

Pediced Anterolateral Thigh Flap Reconstruction for Defects Between Umbilicus and Knee

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ABSTRACT

OBJECTIVES: This study evaluated the efficacy and outcomes of pediced anterolateral thigh flap reconstruction in addressing soft tissue defects between the umbilicus and the knee.

MATERIALS AND METHODS: We evaluated 12 patients (8 males, 4 females; mean age of 56 years; range, 15-74 years) who underwent pediced anterolateral thigh flap reconstruction between 2019 and 2022. Defect locations included the inguinal region, trochanteric region, medial thigh, posterior thigh, lateral knee, and umbilical region.

RESULTS: The average operative time was 2.7 hours (range, 2-4 hours). All donor sites were closed primarily, with no major complications. Mean hospital stay was 7 days (range, 4-18 days).

CONCLUSIONS: The pediced anterolateral thigh flap is a versatile and reliable solution for defects in the lower abdomen and lower extremities, offering excellent outcomes with minimal donor site morbidity.

KEY WORDS: Burn, Flap, Perforator, Reconstruction

INTRODUCTION

Defects between the umbilicus and the knee represent a complex reconstructive challenge for surgeons, given the

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vital anatomical structures in these areas, including major vessels, bones, and exposed implants. Standard reconstruction techniques, such as skin grafts or local flaps, often fall short in addressing larger or deeper defects.

The pediced anterolateral thigh (ALT) flap, first introduced by Song and colleagues in 1984, has become a revolutionary approach in addressing such defects.¹ The ALT flap offers several advantages, including reliable vascular anatomy, long pedicle length, and minimal donor site morbidity.² The versatility of this procedure allows surgeons to modify flap dimensions and perforator dissection to meet the demands of individual cases.³ In addition, preoperative perforator mapping using handheld Doppler or imaging ensures surgical success and minimizes complications.⁴

Previous studies have demonstrated that ALT flaps can effectively cover defects in regions such as the inguinal area, trochanteric region, and thigh, while maintaining functionality and aesthetics.⁵ Furthermore, the ALT flap's long pedicle reach eliminates the need for microvascular anastomosis in most cases, enhancing its appeal as a reconstructive option.^{6,7} In this study, we have described our institutional experience with pediced ALT flaps in reconstructing soft tissue defects in 12 patients over a 3-year period.

MATERIALS AND METHODS

Patient selection

We included 12 patients (8 males, 4 females; mean age of 56 years; range, 15-74 years) who underwent pediced ALT flap reconstruction between 2019 and 2022 at Başkent University Hospital.

Defect characteristics

We treated defects located in the inguinal region (n = 3), trochanteric region (n = 3), medial thigh (n = 2), posterior thigh (n = 1), lateral knee (n = 1), lumbar region (n = 1), and umbilical region (n = 1). Etiologies of defects

included angiography-related skin necrosis, vascular prosthesis infection, wound dehiscence after abdominoplasty, sarcoma resection, burn injury, and hematoma. We show detailed illustrations of these defects and their reconstructions in Figures 1 to 4.

Surgical technique

For planning before surgery, perforators were mapped using a handheld Doppler to ensure optimal vascular supply. The ALT flap dimensions ranged from 8×10 cm to 17×9 cm, with pedicle lengths tailored to the defect's

FIGURE 1. 15-Year-Old Male Patient With Excision of Ewing Sarcoma Located Proximally and Laterally in the Leg



The surgery resulted in a 6×14 -cm defect with exposed bone and plate. A reverse pedicled anterolateral thigh flap was used for reconstruction.

FIGURE 2. 62-Year-Old Male Patient With a 5×10 -cm Inguinal Wound Following an Arteriovenous Fistula Operation



Pedicled anterolateral thigh flap reconstruction is shown postoperatively.

FIGURE 3. Intraoperative View of a 58-Year-Old Female Patient With a 17 × 9-cm Umbilical Defect



The pedicled anterolateral thigh flap with a 30-cm pedicle was utilized for closure.

location. We used subcutaneous tunnelling to reach posterior defects, particularly for posterior thigh cases. All donor sites were closed primarily, minimizing morbidity.

Outcome measures

We systematically evaluated operative time, complication rates, length of hospital stay, and long-term flap viability (Table 1).

RESULTS

Operative outcomes

Among patients, mean operative time was 2.7 hours (range, 2-4 hours). Average duration of hospital stay was 7 days (range, 4-18 days).

Complications

No major complications, such as flap necrosis or infection, were observed during the mean follow-up period of 12 months. With all donor sites closed primarily, patients showed no functional or aesthetic deficits.

DISCUSSION

The pedicled ALT flap is a highly versatile option for reconstruction of defects between the umbilicus and the knee. The reliability and adaptability of this procedure have made it a cornerstone of reconstructive surgery in this challenging anatomical region.

There are a number of key advantages with use of the ALT flap. First is a reliable vascular anatomy. The ALT flap's consistent blood supply, typically derived from the descending branch of the lateral circumflex femoral artery, ensures robust perfusion.¹ Second is the long pedicle reach. With a pedicle length sufficient to cover distant defects, the ALT flap eliminates the need for microvascular anastomosis in most cases.⁷ Third is minimal donor site morbidity. The donor site can be closed primarily, preserving both function and aesthetics.⁸ Fourth is the procedure's^{8,9} versatility. The ALT flap can be customized to meet varying defect sizes and depths, accommodating a wide range of anatomical challenges.⁶

FIGURE 4. 65-Year-Old Male Patient Presenting With a 10 × 15-cm Posterior Thigh Defect Due to Liposarcoma Excision Underwent Reconstruction With a Reverse Pedicled Anterolateral Thigh Flap



Patient underwent tunnelling and transfer of the flap to the defect site.

TABLE 1. Demographic Findings and Outcomes of 12 Study Patients

Patient	Age, y	Sex	Defect Site	Defect Size, cm	Etiology	Comorbidity	Operative Time, h	Complication
1	54	M	Posterior thigh	10 × 15	Liposarcoma resection	HTN	3.5	None
2	58	F	Lumbar area	17 × 9	Abdominal wound dehiscence	Diabetes mellitus	4.0	None
3	45	M	Trochanteric region	8 × 12	Vascular prosthesis infection	None	2.5	None
4	62	M	Inguinal region	5 × 10	Arteriovenous fistula wound	Peripheral vascular disease	2.0	None
5	67	F	Medial thigh	10 × 14	Burn injury	Obesity	2.5	None
6	72	M	Trochanteric region	12 × 9	Sarcoma resection	Coronary artery disease	3.0	None
7	15	M	Lateral knee	6 × 14	Ewing sarcoma excision	None	3.5	None
8	74	M	Inguinal region	9 × 12	Hematoma	CKD	2.5	None
9	65	M	Posterior thigh	10 × 15	Liposarcoma resection	None	3.5	None
10	48	F	Medial thigh	10 × 14	Burn injury	HTN	2.5	None
11	61	M	Trochanteric region	9 × 11	Sarcoma resection	Type 2 diabetes	3.0	None
12	43	M	Inguinal region	7 × 10	Angiography-related defect	None	2.0	None

Abbreviations: CKD, chronic kidney disease; F, female; HTN, hypertension; M, male

Technical challenges

There are a number of technical challenges with the ALT flap technique. First is perforator selection. Accurate pre-operative mapping is critical to avoid complications like ischemia.⁴ Failure to select appropriate perforators may compromise flap viability. Second are the tunneling risks. Subcutaneous tunneling, particularly for posterior thigh defects, can compress the pedicle and pose risks of ischemia. Koshima and Soeda emphasized the importance of precise technique to minimize these complications.⁵ The success of the ALT flap also relies on meticulous intraoperative execution and postoperative care. Recent advancements in imaging and surgical techniques have further enhanced its utility, allowing the procedure to address increasingly complex defects.⁹ In conclusion, our experience reinforces the pedicled ALT flap as an indispensable tool in the reconstructive surgeon's arsenal, offering excellent functional and aesthetic outcomes.¹⁰

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