



Tailoring of ALT Flap for Optimizing Donor Site Morbidity

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Abstract

Wide and irregular-shaped defects at the lower trunk region are not uncommon following wide local excision of tumors. Pedicled anterolateral thigh (ALT) perforator flap has been the workhorse for these types of defects. But, in most of the cases flap donor sites cannot be closed primarily due to wide and irregular-shaped flap requirement. We propose a method of harvesting ALT flap in elliptical shape, dividing it into two or more geometrically predesigned islands based on perforators and rearranging them to fit into the defect, and thus achieving primary closure of the flap donor site.

Keywords

- ▶ split ALT
- ▶ donor site
- ▶ trunk reconstruction

Introduction

Anterolateral thigh (ALT) perforator flap is one of the most utilized flaps by modern day plastic surgeons. Its reliability and ability to incorporate large amount of tissue in the flap makes it the flap of choice for reconstruction of almost all areas of human body. Though it is desirable to close the flap donor site primarily, it becomes difficult when flap width exceeds 7.5 to 8 cm. In this case we used a technique wherein a 16 × 14 cm² defect was covered and primary closure of the donor site was achieved. The elliptical-shaped flap was geometrically split into two triangles based on perforators to fit into the round defect.

Case Report

A 65-year-old gentleman presented with a recurrent soft tissue sarcoma (previously operated and radiated) at the lateral gluteal and trochanteric region. After evaluation and discussion in multidisciplinary team, he was taken up for surgery. Wide local excision of the tumor resulted in an oblong defect of 16 × 14 cm² after closing approximately 4 cm primarily (▶ **Fig. 1**). An ALT perforator flap from the

ipsilateral thigh was planned for coverage. Generally, harvesting a flap of 14 cm width would leave a large donor area not amenable for primary closure. We divided the rounded defect into two isosceles triangles (each with height equaling half of defect width) and the flap length was calculated by placing the triangles side by side in the thigh (▶ **Figs. 2 and 3**).

Perforators were marked by handheld Doppler. An elliptical flap measuring 25 cm × 7 cm² was harvested. It was supplied by one septocutaneous (proximal) and one musculocutaneous (distal) perforator at 10 and 19 cm distance, respectively, from the lateral circumflex femoral artery (LCFA) origin. Both the perforators were dissected till its origin from the main pedicle. A cuff of muscle (vastus lateralis) was taken with the musculocutaneous perforator. Flap pedicle was dissected till origin of LCFA following which the flap was delivered to the defect through a generous subcutaneous tunnel. After confirming comfortable pedicle lie and hemostasis, the flap was divided into two islands with nearly triangular shapes as previously planned (▶ **Fig. 4**). Subcutaneous tissue, fascia, and some muscle fibers were divided in the same line to provide adequate mobility to the islands and they were rearranged to cover the defect (▶ **Fig. 5**). Inset was completed in two layers, over a 16 Fr

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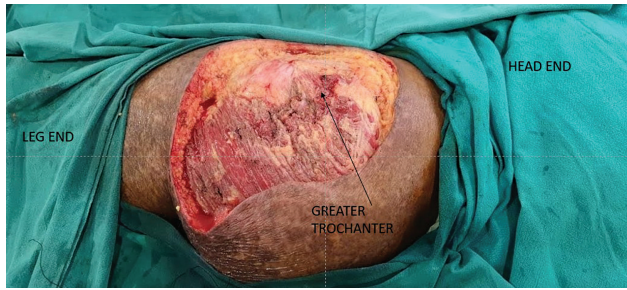


Fig. 1 Defect after wide local excision (anatomical landmarks marked).

suction drain. Donor thigh was closed primarily (►**Fig. 6**). Flap survived completely. Sutures were removed gradually from 3 weeks onwards (►**Fig. 7**). Donor area also healed without any complication. Patient was allowed gradual ambulation after 3 weeks. After 1 year of follow-up post-radiation the patient is doing well.

Discussion

After initial description of anatomy by Song et al¹ in 1984, ALT perforator flap has been used as a workhorse flap by most of modern day plastic surgeons. Being a very reliable

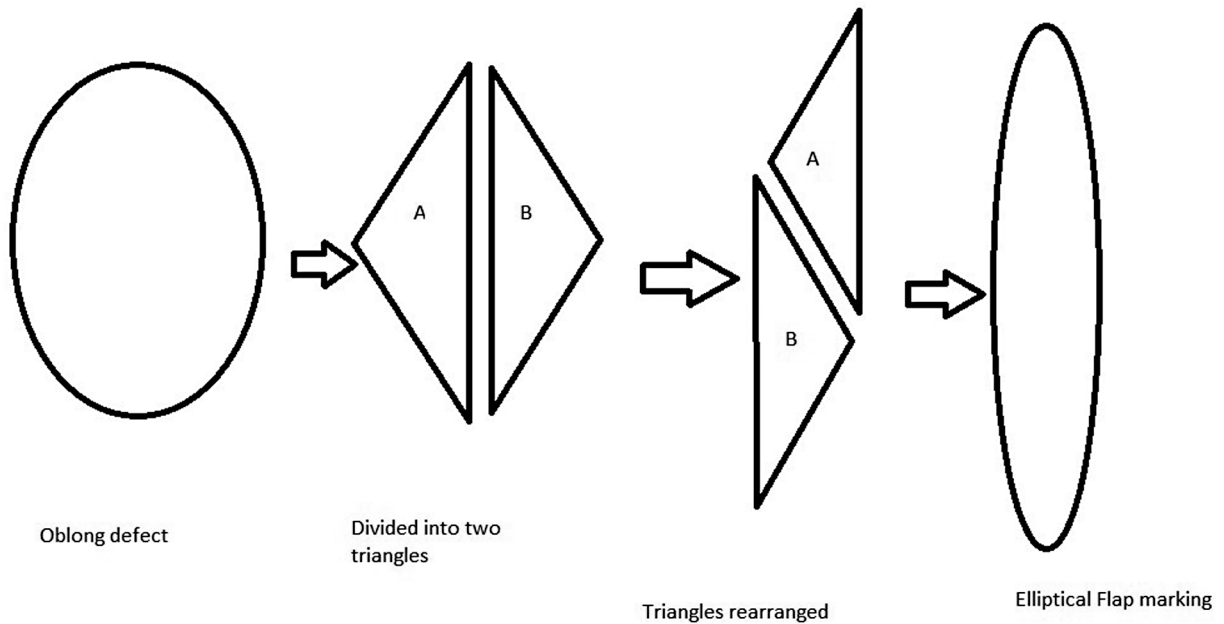


Fig. 2 Principle of planning an elliptical flap for an oblong defect (by rearranging two triangles).

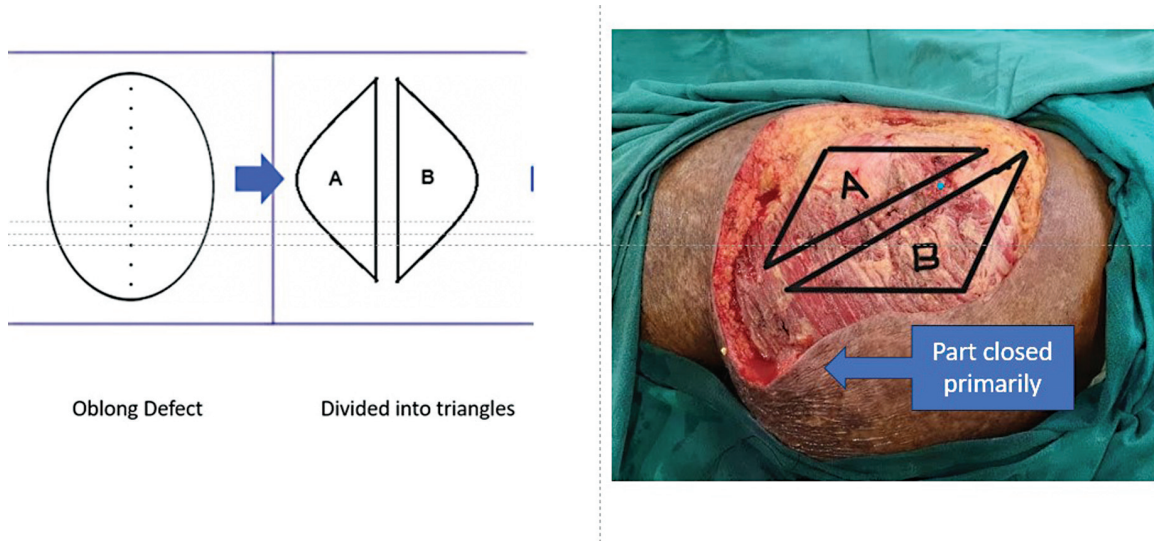


Fig. 3 Defect divided into two triangles A and B.



Fig. 4 Flap divided into two islands A and B with nearly triangular shape.

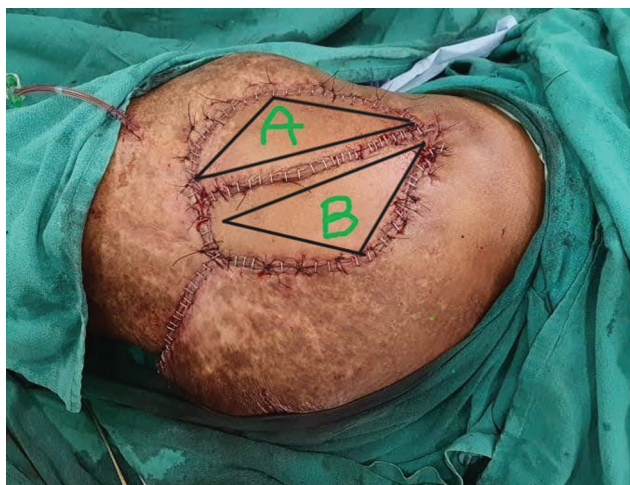


Fig. 5 Final inset of the flap showing triangles A and B.

and versatile flap, this flap is used to cover defects in the head and neck, trunk, and extremity reconstruction frequently. Though the flap donor site is frequently closed primarily, it is difficult whenever a flap wider than 6 to 9 cm is planned. Boca et al² suggested that a flap width to thigh circumference ratio should be less than or equal to 16% for achieving primary donor site closure. However, it also depends on the patient's body mass index, age, and sex. Failure to achieve primary closure of donor site adds greatly to morbidity both in terms of functional and aesthetic outcome. Kimata et al³ reported that patients who underwent primary donor site closure could perform activities of daily life normally; 87.5% of patients were satisfied with their donor site aesthetic results and only 3.1% had limited range of motion at the hip and knee. Whereas limited range of motion at the hip and knee was found in 60% of patients where donor site was skin grafted.³ Mureau et al reported cold intolerance to be more common in skin grafted patients.⁴ In summary, achieving



Fig. 6 Donor thigh closure.

primary closure avoids a lot of donor site morbidity in these patients.

To achieve this even on the face of wide defects, many authors have planned to split the flap on its perforators. Initial description is found in sporadic cases where such technique was used to cover rectangular and oval defects.^{5,6} Zhang et al⁷ in 2016 have described the so-called “kiss”



Fig. 7 Postoperative picture (2 months) showing healthy, settled flap.

technique to harvest multiple skin paddles (smaller than those harvested with traditional techniques), and then rearrange them side-by-side at the recipient site to exactly match the size of a large defect. Xiong et al⁸ have used this technique for reconstructing a large oncological scalp defect. Chang et al⁹ in their case series have described 31 such cases from 2002 to 2010 which includes triangular-, arrow-, and hourglass-shaped defects. Scaglioni et al¹⁰ reported a case of split ALT flap covering a 16-cm wide defect in upper posterior thigh in 2018. We have also used similar principle in our case, wherein an oblong-shaped defect has been simulated as two triangular defects and covered by splitting the ALT flap on two perforators, achieving primary closure of the donor thigh (►Fig. 6). The key points to be concerned are the presence, location, and size of the perforators which are of utmost importance for execution of this plan.

Conclusion

ALT flap is a versatile flap able to cover all types of defects. If properly planned, even large round or oblong defects can be covered with elliptical flap and donor site morbidity can be significantly reduced by closing it primarily.

Conflict of Interest

None declared.

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