neck reconstruction. Harvesting the cutaneous skin paddle and a longer piece of the fibula bone would theoretically appear to increase the risk of donor site morbidity, both short- and long-term. The purposes of this study were to (1) compare the complications and functional outcome of primary closure vs split-thickness skin grafting of the fibula osteocutaneous flap donor site, (2) identify patient-mix and treatment factors that may be related to the development of donor site complications, and (3) address early detection and management of donor site complications.
RESULTS

DONOR SITE WOUND COMPLICATIONS

Fibula donor site wound complications occurred in 15 of the 55 patients. Four patients (8%) developed major complications (group 1) with extensive wound breakdown, muscle necrosis, and/or exposure of tendon and/or bone. In 1 patient, wound dehiscence was noted at 3 weeks. The open wound was treated with local wound care, daily dressing changes, and healed by secondary intention. Two patients presented with wound breakdown and purulent drainage at 6 weeks postoperatively, after having been discharged from the hospital with leg wounds that appeared to be healing well. These 2 patients required multiple debridements of necrotic muscle and exposed peroneal tendon; they were treated by packing the wounds with Sorb-san and allowing them to heal by secondary intention. In these 3 patients, the cutaneous defects had been closed primarily at the time of flap harvest. The fourth patient underwent split-thickness skin grafting, which did not “take” as the patient developed severe medical complications, including fungemia and adult respiratory distress syndrome. The wound was treated with packing, allowed to granulate, and healed by secondary intention as the patient’s underlying medical condition improved. Despite these donor site complications, no flaps were lost to vascular failure in this group or the other groups.

Eleven patients (21%) had minor wound complications (group 2), which were limited to a small area of superficial skin or skin graft slough that did not involve underlying soft tissues. Three of these patients were managed with a repeat skin graft, and all others healed with local wound care. The donor sites healed without complication (group 3) in 38 patients (72%).

AGE AND COMORBIDITY

The mean age (47.9 years) of patients who developed a major or minor donor site complication was younger than the mean age (55.6 years) of those who did not; however, this difference was not statistically significant ($P = .97$). Of all the comorbidities evaluated, a history of heavy tobacco use was the only one significantly associated with an increased risk of donor site wound complication ($P = .047$). The incidence of cardiovascular disease (hypertension, coronary artery disease, atrial fibrillation), pulmonary disease (chronic obstructive pulmonary disease), and heavy alcohol use tended to be higher among patients who developed wound complications; however, these differences were not significant (Table 1). There was no significant difference in preoperative hemoglobin, hematocrit, total serum protein, serum albumin, and serum glucose values between patients who had no donor site complication and those who did.

OPERATING TIMES, Tourniquet TIMES, AND SKIN PADDLE SIZE

The group of patients with donor site complications had slightly longer average total operating times and tourniquet times and slightly larger average skin paddle widths than the group of patients without complications (Table 2). However, the differences in these operative parameters were not significant.

METHOD OF CLOSURE

Ten (38%) of 26 patients who had primary closure of the donor site developed wound complications. Three of these 10 patients developed major wound complications. In the other 7 patients, the wound dehiscence was minor. Seven of the 26 patients who underwent primary closure developed epidermolysis, manifested by blistering of the skin adjacent to the closure site. Epidermolysis occurred on average 5.4 days postoperatively. Four of these 7 patients who manifested epidermolysis subsequently developed wound dehiscence, 2 of them ultimately developing major complications (group 1).

Five (18%) of the 27 patients who underwent skin grafting developed donor site complications. One pa-

### Table 1. Analysis of Demographic Information and Comorbidity Factors With Respect to Donor Site Morbidity

<table>
<thead>
<tr>
<th>Group</th>
<th>Comorbidity Factors, No. (%) of Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pulmonary Disease</td>
</tr>
<tr>
<td>Postoperative wound complication</td>
<td>1 (25)</td>
</tr>
<tr>
<td>Major (n = 4)</td>
<td>1 (9)</td>
</tr>
<tr>
<td>Minor (n = 11)</td>
<td>3 (8)</td>
</tr>
<tr>
<td>No complication (n = 38)</td>
<td>52.7</td>
</tr>
</tbody>
</table>

### Table 2. Analysis of Operative Factors With Respect to Donor Site Morbidity

<table>
<thead>
<tr>
<th>Group</th>
<th>Operating Time, h</th>
<th>Tourniquet Time, min</th>
<th>Mean Skin Paddle Width, cm</th>
<th>Primary Closure, No. of Patients</th>
<th>Skin Graft Closure, No. of Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>1: Major complication (n = 4)</td>
<td>14.6</td>
<td>117</td>
<td>6.3</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>2: Minor complication (n = 11)</td>
<td>14.5</td>
<td>115</td>
<td>5.8</td>
<td>7</td>
<td>4</td>
</tr>
<tr>
<td>3: No complication (n = 38)</td>
<td>13.4</td>
<td>111</td>
<td>5.5</td>
<td>16</td>
<td>22</td>
</tr>
</tbody>
</table>

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patient developed a major wound breakdown associated with fungemia and adult respiratory distress syndrome. Partial loss of the skin graft occurred in 4 patients. Of these 5 wounds, 3 were regrafted successfully and the other 2 healed with local wound care.

Although there was a strong trend toward an increased incidence of major or minor donor site complications in the patients who underwent primary closure (38%) compared with those who underwent skin grafting (18%), this difference did not reach statistical significance with this relatively small sample of patients ($P = .10$).

**OTHER WOUND COMPLICATIONS**

In group 1, one patient (25%) developed a head and neck wound complication (cervical skin dehiscence). Six (55%) of 11 patients in group 2 developed head and neck wound complications (1 intraoral dehiscence, 4 neck wound dehiscences, and 1 orocutaneous fistula). Four (11%) of the 38 patients in group 3 developed head and neck wound complications (2 neck dehiscences, 1 oral dehiscence, and 1 orocutaneous fistula).

**FUNCTIONAL OUTCOME**

Twenty-seven of the 53 patients were available for long-term (≥3 months) functional evaluation (Table 3).

In group 1, the 4 patients who developed major complications rated the consequence of the donor site harvest on their ADL as 1, 6, 10, and 10 (average, 6.8); the 3 patients who underwent primary closure had moderately severe limitations in routine activities. Two of these patients were unable to place full weight on the operated-on leg and required assistive devices (cane, ankle-foot orthotic) for ambulation. Three demonstrated weakness of ankle and toe dorsiflexion and numbness or paresthesias of the anterior and lateral aspects of the leg and dorsum of the foot. Two patients reported chronic pain and discomfort with exposure to extreme temperatures that further limited activity, and 1 patient complained of chronic leg edema. The patient who had undergone split-thickness skin grafting had no major alteration in ADL, but it should be noted that this patient’s preoperative functional status was low.

In group 2, 9 of the 11 patients who developed minor wound complications were available for long-term follow-up. The average ADL score for this group was 2.4. Six of these patients rated the effect of the harvest on their ADL as 1. They reported no change from their preoperative functional level. They were able to place full weight on the donor leg and did not experience numbness, paresthesia, temperature intolerance, or swelling. One patient reported mild pain (grade 2). One patient had slight weakness of great toe dorsiflexion; the other 2 had normal ankle and toe mobility. One patient in this group was severely disabled. This patient, who underwent primary closure, reported an overall effect on ADL of 10, required an ankle-foot orthotic, was unable to place full weight on the donor leg, and could walk only 100 steps. He reported chronic pain and temperature intolerance. Examination revealed weakness in ankle dorsiflexion and numbness over the anterior and lateral aspects of the leg and dorsum of the foot.

In group 3, 14 patients who had no wound complications were available for follow-up. Their average ADL score was 2.5. Ten resumed normal activity. Of these 10 patients, 5 had some degree of sensory impairment of the lateral leg or foot, 3 experienced cold or heat intolerance, 2 had chronic swelling, and 1 experienced mild chronic pain. However, these complaints did not significantly alter their activities. The remaining 4 patients had some limitation in activity. Three of these 4 patients underwent primary closure. One patient had limitation in the ability to walk due to weakness of ankle dorsiflexion, numbness of the anterior and lateral aspects of the leg and dorsum of the foot, and mild persistent swelling. One patient had weakness of ankle dorsiflexion and aching of the donor leg with long walks. However, numbness, paresthesia, temperature intolerance, swelling, or chronic pain was not reported. One patient had mild leg pain that limited his walking to 1 mile (1.6 km). The final patient experienced mild ankle weakness, numbness of the lateral aspects of the leg and foot, mild chronic pain, and intermittent edema.

**COMMENT**

Despite wide use of the fibular osteocutaneous flap in reconstruction of segmental mandibular defects, few studies have looked specifically at the morbidity of harvesting this flap. In general, these studies have reported minimal disruption of routine activities even though some motor and sensory deficits have been encountered. Goodacre et al$^4$ reported minimal functional loss in 8 patients who underwent fibula osteocutaneous flap harvesting and 1 patient who underwent fibular bone harvesting. Although 7 of 9 patients had weakness of great toe dorsiflexion and 6 of 9 patients had reduced spring action or hopping ability of the donor leg, most patients (6 of 9) were able to walk at least 1 mile, and 8 were able to carry out routine ADL, such as shopping. Sensory loss occurred in only 2 patients and did not affect function. Anthony et al$^5$ administered postoperative patient questionnaires to 27 patients and found ankle stiffness in 41%, occasional discomfort in 28%, transient sensory deficit in 28%, ankle instability in 10%, and transient peroneal motor weakness in 7%. Eleven patients underwent isokinetic testing and were found to have quantitative deficits in strength of knee and ankle flexion and extension.

**Table 3. Summary of Functional Outcome for the Different Groups**

<table>
<thead>
<tr>
<th>Complication</th>
<th>Group 1: Major Complication (n = 4)</th>
<th>Group 2: Minor Complication (n = 9)</th>
<th>Group 3: No Complication (n = 14)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weakness of foot dorsiflexion</td>
<td>3 (75)</td>
<td>5 (56)</td>
<td>4 (29)</td>
</tr>
<tr>
<td>Sensory disturbance</td>
<td>3 (75)</td>
<td>1 (11)</td>
<td>8 (57)</td>
</tr>
<tr>
<td>Chronic pain</td>
<td>3 (75)</td>
<td>2 (22)</td>
<td>3 (21)</td>
</tr>
<tr>
<td>Need for assistive walking device</td>
<td>2 (50)</td>
<td>1 (11)</td>
<td>0</td>
</tr>
</tbody>
</table>
and ankle inversion and eversion. Despite these deficits, all patients were able to resume daily and recreational activities. Hidalgo9 reported no long-term morbidity in 12 patients who underwent fibula osteocutaneous free flap harvesting. Cheung et al9 also reported minimal long-term morbidity in another 12 patients. Early complications included transient peroneal neuropathy that required physical therapy in 2 patients and donor site cellulitis in 1 patient.

Our overall donor site complication rate was 28%, which is within the range of complication rates previously reported. The major donor site complication rate was 8%. Patients who developed major wound complications tended to have more severe motor and sensory deficits resulting in functional impairment.

The results of this study indicate that a variety of patient-mix and treatment factors may be associated with the development of donor site healing complications in patients who have undergone fibula osteocutaneous free flap harvesting. The development of a donor site complication was found to have a significant association with a history of heavy smoking. Comorbid illness, longer operative and tourniquet times, and larger skin paddle width also tended to be more prevalent in patients who developed donor site complications. Patients who underwent primary closure appeared to have a much greater incidence of both major (12%) and minor (27%) wound complications compared with those patients who developed major (4%) or minor (15%) donor site complications who underwent split-thickness skin grafting to close the donor defect. Overall, 18% of patients whose sites were closed with a skin graft, compared with 38% of patients whose sites were closed primarily, developed donor site complications. This difference in donor site complication rate as related to method of closure approached but did not achieve statistical significance ($P = .10$). The single case of a major complication in a skin-grafted donor site occurred in a patient with multiple systemic medical problems, including fungemia and adult respiratory distress syndrome. In addition, almost all motor and sensory deficits that resulted in patient-reported impaired function occurred in patients who underwent primary closure.

The physical mechanism of development of major wound complications following primary closure is likely to be excessive tension on closure and subsequent gradual development of a pseudo-compartment syndrome. The development of a compartment syndrome begins with tissue damage and muscle ischemia, in this case, created surgically by harvesting the fibula, peroneal vessels, and a cuff of flexor hallucis longus and soleus muscles. Muscle ischemia leads to a cycle of increased capillary permeability and intramuscular edema and pressure. Venous, lymphatic, and arterial compression result, producing more muscle ischemia, thus perpetuating the cycle. Left untreated, muscle necrosis and permanent tissue injury may occur, resulting in major functional morbidity.11

Based on the preoperative vascular studies obtained in this series of patients, the remaining 2-vessel vascular supply to the leg should have been adequate to perfuse the leg following fibula osteocutaneous free flap harvest. Although distal dorsalis pedis and posterior tibial pulses were maintained in legs closed primarily, enough pressure may have developed on primary closure to reduce perfusion pressures to the remaining musculature, resulting in ischemia, necrosis, and ultimately wound breakdown. The additional deleterious healing effects associated with heavy tobacco use and cardiac and pulmonary illness also clearly played some role in healing. It was interesting that patients with donor site healing complications tended to be slightly younger than the group with no donor site healing problems. This may reflect a greater laxity of the lower leg skin in the more elderly patients, resulting in less tension on the suture line in primarily closed donor sites.

The clinical symptoms of a compartment syndrome are (1) pain out of proportion to the clinical situation, (2) weakness and pain on passive stretch of the muscles, (3) hypoaesthesia in the distribution of the nerves running through the compartment, and (4) tenseness of the fascial boundaries of the compartment. Evaluation of these symptoms can be difficult in patients who have undergone osteocutaneous free flap harvesting, since these findings are not reliable predictors of increased compartment pressure. Pain out of proportion is also difficult to assess, since most patients receive substantial postoperative sedation and narcotic pain medication. Furthermore, almost all patients undergoing primary closure required closure under some tension. Although quantitative measurements such as compartment pressures were not performed in the 3 patients who underwent primary closure and developed major wound complications, some physical signs were present in retrospect. Two of the 3 patients had moderate foot and leg edema associated with numbness over the dorsum of the foot. In 2 cases, blisters were noted around the closure site, indicating epidermolysis and vascular compromise of the skin. All presented with wound dehiscence and significant muscle necrosis 3 to 6 weeks postoperatively. This indicates gradual development of underlying muscle necrosis despite initial healing of the skin incision. All of these patients had good dorsalis pedis or posterior tibial pulses throughout the postoperative period. Therefore, these findings are not reliable predictors of increased compartment pressure. This clinical scenario suggests the slow development of a pseudo-compartment syndrome.

The literature suggests that a donor site width less than 6 cm may be closed primarily.2 In the present series, minor wound complications have developed in patients with donor site defects as narrow as 2.5 cm. Although not specifically evaluated as separate variables in this study, we speculate that 2 other operative factors unrelated to skin paddle size may also potentially affect skin tension at the donor site. First, flap elevation, except for pedicle division, may be completed several hours before complete resection of the primary tumor. In these cases, donor site closure may be performed several hours after the surgical manipulation of flap elevation. During this time, significant muscle edema may develop, resulting in increased tension at the suture line. Second, skin paddles located more distally on the lower leg would involve resection of a proportionally greater amount of skin, and similarly sized skin paddles located distally would...
be expected to result in greater skin tension if closed primarily. Depending on a variety of patient-mix and anatomic factors outlined in this study, even narrow donor site defects closed primarily are at risk for poor healing. These variables certainly need to be evaluated independently in future studies.

Based on this series of patients, it appears that the width of the skin paddle alone should not be used as the determining factor in whether to close the defect primarily. We recommend that unless the donor site can be closed with essentially no tension, a split-thickness skin graft should be applied. This should be strongly considered even in cases in which a skin paddle was not harvested when the suture line is under significant tension. Extensive undermining and closure under tension should be avoided. The aesthetic appearance of a grafted site is a drawback; however, none of the patients expressed significant concern about the appearance of the grafted site. If a patient were concerned about the appearance of the skin graft, the grafted sight could easily be excised at a later time once all swelling in the lower extremity had resolved. The benefits of avoiding a potentially severe wound healing problem and functional impairment appear to outweigh the minor disadvantages associated with skin grafting the defect.

If the wound is closed primarily, it should be closely watched for early signs of increased compartment pressure, such as excessive swelling and pain of the leg, sensory and/or motor neuropathy, and epidermolysis. Development of these signs warrants evaluation of compartment pressures and/or partially opening the suture line to relieve the pressure and to explore the wound for muscle necrosis. Any nonviable muscle should be debrided, and the wound should be allowed to granulate. The defect may be skin grafted after healthy granulating tissue fills the wound, which may take several weeks. None of our patients required donor site coverage with a free or pedicled flap. Physical therapy should be initiated as soon as the wounds are healing well to prevent muscle contracture and further functional limitation.

A variety of patient-mix and treatment factors are likely associated with the potential development of donor site complications following harvest of a fibula osteocutaneous free flap. Of the factors beyond the surgeon’s control, a history of heavy tobacco use appears to be the most important. Of the factors within the surgeon’s control, avoidance of skin tension at the donor site suture line appears to be the most important. Avoidance of skin tension at the suture line may be accomplished through closure with a split-thickness skin graft. Minimizing operative time, tourniquet time, and the period between flap elevation and donor site closure, as well as locating the skin paddle as proximally as possible on the lower leg, may also decrease the chance of donor site healing complications. Wound complications following primary closure tend to result in more postoperative functional deficits and greater limitations in daily activities than those following skin graft closure.

Accepted for publication June 28, 2000.

This work was supported in part by an American Cancer Society Clinical Oncology Career Development Award (No. 93-33).


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