

## VERSATILITY AND EFFICIENCY OF PEDICLED ANTEROLATERAL THIGH FLAP IN REGIONAL SOFT TISSUE RECONSTRUCTION

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### Abstract

**Background:** The pedicled anterolateral thigh (ALT) flap with its long and reliable pedicle, wide arc of rotation and minimal donor site morbidity is a workhorse flap to cover defects in the groin, lower abdomen, perineum and knee. The aim of the study is to analyse the versatility of pedicled anterolateral thigh flap in terms of distal reach and arc of rotation. **Materials and Methods:** We conducted a retrospective study between January 2021 and January 2023, on patients who underwent loco-regional soft tissue reconstruction with pedicled anterolateral thigh flap. Patient demographics, location and size of the defects, flap details, follow up and post operative complications were reviewed. **Result:** All flaps survived and settled well. One patient who underwent pedicled ALT flap cover for lower abdomen defect, developed graft loss at flap donor site which was re-grafted and settled subsequently. The average follow up period was 12 months and all the patients in the study were satisfied with the outcome. **Conclusion:** Our case series highlights the versatility of pedicled Anterolateral thigh flap for loco-regional reconstruction of various defects.

## INTRODUCTION

Large defects in lower abdomen, perineum, groin, gluteal region, thigh and knee areas result from oncological resection, trauma or infection and they require reliable cover. Free Anterolateral thigh (ALT) flap was introduced by Song et al in 1984. It was mainly used for head and neck reconstruction. After the introduction of Pedicled Anterolateral thigh (ALT) flap by Kimata et al. for abdomen defect reconstruction, it has become the workhorse flap for defects in these regions owing to its long and reliable pedicle, wide arc of rotation with minimal donor site morbidity and ability to be harvested with multiple tissue components.<sup>[1,2]</sup>

## MATERIALS AND METHODS

A Retrospective study was conducted between January 2021 and January 2023 in this institution. All patients who have undergone pedicled ALT flap for loco-regional soft tissue reconstruction were included in this study. The study was conducted after obtaining approval from Institutional Ethical Committee. Data were reviewed with regard to

patient's age and sex, cause of the defect, size of the flap and post operative complications.

### Surgical Technique

#### a) Flap design:

Prior to surgery, perforators for pedicled ALT flap was marked using handheld doppler, within the circle of 3cm radius located at the midpoint of the line joining Anterior superior iliac spine (ASIS) and superolateral border of patella. Flap was designed eccentrically as per the defect location to increase the pedicle length. Pivot point for proximally based pedicled ALT flap was 7-10 cm below ASIS and for distally based pedicled ALT flap (site of anastomosis of superior genicular artery with descending branch of lateral circumflex femoral artery-LCFA) was 3 to 8 cms above knee.

#### b) Patient positioning and Anaesthesia:

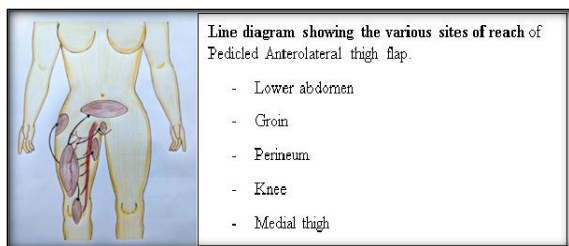
- Patient was placed in supine position.
- General anaesthesia / regional anaesthesia were chosen based on the defect and duration of surgery.

#### c) Flap harvest technique:

After debridement / oncological resection, the defect size was noted. Flap harvest started with medial incision made through skin, subcutaneous tissue and

down to the level of the deep fascia of the thigh. Sub fascial dissection proceeds with identification and confirmation of perforators (Septocutaneous/Musculocutaneous) arising from descending branch of LCFA in between the rectus femoris and vastus lateralis. The pedicled flaps were based proximally, with the most proximal pivot point located just distal to origin of LCFA off profunda femoris artery below inguinal ligament. Length of vascular pedicle for proximally based flaps ranged from 16 to 20 cm. The distally based pedicled flaps were based on retrograde flow, with the pivot point at the anastomotic connection between descending branch of LCFA and the superior lateral geniculate artery. Length of vascular pedicle for distally based flaps was 12 to 16 cm. For both proximally and distally based pedicled anterolateral thigh flaps, the flaps were designed eccentrically over the marked perforator for better reach. Flap donor sites were covered with split thickness skin graft.

The reach of the proximally based ALT flap was increased with the following manoeuvres namely ligation of transverse branch of LCFA and passing the flap underneath the rectus femoris muscle.<sup>[3]</sup>



### Representative cases:

#### 1. Right lower quadrant defect of abdomen

40/M, a case of necrotising fasciitis lower abdomen for which debridement and grafting was done one year back. Subsequently patient developed incisional hernia, for which repair was done by using the polypropylene mesh and abdominal wall reinforcement was done by using the pedicled ALT flap [Figure 1].



Figure 1: a) Pre-op incisional hernia, b) Flap marking, c) Flap harvested, d) Flap inset, e) 6 months post-op.

#### 2. Perineal defect:

45/F, a case of carcinoma vulva, wide local excision with permanent urinary diversion was done by surgical oncology team, and we were called for the reconstruction of the perineal defect. Pedicled ALT flap from left thigh was done [Figure 2].



Figure 2: a) Post excisional defect, b) Flap marking, c) Flap harvest, d) Tunnelling under rectus muscle, e) Flap inset, f) 15 days post-op.

#### 3. Lower abdomen defect:

55/F, a case of sarcoma lower abdomen for which wide local excision and mesh reinforcement of the lower abdomen was done by Surgical Oncology team and reconstruction of lower abdominal wall with pedicled ALT flap was done by our team [Figure 3].



Figure 3: a) Sarcoma lower abdomen, b) Post excision defect, c) Flap harvest, d) Flap inset, e) Graft loss at donor site, f) 9 months post-op.

#### 4. Knee defect:

30/M, with Post traumatic soft tissue defect Right knee with exposed patella was resurfaced with reverse ALT flap [Figure 4].



Figure 4: a) Knee defect, b) Flap marking, c) Flap harvest, d) Flap inset, e) 6 months follow-up.



Figure 5: a) Post excisional defect, b) Flap marking, c) Flap elevation, d) 1 month post-op.

## 5. Medial thigh Defect

23/M, left medial thigh soft tissue sarcoma, wide local excision done by general surgery team. Patient needed post operative Radiotherapy; hence pedicled ALT flap cover was done [Figure 5].

## RESULTS

Totally ten patients had undergone pedicled ALT flap for loco-regional soft tissue reconstruction. Out of them, 8 were male and 2 were female. The average age of the patients was 41 years. The average flap size was 18\*11 sq cm. ALT perforator supplying the flap was septocutaneous in 4 cases and musculocutaneous in 6 cases. The flap was used to cover defects in lower abdomen, groin, perineum, medial thigh and knee [Table 1]. The average follow up period was 1 year. All flaps survived and settled well. Graft loss at flap donor site was noted for a patient following pedicled ALT flap reconstruction for lower abdomen defect. Regrafting was done and it healed subsequently.

Table 1: Patient details

S. No	Age	Sex	Defect etiology	Defect site	Flap size (sq. cm)	Proximally/Distally Based Septocutaneous/ Musculocutaneous Perforator	Complications
1	40	M	Abdominal wall defect following necrotising fasciitis	Lower abdomen	20*12	Proximally based flap M/C Perforator	Nil
2	45	F	Carcinoma vulva post excisional defect	Perineum	14*12	Proximally based flap S/C Perforator	Nil
3	55	F	Sarcoma post excisional defect	Lower abdomen	22*14	Proximally based flap S/C Perforator	Graft loss at donor site
4	30	M	Post traumatic raw area	Right knee	16*10	Reverse ALT flap M/C Perforator	Nil
5	23	M	Sarcoma post excisional defect	Left medial thigh	20*12	Proximally based flap M/C Perforator	Nil
6	55	M	Penile Carcinoma	Groin	22*12	Proximally based flap S/C Perforator	Nil
7	40	M	Post infective raw area	Lower abdomen	18*10	Proximally based flap M/C Perforator	Nil
8	48	M	Post infective raw area	Groin	20*10	Proximally based flap M/C Perforator	Nil
9	33	M	Post traumatic raw area	Left knee	16*10	Reverse ALT flap M/C Perforator	Nil
10	42	M	Sarcoma post excisional defect	Medial thigh	18*8	Proximally based flap S/C Perforator	Nil

M/C - Musculocutaneous, S/C- Septocutaneous

## DISCUSSION

Following the introduction of free ALT flap for reconstruction of soft tissue defects, the pedicled ALT flap has gained increase in application. Kimata et al,<sup>[4]</sup> Lin et al,<sup>[5]</sup> and Friji et al,<sup>[6]</sup> reported their experience with pedicled ALT flaps for abdominal wall reconstruction. Wang et al,<sup>[7]</sup> used pedicled ALT flap for perineal reconstruction with good results.

Long arc of rotation allows the flap to reach supra patellar defects and sufficient to cover defects involving entire knee.<sup>[8,9]</sup> Distally based pedicled ALT flaps possess the risk of venous congestion due

to reverse flow but with venous supercharging to great saphenous vein, antegrade drainage is possible.<sup>[10]</sup>

It has the added advantage of not sacrificing any muscle, thereby reducing donor site morbidity.<sup>[11-13]</sup> Reconstruction of defects of perineum, lower abdominal wall and genital area poses a unique challenge to plastic surgeons as wounds in this area are often extensive (irradiated / contaminated). In our study we have used pedicled ALT flap cover for defects involving lower abdomen, perineum, groin, thigh and knee and found it to be reliable.

## CONCLUSION

Our experience with pedicled ALT flap illustrates the versatility of flap in terms of the distal reach, wide arc of rotation and diversity of defects that can be reconstructed using pedicled ALT flap without the need for microsurgical anastomosis. Reduced donor site morbidity and reliable vascularity are its added advantages.

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## REFERENCES

1. Steiner, S.A., Schweizer, R., Klein, H. et al. Abdominal, perineal, and genital soft tissue reconstruction with pedicled anterolateral thigh perforator flaps. *Eur J PlastSurg* 44, 669–677 (2021). <https://doi.org/10.1007/s00238-021-01830-4>
2. Gravvanis AI, Tsoutsos DA, Karakitsos D, et al. Application of the pedicled anterolateral thigh flap to defects from the pelvis to the knee. *Microsurgery* 2006; 26: 432–438. PMID: 16924632; DOI: 10.1002/micr.20267
3. Mishra JK, Sahu SA, De M, Saha A. Pedicled anterolateral thigh flap: A versatile flap for complex regional defect reconstruction. *GMS InterdiscipPlastReconstrSurg DGPW*. 2023 Jul 25;12: Doc04. doi: 10.3205/ipsr000174. PMID: 37577728; PMCID: PMC10413255.
4. Kimata, Yoshihiro M.D.; Uchiyama, Kiyotaka M.D.; Ebihara, Satoshi M.D.; Nakatsuka, Takashi M.D.; Harii, Kiyonori M.D... Anatomic Variations and Technical Problems of the Anterolateral Thigh Flap: A Report of 74 Cases. *Plastic and Reconstructive Surgery* 102(5):p 1517-1525, October 1998.
5. Lin, J., Wang, Z., Zhang, H. et al. Abdominal Wall Skin Loss Defects Reconstruction Using Pedicled Anterolateral Thigh Flap. *Indian J Surg* 85, 371–376 (2023). <https://doi.org/10.1007/s12262-022-03454-9>
6. Friji MT et al (2010) Pedicled anterolateral thigh flap: a versatile flap for difficult regional soft tissue reconstruction. *Ann PlastSurg* 64(4):458–461
7. Wang X et al (2006) Perineum reconstruction with pedicled anterolateral thigh fasciocutaneous flap. *Ann PlastSurg* 56(2):151–155
8. Bekarev M, Goch AM, Geller DS, Garfein ES. Distally based anterolateral thigh flap: an underutilized option for peri-patellar wound coverage. *Strategies Trauma Limb Reconstr*. 2018 Nov;13(3):151-162. doi: 10.1007/s11751-018-0319-9. Epub 2018 Oct 1. PMID: 30276606; PMCID: PMC6249144.
9. Madsen CB, Sørensen JA. Versatility of the pedicled anterolateral thigh flap for surgical reconstruction, a case series. *JPRAS Open*. 2020 Jun 13;25:52-61. doi: 10.1016/j.jpra.2020.05.002. Erratum in: *JPRAS Open*. 2021 Sep 24;30:180-181. PMID: 32642534; PMCID: PMC7334399.
10. Vijayasekaran A et al (2017) Maximizing the utility of the pedicled anterolateral thigh flap for locoregional reconstruction: technical pearls and pitfalls. *Clin PlastSurg* 44(2):371–384
11. Lin CT, Wang CH, Ou KW, et al. Clinical applications of the pedicled anterolateral thigh flap in reconstruction. *ANZ Journal of Surgery*. 2017; 87: 499-504. PMID: 25598019; DOI: 10.1111/ans.12973
12. Neligan PC, Lannon DA. Versatility of the pedicled anterolateral thigh flap. *Clin Plast Surg*. 2010 Oct;37(4):677-81, vii. doi: 10.1016/j.cps.2010.07.001. Epub 2010 Aug 4. PMID: 20816522.
13. Saint-Cyr M, Oni G, Lee M, Yi C, Colohan SM. Simple approach to harvest of the anterolateral thigh flap. *PlastReconstr Surg*. 2012 Jan;129(1):207-211. doi: 10.1097/PRS.0b013e318233ef4a. Erratum in: *PlastReconstr Surg*. 2012 May;129(5):1213. Colohan, Shannon M [corrected to Colohan, Shannon M]. PMID: 22186511.