

# Unusual Venous Drainage of A Reverse-Flow Anterolateral Thigh Flap: A Case Report

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## ABSTRACT

**Background:** The anterolateral thigh (ALT) flap is a versatile perforator flap. It can be used as a pedicled flap, a reverse flow flap or a free flap. However, thorough understanding of the anatomic variations of the vascular pedicle of this flap is important for successful flap elevation.

**Aim:** Presenting a case of unusual venous drainage of reverse-flow anterolateral thigh flap.

**Methods:** We report a case of reverse-flow (ALT) flap with anatomic variation of its venous outflow. During flap elevation, an anomalous vein was found in the intermuscular septum between the vastus lateralis and vastus intermedius muscles. Temporary occlusion of this vein resulted in intraoperative flap congestion. So, we decided to include this vein with the flap. The flap had two venous systems. The first venous system was the vena comitantes of the descending branch of the lateral circumflex femoral vessels and the second was the anomalous vein which emerged from the vastus intermedius muscle.

**Results:** Postoperative course was uneventful and the flap survived completely. We did not observe any flap congestion or flap arterial insufficiency. Complete wound healing was achieved in 3 weeks.

**Conclusions:** We conclude that this anomalous vein has a significant contribution to the venous outflow of this flap. Meticulous planning and intraoperative dissection is needed for successful elevation of ALT flap.

**Key Words:** Anterolateral Thigh – Knee – Quadriceps Tendon – Lateral circumflex femoral.

**Disclosure:** No conflict of interest.

## INTRODUCTION

The anterolateral thigh flap (ALT) is a working horse flap which are used extensively in soft tissue reconstruction [1-3]. It can be elevated as pedicled flap [2], free flap [5] or reverse-flow flap [6]. The reverse-flow (ALT) flap is used for reconstruction of knee and upper third tibia defects [7].

The (ALT) flap is nourished by perforating vessels from the descending branch from the lateral circumflex femoral vessels which are connected with the profunda femoral artery or the lateral superior genicular artery at the level of 3-10cm proximal to knee joint [8]. This connection allows elevation of the ALT flap as a reverse-flow (ALT) flap [9].

## CASE REPORT

We present a case of 14 years old male patient who suffered from high voltage electrical burn injury which resulted in skin loss of the anterior aspect of knee joint with exposure of the quadriceps tendon. The reverse-flow (ALT) flap was used for reconstruction of such defect. During flap elevation, we found a musculocutaneous perforator from the descending branch from the lateral circumflex femoral vessels in the intermuscular septum between the vastus lateralis and rectus femoris muscles. Also, an anomalous vein was found emerging from the substance of vastus intermedius muscle at the level of 10cm proximal to the knee joint, ascended in the septum and drained in the descending branch from the lateral circumflex femoral vena comitantes proximal to the skin perforator to lateral thigh skin Fig. (1).

Before ligation of the descending branch of the lateral circumflex femoral vessels, we applied non-traumatic microvascular clamp to this anomalous vein and we noticed venous congestion of the skin paddle of our flap. So, we decided to ligate the proximal end of our pedicle at the level proximal to origin of this vein and of 2 venous systems were included to drain our flap. The first venous system was the vena comitantes of the descending branch of the lateral circumflex femoral vessels and the second was the anomalous vein which emerged from the vastus intermedius muscle.

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Postoperative course was uneventful and we did not observe any flap congestion or flap arterial insufficiency. Long term follow-up showed complete flap survival and normal range of motion of the knee joint Fig. (2).

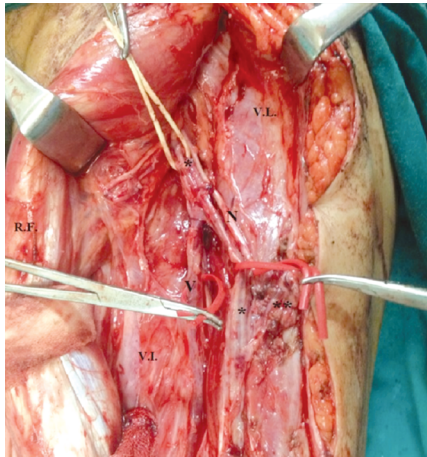


Fig. (1): Intraoperative view of the case.

\*: Descending branch of lateral circumflex femoral vessels.  
 \*\*: Musculocutaneous perforator of the descending branch of lateral circumflex femoral vessels. N: Motor nerve to the Vastus lateralis muscle. V: Anomalous vein. R.F.: Rectus Femoris. V.L.: Vastus lateralis. V.I.: Vastus Intermedius.

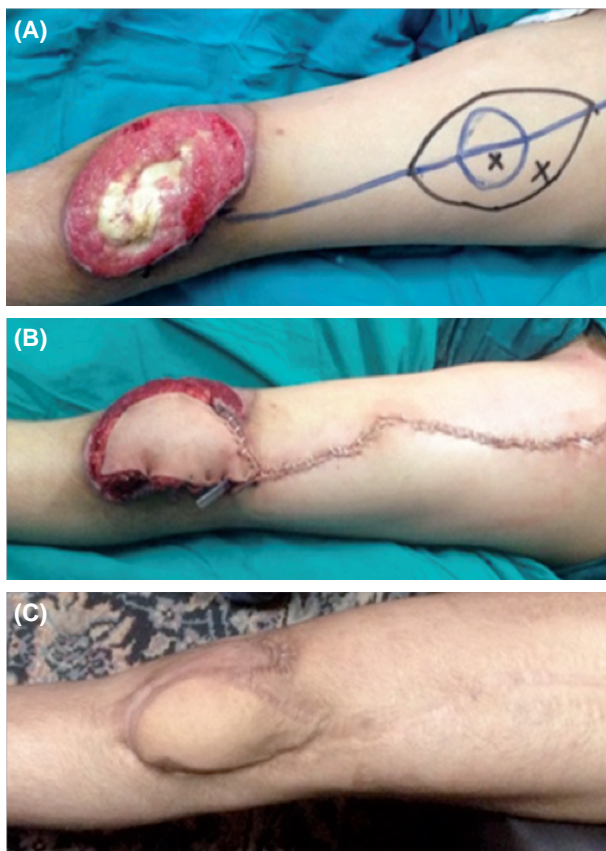


Fig. (2): (A): Preoperative view and flap marking. (B): Immediate intraoperative view after flap inset and primary closure of the donor site. (C): 2 years postoperative view.

We think that this anomalous vein has a significant contribution to the venous drainage of the reverse-flow (ALT) flap and its inclusion with the flap pedicle prevented our flap from venous congestion.

## DISCUSSION

Reconstruction of soft tissue defects around the knee joint is a difficult task due to limited available local flaps, ease of tendon or bone exposure, possibility of neurovascular structures exposure and possibility of bone hardware exposure [10].

Reconstructive options are variable. Local rotation or advancement flaps offer very limited tissues for coverage of extensive defects. Pedicled fascio-cutaneous flaps including sural flap, saphenous flap or lateral genicular artery flap resulted in sensory disturbances in the lower limb with limited soft tissue coverage. Muscular flaps including gastrocnemius and soleus muscles flaps are too bulky with functional motor disturbances and poor cosmetic appearance [11]. Even free flap coverage of the knee joint is very difficult task due to limitation of good superficial recipient vessels and very difficult vascular anastomosis with deep major vascular structures [12].

Reverse flow ALT flap has the advantages of having a long pedicle that allow tension free reach to the knee region, possibility of having a very large flap, minimal donor site morbidity and availability of the tensor fascia lata for reconstruction of the quadriceps muscle tendon [13].

However, Variations in the ALT flap vascular pedicle were reported and discussed. Meticulous planning and intraoperative dissection is needed for successful flap elevation [14].

We found an anomalous vein in this case who share in the vascular outflow of such reverse flow flap. The inclusion of this vein with our flap allowed us to prevent venous congestion in the postoperative course of this flap.

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