Abstract:
Defects over the anterior aspect of knee joint are usually covered by medial gastrocnemius myocutaneous flap, vastus medialis muscle flap or free flap. We are presenting a pedicled distally based Anterolateral Thigh flap used for covering a defect over the anterior aspect of the knee joint. The flap is based on the perforator from superior lateral genicular artery anastomosing with the descending branch of the lateral circumflex femoral artery. It is harvested from the proximally based anterolateral thigh flap territory from the anterior and lateral aspect of the thigh. In our case, the defect was over the whole of the anterior aspect of the right knee joint with fracture but intact patella and exposing the implants used for patella fracture fixation. It was a single stage procedure. Patient had comfortable postoperative period, flap healed well and donor site was acceptable. Pedicled distally based islanded anterolateral thigh flap is a reliable fasciocutaneous flap for covering the defect over anterior knee joint region.

Keyword: Distally based Anterolateral thigh flap, perforator,

INTRODUCTION:
Soft-tissue defects in the knee region are usually complex and have traditionally been reconstructed with pedicled flaps, such as the gastrocnemius flap. However, this is not always feasible. Recently, the reverse-flow (distally based) anterolateral thigh flap has been used for soft tissue reconstruction around the knee, and it has several advantages such as a long pedicle, a sufficient amount of tissue, possible composite transfer with fascia lata and minimal donor site morbidity.

MATERIALS AND METHODS:
A 32 year old male patient who sustained right patella fracture, was operated for the same by the orthopaedic surgeon with tension band wiring and k-wires, presented with defect over anterior aspect of right knee joint region measuring 14 cm.
horizontally and 11 cm vertically with fractured but intact patella and exposed implants used for fracture patella fixation. Distally based anterolateral thigh flap was used to cover the defect, except for a small noncritical raw area over the lateral most part of the defect which was covered with split skin grafting. Flap was observed for flap ischaemia and venous congestion. Patient was followed up for a period of one month for any complications.

**VASCULAR ANATOMY:**

The blood supply of this reversed island flap, is based on the perforator from superior lateral genicular artery anastomosing with the descending branch of the lateral circumflex femoral artery. The superior lateral genicular artery takes part in the anastomosis around the knee joint region and the flap is perfused by the retrograde flow through this vessel after ligation of the descending branch of the lateral circumflex femoral artery at the superior end of the flap while elevating. The retrograde flow from superior lateral genicular artery should be safely maintained by careful dissection within 10 cm above the knee. It may be a septocutaneous perforator, otherwise a 0.5 cm cuff of vastus lateralis muscle is included with the intramuscular pedicle. The venous drainage is by concomitant veins.

**PIVOT POINT:**

The pivot point, located at the distal portion of the vastus lateralis muscle, ranges from 3 to 10 cm above the knee joint.

**OPERATIVE TECHNIQUE:**

The perforators were detected with a hand held Doppler probe preoperatively. Planning in reverse was done to calculate the dimension of the flap.

**DESIGN OF THE FLAP:**

First, a line is drawn on the donor thigh between the anterior superior iliac spine and the lateral border of the patella. A circle is drawn around the midpoint of this line with 3 cm diameter. Then, the exit point of the cutaneous perforator is identified at the inferior lateral quadrant of this circle, with a Doppler flowmeter. Finally, the flap is marked over the skin on the surface of the donor thigh with a previously prepared pattern of the recipient defect and centering the perforator marking.

**ELEVATION AND INSET OF THE FLAP:**

The anterior incision is made first up to the fascia, the intermuscular septum between the rectus femoris and the vastus lateralis.
The descending branch of the Lateral circumflex femoral artery (LCFA) is identified in this intermuscular space. After identifying the septocutaneous branch in the intermuscular septum or the myocutaneous perforator of the descending branch of the LCFA on the surface of the vastus lateralis muscle, the vascular pedicle of the thigh flap is dissected in this space along the perforator raised from the descending branch of LCFA. The upper end of the vascular pedicle (the crossing point of the descending branch and the transverse branch of the LCFA) can be temporarily clamped with microvascular clamps to determine inflow dominance through the superior lateral genicular artery. When divided, active bleeding can be confirmed in the cut end of the pedicle and the blood supply of the thigh flap should be good. The motor nerve to the muscle accompanying with the descending branch of the LCFA should be preserved in the surgical procedure. The skin incision is completed up to fascia deep all around except over the inferior border of the flap, where it is stopped at subdermal level. A subcutaneous strip ranging from the inferior border of flap end to the upper end of the knee defect is preserved as it was associated with the absence of venous congestion and hence the same preserved by elevating a subdermal flap in the skin bridge. The flap is rotated to 180 degrees to give inset into the defect. The donor defect can be closed primarily if up to 8 cm width or covered with split skin graft if more than 8 cm.

CASE SUMMARY:
A 32 year old male patient who met with road traffic accident sustained injury to right patella. He underwent open reduction and internal fixation of patella fracture by Orthopaedic surgeon. Subsequently he developed wound infection and developed raw area over right knee joint region exposing the implants and referred to us for skin cover. The defect was of size 14 cm horizontally and 11 cm vertically of which 3x5 cm defect over lateral most part of the knee joint was non critical raw area. (Fig-2)
Flap pedicle was identified and it was septocutaneous in this case. After isolating, the superior end of the pedicle was clamped with microvascular clamps, flap perfusion checked and was found to be satisfactory. (Fig-5)

Then the superior end of the pedicle was divided, retrograde blood flow through the pedicle is confirmed(Fig-6).

Flap elevation was completed all around except over the inferior end, where cutaneous flap was elevated leaving the subcutaneous tissue and fascia attached to the inferior end of the flap and to the superior end of the knee defect. (Fig-7)

Flap was rotated to 180 degrees and inset into the defect with drain tube kept under the flap and donor area. The non critical raw area and donor site was covered with split skin graft from left thigh. Wound dressing done. (Fig-8)

**RESULT:**
Postoperatively there was no venous congestion, flap ischaemia or infection. There was flap edema initially but it settled with lowering the foot end of the patient below the level of the heart over a period of 4 days. (Fig-9) Wound healed well. Sutures were removed after 3 weeks. Donor site healed without any complications. (Fig-10),(Fig-11)

DISCUSSION:
Distally based anterolateral thigh flap is a large, thin, reliable flap done in a single stage. Muscle need not be sacrificed and donor site morbidity is not significant. Does not need any special and uncomfortable positioning during postoperative period. The learning curve is less and does not need any expertise as for free flap and need only a magnifying loupe for perforator identification. However, venous congestion seems to be the major reason of its unpopularity.

The simple procedure of preserving a strip of subcutaneous tissue in between the flap and defect allows the venous drainage to remain physiological and obviates the risk of venous congestion in a reverse-flow ALT flap.

CONCLUSION:
Despite a variable vascular anatomy that can be challenging for the surgeon, reverse-flow anterolateral thigh perforator flap is a safe and reliable method for reconstruction of the defects around the knee and even the upper third of the leg. Even in complex knee defect with loss of the patella tendon, this flap can provide an ample skin paddle with underlying fascia lata for one-stage reconstruction.

REFERENCES:


