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Abstract

A 58-year-old male presented to our institution with synchronous large left thigh sarcoma and sacral decubitus ulcer requiring oncologic resection and reconstruction. Due to extensive tumor involvement, use of local flap for reconstruction was not feasible. Therefore, a spare parts free fillet flap from the disarticulated lower leg was utilized for reconstruction following oncologic resection. The benefits of this spare parts approach include no donor site morbidity, sufficient tissue padding for later use of prosthesis, and preservation of other flaps for future reconstruction of his sacral decubitus ulcer.

Keywords

Spare Parts Surgery, Free Fillet Flap, Oncologic Reconstruction, Hip Disarticulation

Spare Parts Surgery for Oncologic Reconstruction to Preserve Local Advancement Flap for Decubitus Ulcer Reconstruction: A Case Report

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Abstract

A 58-year-old male presented to our institution with synchronous large left thigh sarcoma and sacral decubitus ulcer requiring oncologic resection and reconstruction. Due to extensive tumor involvement, use of local flap for reconstruction was not feasible. Therefore, a spare parts free fillet flap from the disarticulated lower leg was utilized for reconstruction following oncologic resection. The benefits of this spare parts approach include no donor site morbidity, sufficient tissue padding for later use of prosthesis, and preservation of other flaps for future reconstruction of his sacral decubitus ulcer.

Introduction

Large soft tissue cancers of the lower extremity and pelvis pose a difficult resection and reconstruction for surgical teams. Sound oncologic resection may require hip disarticulation or hemipelvectomy, and standard wound closure may not be possible. Additionally, standard closure may lack sufficient tissue padding of bony prominences for the use of prosthetics. Depending on the tumor properties and guideline-based treatment, radiation therapy can threaten tissue integrity and healing of recent surgical resection. For these reasons, flap coverage may be pursued following these types of resections.

There are several flap options available to the reconstructive surgeon, including musculocutaneous flaps from the gluteus maximus, quadriceps, adductors, rectus abdominis, latissimus dorsi, and external oblique.[1-3] Each of these reconstructive options poses its own practical and technical challenges. The most common reconstructive options used following hemipelvectomy for complex pelvic tumors are anterior or posterior thigh flaps.[4] However, in the setting of advanced tumor burden that involves these tissues or compromises their vascular pedicles, they are not viable options. Local advancement or rotational flaps can be complicated by local radiation injury to surrounding tissue, which often limits the feasibility and likelihood of successful local tissue flaps in the setting of large tumors.[5] The need for upper body strength in the rehabilitation of these patients will limit flap selection from the trunk or abdominal wall. In these situations, the lower leg tissue becomes an alternative option as a "spare parts" approach to eliminate donor site morbidity and to preserve alternative flap donor sites.[6,7]

Historically, free fillet flaps have been used to reconstruct large sacral decubitus ulcers, with one of the first described cases by Chen et al. in 1985.[8] However, free fillet flap is proving to be a successful option following oncologic resection of lower extremity bone and soft tissue tumors. Workman described a lower leg fillet flap reconstruction following a hemipelvectomy in 1992.[3] A review by Roulet identified 16 published cases of lower leg fillet flap reconstruction following hemipelvectomy or hip disarticulation, and then went on to describe their experience of seven cases.[9] The purpose of this case report is to describe our institution's experience in free fillet flap reconstruction. The educational purpose of this case report was described to the patient during an informed consent discussion, and the patient provided verbal and written consent to the publication of this case.

Case Presentation

A 58-year-old male presented to our institution with a longstanding history of a left thigh mass. Past medical history was significant for hypertension, hyperlipidemia, and hydrocephalus requiring metal stent placement as a child. The patient was unable to ambulate well due to pain and weight of the leg and had subsequently developed a sacral decubitus ulcer prior to presentation at our institution. Upon examination, the mass extended from the inguinal crease to the proximal pole of his patella (Figure 1). The mass was not circumferential, however did extend laterally to the dorsal aspect of the thigh. Core-needle biopsy returned as high grade undifferentiated pleomorphic sarcoma. CT angiogram demonstrated a 20 x 25 x 34 cm mass encompassing the majority of the anterior compartment with extension into the posterior compartment without vascular involvement. Completion angiogram confirmed patent distal anterior tibial, posterior tibial, and peroneal arteries. After completing neoadjuvant chemotherapy, patient underwent a left hip disarticulation and reconstruction with a free fillet flap from the left lower extremity.

The procedure started with flap dissection of the lower leg. An incision was made from the tibial tuberosity to the just above the ankle followed by circumferential incisions at the proximal and distal aspects taking care to preserve the saphenous vein. Dissection started along the lateral aspect of the tibia down to the interosseous membrane localizing the anterior tibial artery. After sweeping off muscle, the interosseous membrane was opened to expose the posterior compartment as well as to improve flexibility of flap for maximal coverage of the wound bed. The periosteum was opened to free the fibula from surrounding tissues except at the level of the anterior tibial and peroneal vessels where the periosteum was left intact. A periosteal elevator was used to free the fibula at these points, and this allowed removal of the fibula as a single unit while preserving these vessels. Next, dissection continued in a supraperiosteal fashion around the tibia including identification and preservation of the saphenous vein as an alternative outflow vessel. The popliteal vessels were identified and dissected as far proximally as possible. The gastrocnemius muscles were divided above the pedicle, and distal muscles and tendons were divided around the ankle with exception of the Achilles tendon. The distal vessels at the ankle were ligated, and the muscle remained well perfused. At this point, the flap was only held in place by the Achilles tendon and the popliteal pedicle (Figure 2).

Next, the oncologic resection was completed by the orthopedic surgical team keeping the femoral vessels intact until just before disarticulation. Vascular clamps were placed prior to ligation of the femoral vessels. After disarticulation, the leg was taken to a back table for completion dissection, and, at the same time, hemostasis was ensured at the defect (Figure 3). The Achilles tendon and prepared vascular pedicle were ligated, and the flap was flushed with heparinized saline and returned to the operative field. The flap was positioned to cover the defect. Under loupe magnification, the femoral-popliteal anastomosis was completed with 6-0 prolene. The venous anastomosis was completed in running technique while the arterial anastomosis was completed with interrupted suture. Upon removing the femoral vessel clamps, excellent perfusion was observed, and the remainder of the flap was sutured at the fascial and cutaneous layers closing the

defect (Figure 4). Post-operative cutaneous Doppler signals were appreciated. The patient was monitored in the ICU for two days post-operatively for frequent Doppler and flap checks. Post-operative care consisted of bedrest with frequent turns for seven days. Patient was discharged to an acute rehabilitation facility about two weeks postoperatively.

Due to limited mobility from the pain and weight of left thigh mass, the patient developed a sacral decubitus ulcer, which was present at the time of initial presentation. Nearly two weeks after his disarticulation and fillet flap reconstruction, he underwent debridement of the sacral decubitus ulcer followed by bilateral gluteal advancement flap. Post-operative care included bedrest with frequent turns for three weeks, followed by a progressive sitting protocol, and return to the acute rehabilitation facility upon discharge from the hospital for ongoing rehabilitation and strengthening.

Conclusion

For this patient, the tumor involvement of both anterior and posterior thigh compartments precluded the use of a local flap for reconstruction. Additionally, this patient presented with sacral decubitus ulceration that would eventually require flap coverage. The ultimate rehabilitation goal for this patient included prosthetic use for ambulation, which would require sufficient padding of the pelvis following disarticulation. These clinical points guided the decision to utilize the free fillet flap from the disarticulated leg.

The use of fillet free flaps is a growing reconstructive option following oncologic resections of lower extremity or pelvic tumors. Utilizing a free fillet flap from the extremity incorporated in the oncologic resection eliminates donor site morbidity and provides an oncologically safe reconstructive option for large wounds. Additionally, as highlighted in this case, patients whose mobility is limited by their tumor burden are at high risk of developing decubitus ulcers and may ultimately require flap coverage. This spare parts approach salvages alternative flap donor sites should the patient require flap reconstruction of decubitus ulcers. ■

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Figure 1. Preoperative photograph of thigh sarcoma and surgical planning of lower extremity flap.

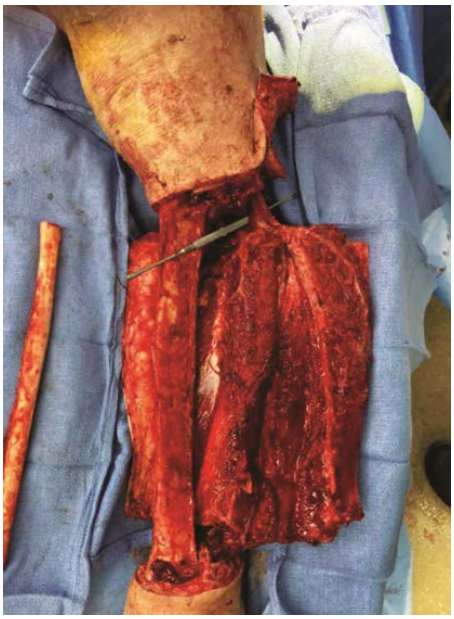

Figure 2. Intraoperative flap dissection.

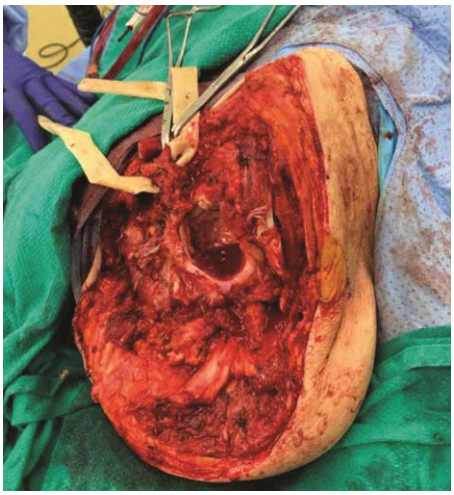

Figure 3. Hip disarticulation.

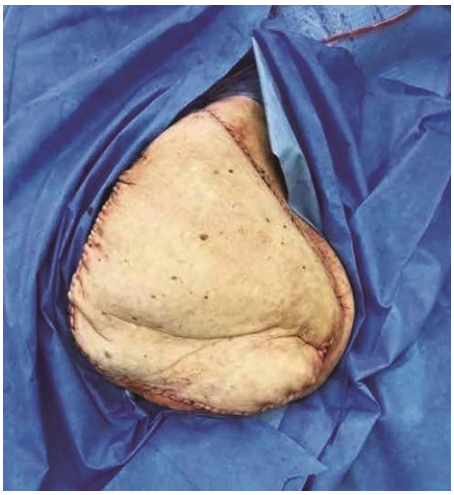

Figure 4. Postoperative photograph of completed reconstruction.

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