SURGICAL TECHNIQUE

Rotational Pedicle Myocutaneous Forearm Fillet Flap Used to Fill Forequarter Amputation Defect: Indications and Uses

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A full-thickness fourth-degree burn to a large area of the upper extremity may require a forequarter amputation. Whereas our case describes a burn injury, forequarter amputations may more commonly be done in oncological surgery. In addition to the challenge of providing well-vascularized tissue coverage, the burn patient may also pose the complication of respiratory compromise in a systemically ill person. Fillet flaps have often been utilized as "spare part" reconstruction. Although previous forequarter amputations have been covered with free myocutanous forearm fillet flaps, we devised a rotational pedicle myocutaneous forearm fillet flap that might be less complex than a microvascular reconstruction. This article describes the technique and advantages of the pedicle fillet flap of the upper limb. This technique eliminates the risks of delayed warm ischemia time and avoids additional morbidity of donor sites. Although we sought to find a simpler, more rapid procedure for a burn patient, the pedicle forearm fillet flap has applications for both burn and oncological forequarter amputation defects. It provides a good combination of large tissue coverage with maximum perfusion of muscle bulk. The pedicle flap also enabled us to keep the distal part vascularized and to "bank" it for later use when the recipient area was well vascularized and free of infection. *(J Hand Surg Am. 2017;■(■):1.e1-e4. Copyright © 2017 by the American Society for Surgery of the Hand. All rights reserved.)*

Key words Forequarter amputation, myocutaneous flap, surgical technique.

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MANAGEMENT OF SEVERE BURNS requires sophisticated reconstructive surgery. The "spare part" concept is a strategy that uses unsalvageable traumatized limbs to harvest tissue for reconstruction of large, complex defects resulting from trauma.[1-5] Under the circumstance of a full-thickness, fourth-degree burn localized to the upper extremity and anterior chest, the clinical challenge lies in removal of devitalized tissue using forequarter amputation while utilizing the spare part concept such as the pedicle fillet flap to provide adequate soft tissue coverage and minimize additional morbidity.

Forequarter amputations are not difficult to close if overlying skin is not involved. However, challenges arise when typical donor sites are involved in the pathology. The rectus abdominis and contralateral latissimus dorsi have proven to be reliable donor sites with minimal morbidity, but tight closure of the donor site can cause a restrictive defect leading to respiratory compromise.[6] In burn patients with coexisting respiratory compromise, use of these soft tissue donor sites can substantially increase morbidity and mortality.

We describe a technique in which we use a pedicled myocutaneous forearm fillet flap to close the defect of a forequarter amputation. Pedicled fillet flaps of the

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upper limb are rarely considered,[1] but this article describes their utility.

INDICATIONS

A pedicled myocutaneous forearm flap may be used to cover a proximal upper extremity and chest wall defect from a forequarter amputation for trauma, burn, or tumor. Tissue to the distal extremity must be viable with an intact vascular supply. This technique is especially useful in burn patients in whom harvesting tissue from the chest wall or abdomen may worsen existing respiratory compromise.

CONTRAINDICATIONS

An injury in which blood supply to the distal extremity is compromised is a contraindication to this technique.

TECHNIQUE

An incision is made down to bone along the ulnar aspect of the forearm directly over the palpable part of the ulna. Elevate a myocutaneous flap off the distal humerus as well as completely circumferentially around the ulna. Then disarticulate the humerus and ulna from the elbow and the wrist, respectively (Fig. 1). Elevate the flap off the radius, paying attention to the interosseous septum. As the flap is dissected down across the interosseous membrane, several large arterial vessels, including the posterior interosseous artery, are tied off to maintain hemostasis. The radius is then disarticulated at the wrist. The hand is amputated following ligation of vasculature and nerves with 2-0 silk ties. Perfusion of musculature is periodically checked. Areas of fascia around the wrist are incised to allow the flap to fully unfurl and lie flat. A large area can be resurfaced (Fig. 2).

The upper extremity wound bed is prepared for adherence of the flap using aerosolized fibrin spray. The fillet flap is rotated superiorly and wrapped around the wound so that the distal most portion of the flap where the radial and ulnar pulses were palpable may be placed at the superior most aspect of the defect. To hold the flap in place, several 3-0 Prolene sutures are placed with spaced vertical and horizontal mattress technique followed by staples (Fig. 3). The skin remains well perfused and warm throughout closure. The radial and ulnar pulses should now be present proximally and should be palpable. Venous congestion must be checked by visual inspection. The flap is wrapped with silver-impregnated elastic bandage and absorptive dressing,

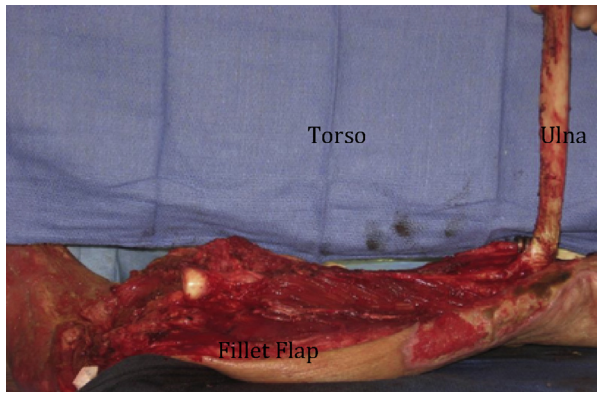

FIGURE 1: Removal of forearm bones.

leaving the distal portion of the flap exposed for vascular checks. An elastic bandage is wrapped around the patient's chest wall and the inferior portion of the flap in order to decrease swelling and minimize venous congestion. The superior portion of the flap toward the neck is held in place using a mesh dressing.

CASE EXAMPLE

The patient is a 56-year-old white man who was found unconscious by family members in his trailer lying on top of a space heater. The patient sustained severe burns to his entire right upper extremity, extending from his neck to right hand, anterior chest, left forehead, and left hand. The duration of his exposure to the space heater was unknown.

The patient's past medical history is extensive, involving multiple systems. He had a history of hypertension, epilepsy, transient ischemic attack, cerebral vascular accident, atrial fibrillation, deep venous thrombosis, inoperable brain tumor, depression, and ventriculoperitoneal shunt for "stenosis." The patient was also a heavy drinker with 2 previous suicide attempts. Owing to the patient's history, the cause of his altered mental status was unknown.

The patient's initial resuscitation began at an outside facility, which included endotracheal intubation, left subclavian triple lumen catheterization, and computed tomography of the head and cervical spine. Imaging studies revealed no acute process. Initial laboratory evaluation and urine output were consistent with rhabdomyolysis and acute renal failure. The patient was transferred to our facility for further care.

On physical examination, the patient was afebrile and in atrial fibrillation with rapid ventricular response without evidence of acute ischemia. Approximately 7% total body surface area was affected with full-thickness fourth-degree burns to his