Case Report

Neurotized Free Anterolateral Thigh Flap for Large Tissue Defect and Joint Exposure in the Setting of Olecranon Bursitis: A Case Report

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Received: 03-08-2025
Accepted: 03-21-2026

ABSTRACT

Elbow wounds secondary to septic olecranon bursitis are a challenging problem to treat. Neurotized fasciocutaneous free anterolateral thigh (ALT) flaps provide a reliable soft tissue coverage option with the opportunity to provide protective sensation to a common pressure point. Free flaps can provide coverage when alternative options lower on the reconstructive ladder are unavailable. A 69-year-old man with rheumatoid arthritis presented with septic olecranon bursitis requiring serial debridement resulting in significant soft tissue loss and bone exposure. A free ALT, with fascial tacking sutures, was used for reconstruction with subsequent neurotization resulting in successful resolution of bursitis and persistent fluid drainage. Neurotized free ALT flaps provide durable soft tissue coverage for a challenging area to treat while also providing sensory protection to a pressure point area.

KEYWORDS
Olecranon bursitis; Elbow reconstruction; Neurotized free anterolateral thigh flap

Please cite this paper as:
Zeyl VG, Mahajan AY, Loewenstein SN. Neurotized Free Anterolateral Thigh Flap for Large Tissue Defect and Joint Exposure in the Setting of Olecranon Bursitis: A Case Report. World J Plast Surg. 2026;15(1):98-101.
doi: 10.61882/wjps.15.1.98

INTRODUCTION

Septic olecranon bursitis can occur in the setting of rheumatoid arthritis due to the proinflammatory state causing increased synovial fluid production and can be difficult to resolve.[1] Serial debridement may result in a soft tissue deficit. Skin grafting over the olecranon may result in unstable soft tissue coverage in a highly mobile area. While locoregional flaps such as the lateral arm, pedicled latissimus, intercostal artery perforator, radial forearm, ulnar forearm, anconeus, brachioradialis, and flexor carpi ulnaris prove to be reliable reconstruction options for smaller olecranon defects, large defects may require free tissue transfer.[2] We present a patient for whom we performed a free, neurotized anterolateral thigh flap to reconstruct a large olecranon full thickness soft tissue defect as a consequence of surgical treatment septic olecranon bursitis with resolution of bursitis symptoms. We further demonstrate the patterned regeneration of protective sensation that would be expected with reinnervation through neurotization.

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[DOI: 10.66224/wjps.15.1.98]

CASE PRESENTATION

The patient was a 69-year-old left hand dominant male heavy machine operator, with a history of seropositive nodular rheumatoid arthritis who developed septic olecranon bursitis. He previously had successful surgical treatment of left olecranon bursitis, which consisted of bursa debridement and closure. Eight months later, he bumped his right elbow and developed swelling, erythema, and stigmata of septic olecranon bursitis. He subsequently underwent six surgical debridements. At the time of consultation, the wound measured 15 cm x10 cm with exposed olecranon bone (Fig. 1a).

After ten days of local wound care, we performed a free anterolateral thigh fasciocutaneous flap for reconstruction. We neurotized the flap by transferring part of the right lateral antebrachial cutaneous nerve to the left lateral femoral cutaneous nerve. Arterial inflow was provided by the ulnar recurrent artery and venous outflow through the median cubital vein (Fig. 1b and 1c).

Postoperatively, there was a small persistent wound on the medial aspect of the flap. At postoperative week 8, pus began draining from the wound and the patient returned to the operating room for a repeat washout (Fig. 2a). Four days later, the wound was closed with tacking sutures (Fig. 2b) that secured the flap to the olecranon and surrounding fascia. Starting nine weeks after the last debridement, the patient started experiencing progressive sensation recovery of the flap over the elbow (Fig. 3a), which advanced along the path of the lateral femoral cutaneous nerve (Fig. 3b). The patient maintained good elbow range of motion and the donor site healed without complication. At two-year follow-up, the flap demonstrated complete neurotization and excellent range of motion (Fig. 3c and 3d).

DISCUSSION

For elbow defects, free tissue transfer is a reconstruction option[3]. In the patient presented, his vocation required repetitive flexion and extension, making the potentially unstable nature of a skin graft a less desirable treatment. Prior debridement eliminated local fasciocutaneous flap options, such as a lateral arm flap. Distant fasciocutaneous flaps were eliminated due to an incomplete palmar arch. Although a pedicled thoracic flap could be an option, such as an intercostal-artery perforator flap, it would require several weeks of immobility, which was not desirable to the patient. By transferring the anterolateral thigh fasciocutaneous flap, we were able to provide neurotized tissue that suited his role as a heavy machine operator and the required pressure to the elbow.

Management of bursitis is difficult due to recurrence of symptoms including pain, swelling, and fluid reaccumulation, due to proinflammatory states, particularly in patients with rheumatoid arthritis. Previous studies demonstrated only 40% of patients with RA experiencing resolution of symptoms compared to 94% of non-RA patients experiencing

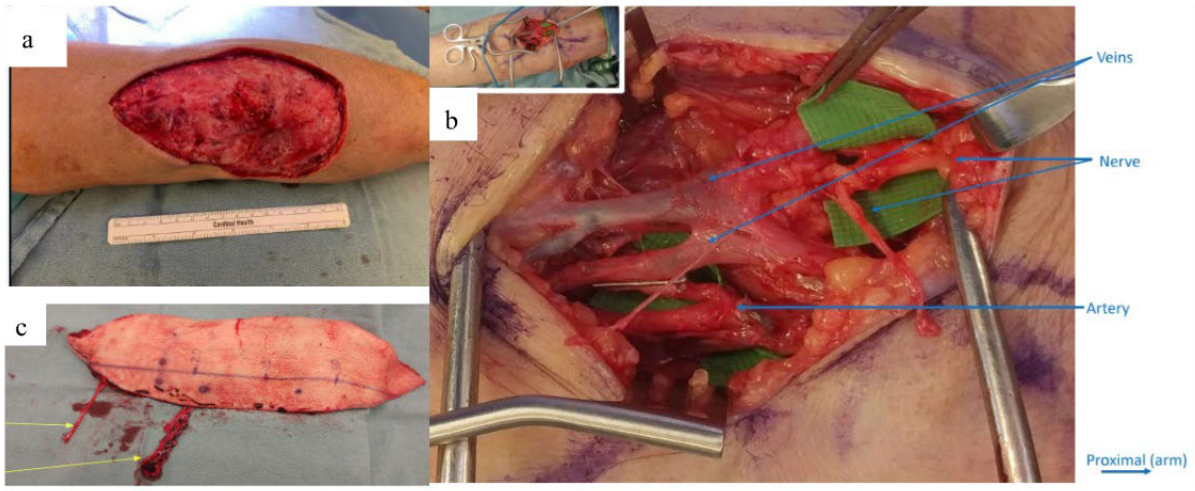


Figure 1: **a)** After debridement, there was a large full thickness elbow wound with exposed olecranon leading to a consult for reconstruction. **b)** Recipient vessel and nerve dissection in the right antecubital fossa. **c)** Donor flap with vascular pedicle and isolated donor lateral femoral cutaneous nerve

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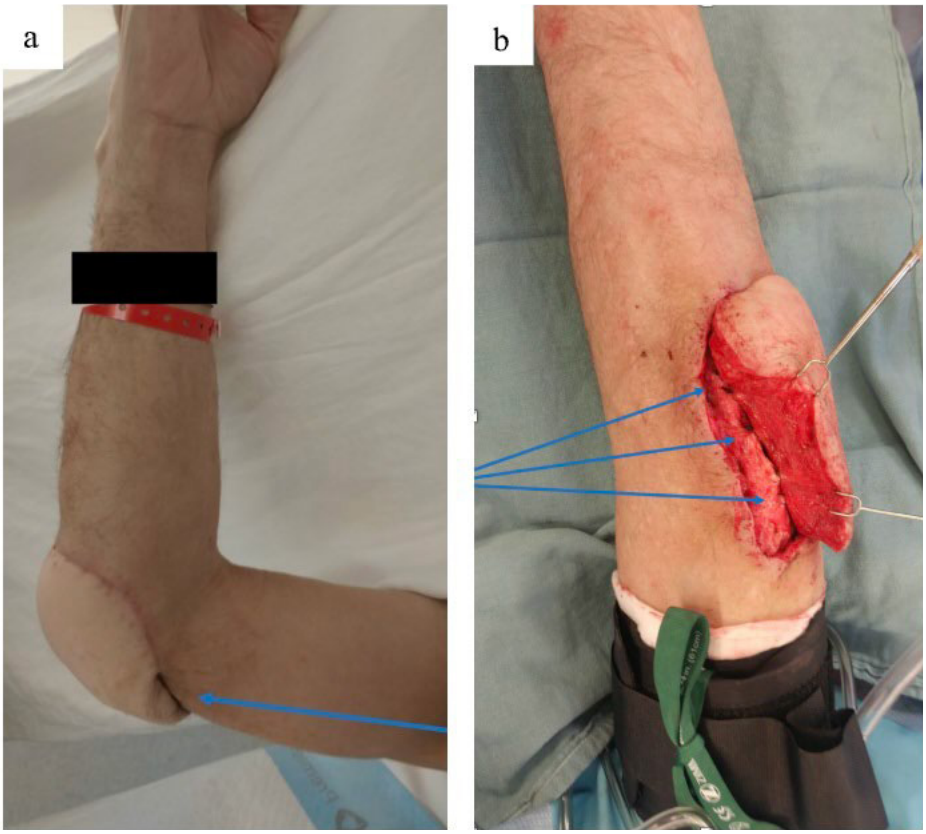


Figure 2: **a)** Demonstrates a persistent sinus tract in the right elbow. **b)** Tacking sutures were placed between the flap and fascia to close the dead space after debridement. The skin was then reapproximated in layers with suture



Figure 3: Blue dots indicate the ability to sense a 10g monofilament. **a)** Sixteen weeks post op from final surgery, **b)** Nine months post op from flap inset and nerve coaptation, **c)** Two year follow up demonstrating complete neurotization of the flap, and **d)** Excellent range of motion

resolution of symptoms[4]. Open bursectomy with complete excision of the bursa is standard of care for refractory septic bursitis, yet complications with wound healing are as high as 29% for open bursectomy due to reaccumulation of fluid [5]. The present patient experienced a small open wound with persistent drainage after the initial bursectomy and subsequent reconstruction, which is a bothersome, yet not uncommon complication, particularly in the proinflammatory state of RA[6]. During the second

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operation, in which the ALT flap was washed out, tacking sutures were placed to immobilize the flap to the fascia resulting in resolution of the drainage and healing of the chronic wound due to closure of dead space. Similar approaches using tacking sutures to close dead space with local advancement flaps have been described to successfully treat bursitis, however the same technique has not been described in reconstruction using free flaps[7]. Though there is a sparsity of literature describing neurotized free flaps for olecranon coverage, neurotized free anterolateral thigh flaps have significantly improved outcomes for other pressure bearing sites including the sole of the foot due to the restoration of protective sensation, subsequent reduction in wound breakdown, and earlier return of previous functional status[8-10]. Restoring protective sensation is a priority in the elbow, which is a common site for applied pressure, in order to avoid further trauma and cyclical recurrence of bursitis.

Over the course of two years, this patient experienced ulnar to radial progression of sensation along the course of the flap, which follows the trajectory of the lateral antebrachial cutaneous nerve. Furthermore, when the patient was touched at the elbow, he localized sensation to the lateral forearm. This supports that sensation is restored through the nerve coaptation rather than spontaneous innervation. This finding is similar to other reports of sensory recovery in neurotized ALT flaps[11]. Semmes-Weinstein 10 g monofilament testing proved to be adequate for mapping out the sensory recovery distribution. As evidence of reinnervation through nerve coaptation in fasciocutaneous free tissue transfer grows, surgeons may find this a useful tool for reconstructing pressure points throughout the body.

CONCLUSION

Neurotized free anterolateral thigh fasciocutaneous flaps provide a durable reconstructive option with the possibility for sensory innervation for elbow soft tissue defects, particularly when patients have no available reconstructive options lower on the reconstructive ladder.

ETHICS APPROVAL

This case report was conducted utilizing data obtained for research purposes and in accordance with the ethical standards of the institutional and national research committee and the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. Written informed consent was obtained from the patient for publication of this case report and accompanying images.

CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

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