

Pediced Anterolateral Thigh Flaps for Reconstruction of Recurrent Trochanteric Pressure Ulcer

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The reconstruction of recurrent pressure sores is challenging due to a limited set of treatment options and a high risk of flap loss. Successful treatment requires scrupulous surgical planning and a multidisciplinary approach. Although the tensor fascia lata flap is regarded as the standard treatment of choice—it provides sufficient tissue bulk for a deep trochanteric sore defect—plastic surgeons must always consider the potential of recurrence and accordingly save the second-best tissues. With the various applications of anterolateral thigh (ALT) flaps in the reconstructive field, we report two cases wherein an alternative technique was applied, whereby pediced ALT fasciocutaneous island flaps were used to cover recurrent trochanteric pressure sores. The postoperative course was uneventful without any complications. The flap provided a sound aesthetic result without causing a dog-ear formation or damaging the lower-leg contour. This flap was used as an alternative to myocutaneous flaps, as it can cover a large trochanteric defect, recurrence is minimized, and the local musculature and lower-leg contour are preserved.

Key Words: Perforator Flap, Pressure sore

Pressure sores form a common condition, with an estimated prevalence of 3% to 10% among hospitalized patients and up to 25% to 33% in nursing homes.¹ Despite the efforts and advanced measures for prevention and management, pressure sores remain an immense problem for medical practitioners as they result in lengthy hospital-stay durations and frequent recurrences. Recently, studies provided a number of practical rationales that may aid in the definitive management of this formidable problem.²⁻⁴

The trochanteric region is one of the common sites of the pressure ulcers that develop in patients who lie in the lateral position—especially in those patients with significant flexion contractures.¹ Successful treatment requires scrupulous surgical planning and a multidisciplinary approach. Due to the large size of the affected area and the exposed bone, the flap of either the tensor fasciae latae (TFL) or the vastus lateralis has been the

standard treatment of choice;⁵ however, disadvantages such as recurrence rates of up to 80%, dog-ear deformation, and flap-tip necrosis have led surgeons to look for new flap alternatives.¹ At present, many local rotational- or transposition-flap options exist for the reconstruction of trochanteric pressure sores;^{1,3,6-8} however, care must always be taken when choosing the best flap for reconstruction, while the possible recurrence of the pressure sore must also be considered. The anterolateral thigh (ALT) flap has been used successfully as a pediced flap, and has primarily been used in the reconstruction of the perineal, groin, and abdominal wall.¹ Kimata et al. (requoted from reference 1) first described the use of the ALT flap as a pediced flap for perineal reconstruction, but there are only a few literature reports on the use of the ALT for reconstructing the trochanteric region. We report two cases wherein an alternative method was used to treat recurrent trochanter pressure ulcers with pediced ALT flaps.

CASE REPORT

Case 1

A 36-year-old male with a cervical spine injury was admitted to our hospital with a 10×5-cm-sized right trochanteric pressure sore that had recurred for the second time during his bedridden state (Fig. 1).

He was treated 2 years ago with a perforator flap using the ascending branch of the lateral circumflex femoral artery (LCFA), and then, 9 months before his presentation, was treated with a TFL perforator-based island fasciocutaneous flap. Surgical treatment was re-planned, but there were not many optional flaps available due to prior surgeries. We chose the

pedicled ALT as our last option, and a 20×10 cm elliptic flap was designed around the perforator (Fig. 2).

An ultrasound portable doppler was used to trace a circle with a 3 cm radius at the midpoint of a longitudinal line drawn from the right anterior superior iliac spine to the superolateral border of the patella at the inferior lateral quadrant. A skin incision was made over the scars from the previous operation, and doppler tracing was used to perform a meticulous dissection in the posterior direction through the loose areolar layer over the original site of the iliotibial tract and fascia lata. The septocutaneous perforator of the LCFA was noted between the vastus lateralis and the rectus femoris, and a further meticulous dissection was performed proximally until about



Fig. 1. The 36-year-old male (Case 1): A preoperative view showing the deep 10×5 cm recurrent trochanteric pressure sore with a 9 cm-width undermining on the right side after two previous surgeries.

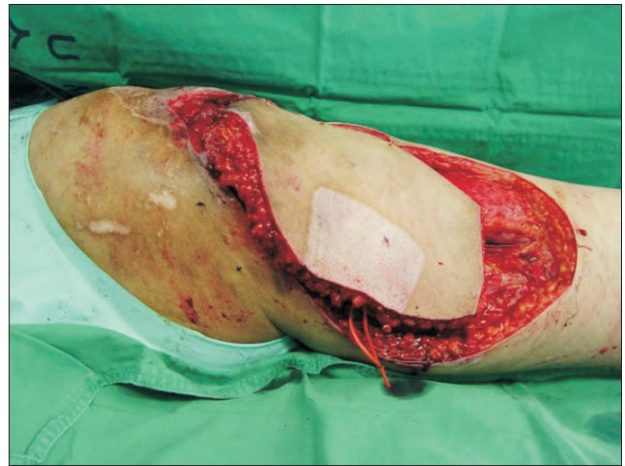


Fig. 3. The final flap in setting after the advancement of the pedicled anterolateral thigh fasciocutaneous flap (Case 1).

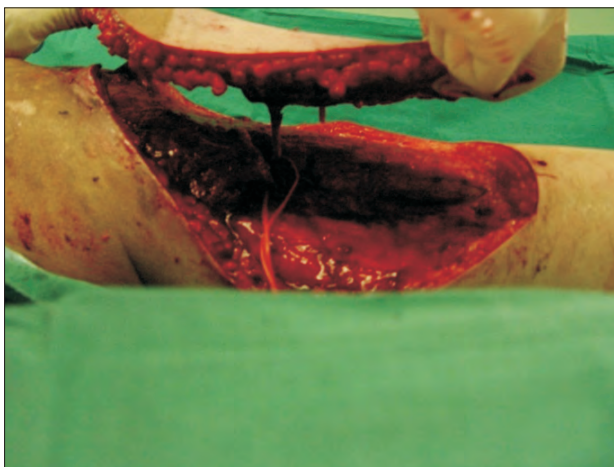


Fig. 2. Final elevation showing the pedicle (Case 1).



Fig. 4. The final result after the pedicled anterolateral thigh flap and skin graft (Case 1).



Fig. 5. The 44-year-old male (Case 2): Preoperative view showing the deep 10×10 cm recurrent trochanteric pressure sore with 5-cm-width undermining on the left side after he had gone through a lateral circumflex femoral artery-based propeller flap 2 years ago.

13 cm of adequate pedicle length was achieved for the flap transfer. The anterolateral fasciocutaneous flap was advanced carefully by about 10 cm to cover the defect. De-epithelization was performed about 5 cm from the cephalic portion of the flap to cover the large undermining defect. A 1-O Vicryl was used to apply an anchoring suture to the undermined deep tissue to prevent the formation of any dead space. After advancement, we were unable to close a small portion of a coin-sized secondary defect at the caudal portion of the flap due to severe tension. A split-thickness skin graft was used to cover the defect (Fig. 3).

A long leg splint was applied from the buttock to the ankle to reduce spasticity. The postoperative course was uneventful without any complications (Fig. 4).

Case 2

A 44-year-old male with a diffuse axonal injury presented with a 10×10-cm-sized recurrent left trochanteric pressure sore resulting from a bed-ridden state (Fig. 5). The grade II pressure sore (8×7 cm) was previously covered with the ascending branch of the LCFA-based propeller flap about 2 years before admission, but had recurred to a larger size with a wider undermining than before. A 26×11 cm pedicled ALT flap was designed on the ipsilateral thigh. A subfascial dissection was performed in a retrograde pattern and the pedicled ALT flap was elevated (Fig. 6).

We avoided the skeletonization of the pedicle as much as possible, and while checking the arc of rotation, a further



Fig. 6. Flap elevation showing pedicle (Case 2).

dissection was performed on the descending branch of the LCFA for full coverage of the defect. We proceeded with the dissection of the perforator until its take-off from the descending branch of the LCFA. The pedicle of the flap was transferred subcutaneously between the defect and the flap, and was safely positioned to avoid pedicle kinking. A de-epithelization of about 3 cm was performed on the distal portion of the flap to cover the undermined defect of the trochanter. To avoid the formation of any dead space, a 1-O Vicryl was used to apply a deep fixation at the undermined area and two Hemovac's were inserted. After checking the color and blanching test, the flap was sutured layer-by-layer without any marginal tension (Fig. 7).

A long leg splint was applied from the buttock to the ankle to reduce spasticity. The Hemovac's were removed after a week and the postoperative course was uneventful without any complications (Fig. 8).

DISCUSSION

Chronic recurrent trochanteric ulcers constitute an important clinical problem in paraplegics and geriatric patients as they are a major cause of patient morbidity. Reported recurrence rates exceed 80% after a first instance of surgical treatment because the motion over the trochanter is greater than for other sites, and there is an undoubted exertion of pressure on the region when the lateral decubitus position is assumed.¹ Keys et al.⁹



Fig. 7. Final flap inset after pedicled anterolateral thigh flap and skin graft (Case 2).



Fig. 8. Postoperative view after 1 month (Case 2).

mentioned that 45% of ulcers recurred at the same site and the rate of subsequent long-term coverage failure was therefore increased. The need for an operative revision after a dehiscence was performed nearly doubled for those flaps located at sites that had prior recurrences or substantial flap line failures.

It is therefore important to approach all patients who have trochanteric pressure sores with a consideration of a possible recurrence. After the first, second, and third treatment choices have been used to manage ulcers, a situation in which no further treatment options are available can be very frustrating.

The management of pressure sores requires thorough planning, and future complications and recurrences must be considered. Foster et al. (quoted from reference 2) advised that proper flap selection and an appropriate sequence of flap use significantly improved the success rate of reconstruction. Disa et al. (quoted from reference 2) emphasized flap requirements in the management of pressure sores; namely, the use of adequate bulk to obliterate dead space, a well-vascularized flap, and an effective transposition that allows for tension-free closure.

When considering the reconstruction of trochanteric pressure sores, there are several methods that are available to the surgeon. Nahai et al. (quoted from reference 3) firstly introduced the TFL musculocutaneous flap and its modifications have become a standard approach for the management of trochanteric defects. This conventional design, however, has the following potential pitfalls: the most distal and poorly vascularized portion is usually placed into the bed of the sore, and a dog-ear deformity

is often created in the lateral thigh region, thereby ruining the leg contour.

Since Song et al. (quoted from reference 10) introduced the use of the ALT flap in 1984, this flap has been widely used in various reconstructive surgical procedures, with options such as advancement, transposition, or even free flaps.¹⁰ Free flaps have been mostly used for head and neck reconstruction, and as a pedicled flap, the option is well-known for the reconstruction of large defects such as those of the groin, lateral and medial thigh, perineum, gluteal region, and abdominal wall. Until now, however, it has been rarely reported in the reconstruction of the trochanteric region.¹

The pedicled ALT flap has many advantages over other regional flaps. The cutaneous territory of the ALT flap involves more than half of the circumference of the thigh and extends from the greater trochanter to above the patella, thereby offering an enormous skin-replacement potential and a greater flexibility in flap design. The pedicle of the ALT flap is long and possesses large caliber vessels. The length of the pedicle of the ALT flap depends on the locations of the selected perforators. In the majority of cases, a flap harvest requires the careful dissection of a suitable intramuscular perforator within the vastus lateralis muscle.⁶ According to Burm and Yang,⁶ a dissection of the pedicle to the origin of the descending branch of the LCFA can mobilize the flap sufficiently to avoid venous congestion, and a flap harvest is associated with little or no functional deficit at the donor site.

Interestingly, preoperative and postoperative perfusions

of the ALT flap are similar, which is attributed to a ligation of the muscular branches, a loss of vascular tone secondary to denervation, and flow redistribution to the areas that are perfused by the perforators.⁷ This advantage in vascularity had led some to investigate the value of the ALT flap for the coverage of infected wounds in the lower extremity. One series concluded that a plentiful postoperative revascularization of the ALT flap was a significant contributor to the sterilization and healing of infected lower-extremity wounds. Likewise, most recurrent trochanteric pressure sores have dirty wound beds—some have a combined bursitis and osteomyelitis—and the pedicled ALT flap can be suitable for corresponding treatment.

With the ALT flap, patients do not require intraoperative mobilization and the vascular territory is sufficiently large; furthermore, it may be raised as an innervated flap that is capable of providing a protective sensation. Additionally, the anterior or lateral branch of the lateral cutaneous nerve of the thigh can be included to provide sensation, while the donor site can be easily concealed, and is closed either primarily or with a skin graft. Gravvanis et al. (quoted from reference 7) even incorporated the lateral cutaneous nerve of the thigh in the flap to provide sensation in a reconstruction of the penis and scrotum.

With the merits of a long vascular pedicle, wide arc of reach, and reliable skin territory, we preferred the pedicled ALT flap for the reconstruction of the difficult recurrent trochanteric pressure sores in this study, and we were able to cover a large undermined defect without leaving a large secondary defect. Another significant advantage for the young male patient was the maintenance of the main contours of both lower limbs. In terms of disadvantages, however, the pedicled ALT flap may need skin grafting and a large scar was left on the donor site.

In conclusion, although there are some variations of vascular anatomy and there are occasional difficulties in the dissection of the long musculocutaneous perforator, the proximally-based pedicled ALT flap provides a large cutaneous island with versatile applications and a reliable blood supply. The flap is a

reliable option for the treatment of trochanteric pressure sores—especially in the case of recurrent trochanteric pressure sores, whereby a coverage of large defects is required.

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