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Case Report

Ipsilateral distal third femoral shaft fracture and retrograde intramedullary fixation are not absolute contraindications to anterolateral thigh flap harvest: A case report

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ABSTRACT

Despite the advantages of anterolateral thigh (ALT) flaps, many surgeons are hesitant to choose a thigh with ipsilateral femoral fracture and internal fixation as the flap donor site. To cover the right mid-upper leg wound, a free ALT flap was harvested from the left thigh of a 55-year-old man who initially underwent closed retrograde intramedullary fixation for a left distal third femoral shaft fracture. The flap was based on a musculocutaneous perforator located in the mid-thigh, which was approximately 10 cm above the proximal fracture level. No adhesion or scar formation between the fascia and adipose tissue was noted when the flap was raised suprafascially, and the adipose tissue surrounding the trunk of the descending branch of the lateral circumflex femoral artery was found to have mild edema. The patient regained good aesthetic outcomes and a complete range of active motion in both lower extremities. Based on current evidence of the vascular anatomy of the ALT flap in the literature and our experience, an ipsilateral thigh with distal third femoral shaft fracture and closed retrograde in-

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tramedullary fixation should not be considered an absolute contraindication to ALT flap harvesting.

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Introduction

The anterolateral thigh (ALT) flap is one of the most useful workhorse flaps for lower extremity reconstruction due to its numerous advantages, including a large cutaneous area, long and large caliber vascular pedicle, versatility to adjust tissue components and flap thickness, suitability for sensate reconstruction, feasibility for a simultaneous two-team approach, and minimal donor site morbidity.¹⁻³ Although there are several factors affecting the flap choice for a particular patient, the choice between the left and right thighs as the ALT flap donor site usually depends on the surgeon's preference, given

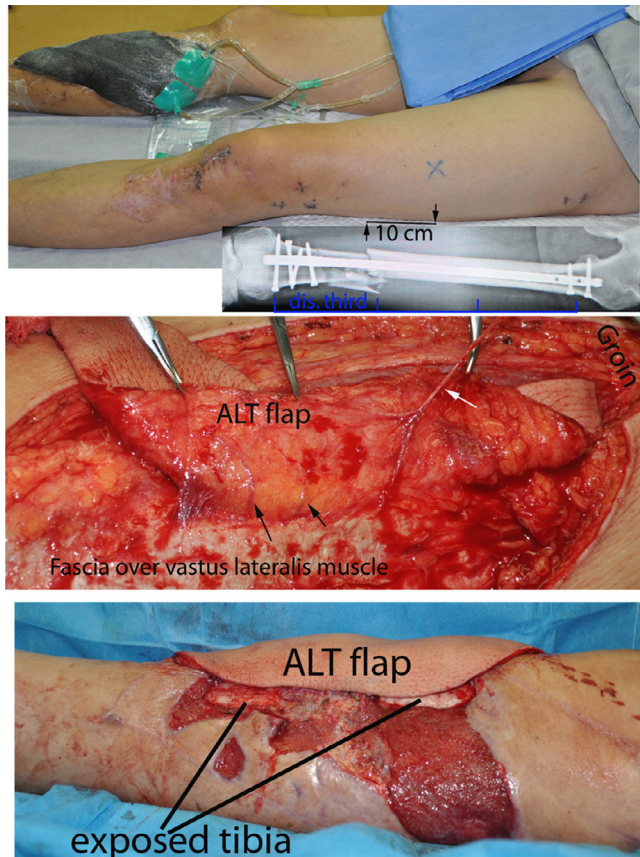


Figure 1. X is the perforator identified by Doppler (upper). Two black arrows show small pulsatile branches, and the white arrow shows a branch of the lateral femoral cutaneous nerve (middle). The flap was transferred to cover the contralateral exposed tibia (lower).



Figure 2. Radiographs at the 1-year follow-up.

that there was no difference in local injury or perforator anatomy between the two thighs.^{2, 4} Ipsilateral femoral fracture is generally considered a contraindication for an ALT flap donor site.⁵ However, considering that the injury zone caused by initial distal third femoral shaft fracture and subsequent surgery might be far from the flap donor site, avoiding harvesting the ALT flap in a large proportion of these patients might unnecessarily forgo optimal flap selection.

We report our experience in a successful leg reconstruction case using the contralateral thigh, which was associated with distal third femoral shaft fracture and retrograde intramedullary fixation, as the ALT flap donor site. This report adheres to STROBE guidelines.



Figure 3. Cosmetic appearance and range of motion in both lower extremities at the 1-year follow-up.

Case report

A 55-year-old man experienced a motor vehicle accident with a severe crush injury to his right midleg, closed fracture in the left distal third femur shaft, and closed fractures of the left tibial plateau, fibula, and fifth metatarsal basement. The patient had immediate debridement, negative pressure therapy for his right leg wound, and left calcaneus traction at an outside center. He was transferred to our unit on the next day. Five days later, he underwent closed retrograde intramedullary nailing fixation for his left distal third femoral shaft fracture. The skin and muscle around his right leg wound were noted to be of poor quality during repeat debridement, thereby precluding the use of a local flap. Negative pressure wound therapy was applied again. Then, seven days after fixation, the patient was transferred to the vascular surgery ward for thrombolytic therapy for left calf vein thrombosis.

Two weeks later, an ALT flap was designed centering on a preoperative Dopplered perforator located in the left thigh, which is approximately 10 cm above the proximal fracture level. At the time of debridement of the right leg wound under tourniquet control, an incision was made over the anterior border of the flap, and subfascial dissection proceeded laterally until a musculocutaneous perforator was identified. Then, the flap was islanded suprafascially from the lateral to anterior direction, with no findings of adhesion or scar formation between the fascia and adipose tissue. The vascular pedicle was finally dissected easily in a retrograde fashion, and the adipose tissue surrounding the descending branch of the lateral circumflex femoral artery was found to have mild edema. The ALT flap was transferred with further thinning by primary defatting to cover the exposed right tibia (Figure 1). A split-thickness skin graft was then placed over the wound on the anteromedial aspect of the leg.

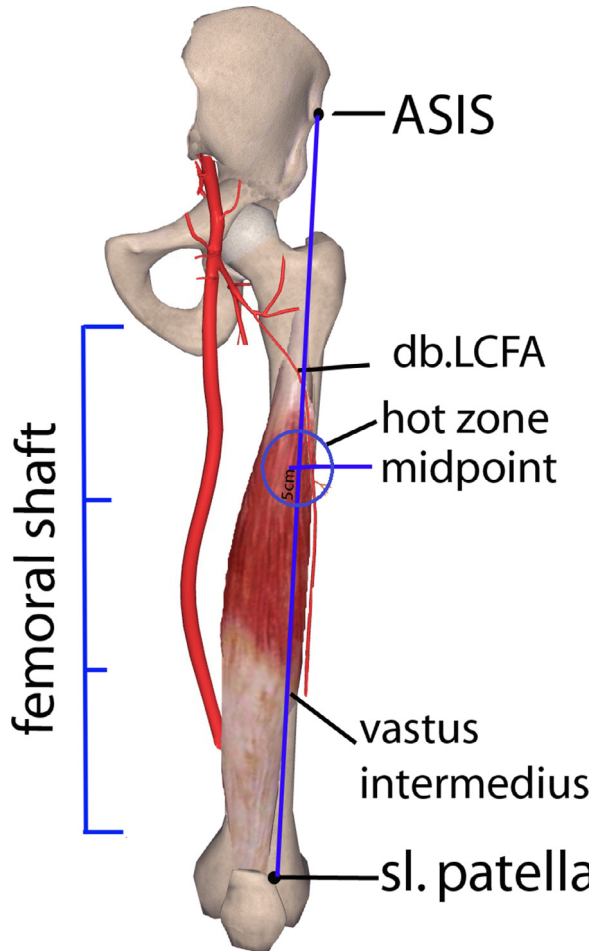


Figure 4. Correlation between the most common distribution of perforators and the femoral shaft fracture. ASIS: anterior superior iliac spine; sl. patella: the superolateral border of the patella; db. LCFA: the descending branch of the lateral circumflex femoral artery.

The patient had an uneventful recovery. Plain X-rays of the femur showed bone continuity in 3 of the 4 cortical bone surfaces at the 1-year follow-up (Figure 2). The patient regained a good aesthetic outcome in the pretibial reconstruction region and complete range of motion in both lower extremities (Figure 3). He was able to resume work without any limitations.

Discussion

Ipsilateral femur fracture complicating ALT flap harvesting has received much less attention, as this scenario is not common. Some surgeons have suggested that the ALT flap should not be harvested from the ipsilateral thigh if it is associated with traumatic injury, including femur fracture, pelvic fracture, or soft tissue injury, which requires simultaneous orthopedic intervention.⁴ However, few reports have analyzed the relationships among concomitant injury from the initial trauma, surgery, and the vasculature of the ALT flap. Existing evidence suggests that perforators supplying ALT flaps are most likely to be located in the central third of the thigh,⁶ and the majority of thighs have at least one perforator within the hot zone, namely a 5-cm radius around the midpoint of the thigh.^{7,8} The dom-

inant perforator supplying the ALT flap most commonly emerges from the descending branch of the lateral circumflex femoral artery, followed by the oblique, transverse, or ascending branches.⁶ Thus, distal third femoral shaft fractures, which account for approximately 4–6% of all femur fractures, are less likely to directly injure the vasculature of the ALT flap based on its dominant perforator located in the central third of the thigh. Furthermore, the musculature covering the femoral shaft, especially the vastus intermedius muscle, which originates from the lateral and anterior aspect of the upper two-thirds of the femoral shaft, could be considered a potential barrier to limit deep hematoma extension to varying degrees, which might lead to secondary injury to the vasculature of the ALT flap (Figure 4). In addition, subsequently closed retrograde intramedullary nailing fixation could avoid incision into the region of a future ALT harvesting donor site.⁹ Thus, ipsilateral distal third femoral shaft fracture and closed intramedullary fixation should not be considered absolute contraindications for the ALT flap donor site. However, additional clinical observations or imaging studies to characterize the ALT flap vasculature in similar scenarios are needed to confirm safety and reliability.

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None of the authors have a financial interest in any of the products, devices, or drugs mentioned in this manuscript.

Conflict of interest statement

The authors have no conflicts of interest to declare relevant to this work.

Informed consent

This report was published with the consent and permission of the patient involved.

Ethical approval

This study was approved by the review board (approval no.2021050)

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