NEW DESIGN FOR A TRANSPOSITION FLAP

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Transposition flap is a versatile local flap used for covering full thickness skin defects and exposed vital structures in various regions of the body. The classical design (Mcgregor 1972) works satisfactorily in areas where skin is elastic, extensible and sufficiently mobile, but presents problems where skin is ralatively in-elastic; less extensible and less mobile e.g. scalp. In latter site skin folds or prominent dog ears result at the point of closing of the apex of the defect and base of the flap, besides increased tension at certain points along the suture line. The skin folds enclose a potential space for haematoma collection and infection and require secondary procedures. In addition they are unsightly when situated over exposed areas and may cause inconvenience during combing & weight bearing.

In the classical design (figure 1) (1) when flap is transposed and point A moves to B with E as pivot, the triangular piece of skin EAD has to adjust to or be accommodated in the space EBD during suturing. In the scalp where skin is inelastic and less mobile, the proximal part of flap close to base DE is thrown into a fold. The skin fold/dog ear is most prominent at D and becomes less at E, (2) the dotted area ABF of the normal skin is now overlaped by the flap and needs to be excised for approximation of skin edges.

(3) The design requires EA to be equal to EB and to achieve this the DF has to be elongated to DA so much so that the inequality between DA and DB becomes pronounced and consequently when A is sutured to B after transpoing the flap, a longer skin edge DA is to be accommodated and sutured to smaller DB thus contributing to prominent skin fold at D.

(4) EN (where N is any point on the iine AC but closer to A) cannot be equal EA (diagonal of a square) so after transposition with E as fixed point (pivot). EN will be seen to fall short of EA being smaller and so N can only be approximated to A under increased tension, along EN which may interfere with vascular supply to the part of flap AEC. Taking this into consideration we have been following a different design.

Proposed Technique : (Figures 2-3)

1. First triangulate the defect into ABC, which is isosceles to begin with.
2. At A draw AD at right angle to BA which meets BC, when extended at D.
3. At D draw DE at 90° angle to DA. DE is generally bigger than AB, length varying with the location of the flap and the availability of the skin.

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4. With E as the centre and EA as the radius draw an arc AFN. N lies where line EN duawn parallel to DB cuts the arc AFN and F lies where DB when advanced cuts the arc AFN. Now flap DENF is marked with base DE.

When the flap is moved to cover the defect ABC with E as pivot point, F will approximate to A and N will approximate to any point on AFN without tension. DF will be sutured to DA. As triangular pieces of skin ABF and ADC are likely to be overlaped by the transopsed flap these will have to be excised, so that while designing the transposition flap these should be excised thus creating a much larger triangular defect. As the defference in length of DF & DA is small, and the closing angle ADF is narrow the skin deformations at D (folds, CONES) will not be marked (Limberg 1966). These can be futher minimised or eliminated by under mining beyond DE, so that skin elasticity and mobility takes up minor slackness of DF and gets adjusted. This design works well in scalp with relatively fixed and inelastic skin.

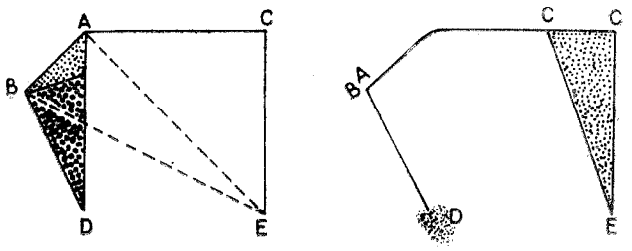
In sites where the skin is elastic and extensible as on face, neck and underming beyond DE can be safely undertaken and skin made freely mobile, the above design can be simplified further.

Simplified Design (Figures 4-5)

First triangulate the defect to ABC and next draw AD perpendicular to AB and DE perpendecular to DA. DE is generally winder than AB. the width depending on skin availability. Draw EN parallel to DE and extend AB to meet EN at N. The transposition flap thus marked is DENB. When raising the flap undermining is done beyond DE to make skin around it mobile. When flap is transposed B meets A. As EB is slightly smaller than EA undermining around E allows shift of E upwards so that B can be sutured to A and EN can be sutured to EB. DB is slightly bigger than DA and when DB is sutured to DA, point D shifts down and slight laxity of DB gets adjusted. As the closing angle ADB is small the deformation of skin round D is minimal (Limberg 1966). In this case the pivot poin" is some where between E and D but nearer E and at or below point L.

The proposed transposition flap differs from classical design in following ways:—

1. The triangulated defect is larger and is in the nature of a right angle triangle.
2. The transposition flap is designed along the hypertenuse of the right angle triangle.
3. The transposed flap is more like a parallelogram and not rectangular or square.
4. It requires additional undermining beyond and around the base of the designed flap.



CLASSICAL DESIGN

Fig. 1 Illustrating classical design of a transposition flap.

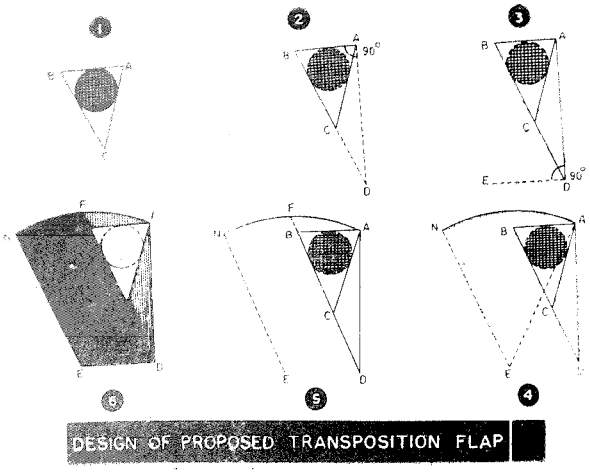


Fig. 2 Illustrating design of the proposed transposition flap.

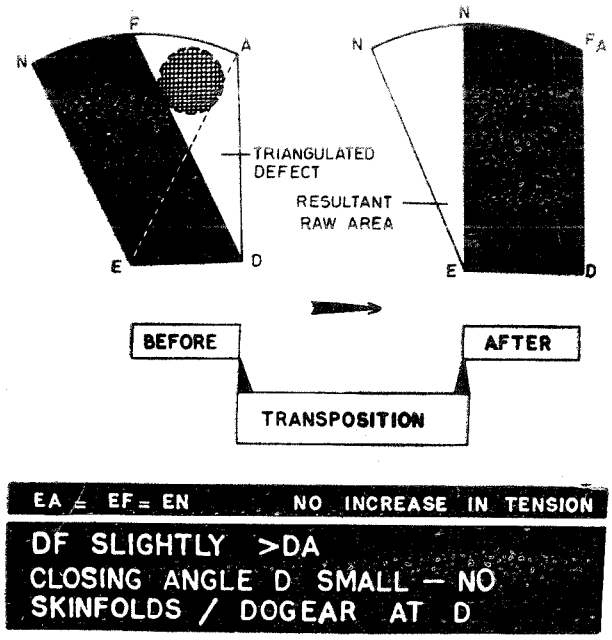
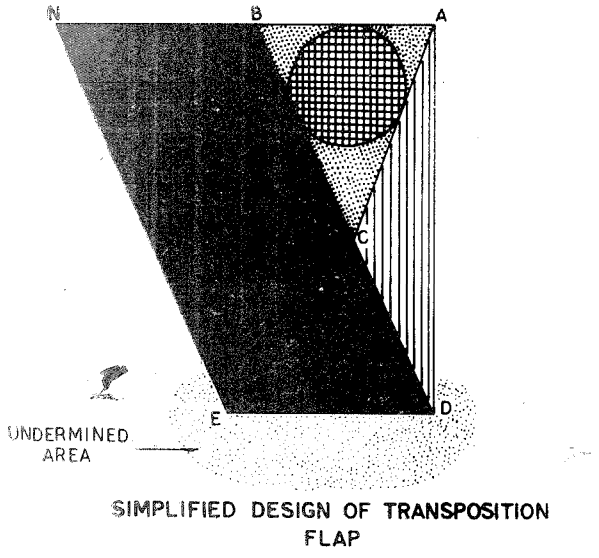


Fig. 3 Illustrating design of transposition flap before and after transposition.



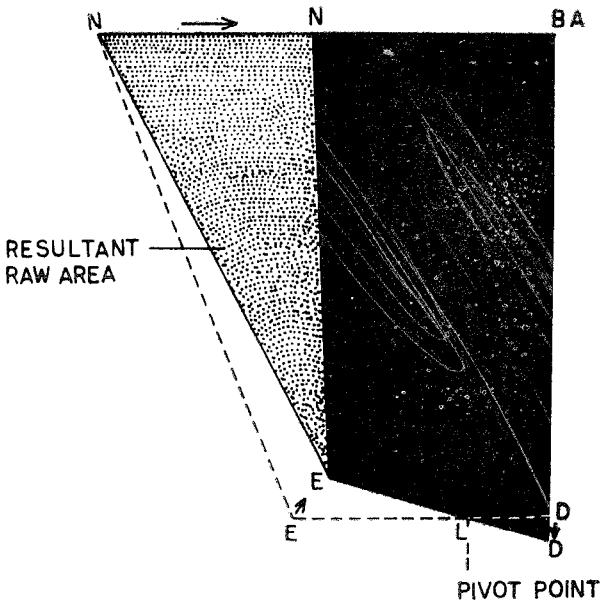


Fig. 4-5 Illustrating simplified design of a transposition flap before and after transposition

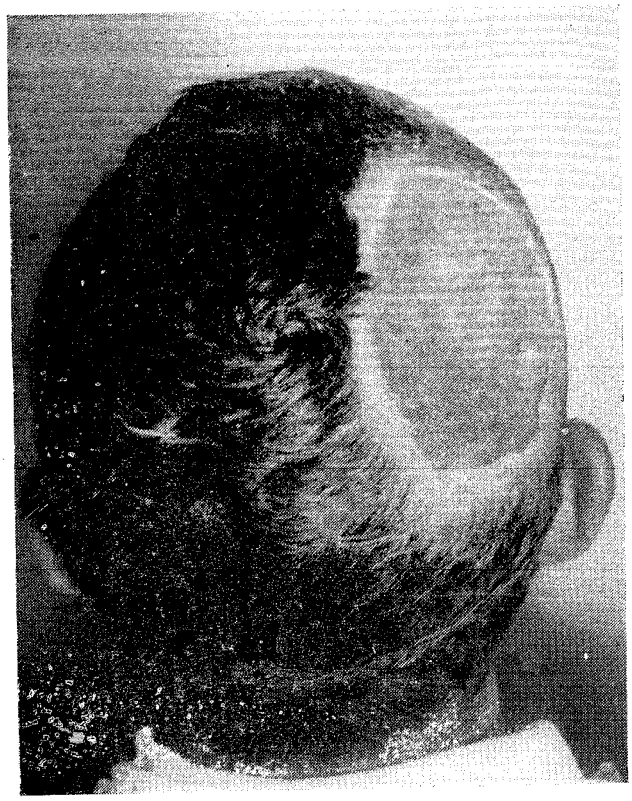


Fig. 6

Fig. 7

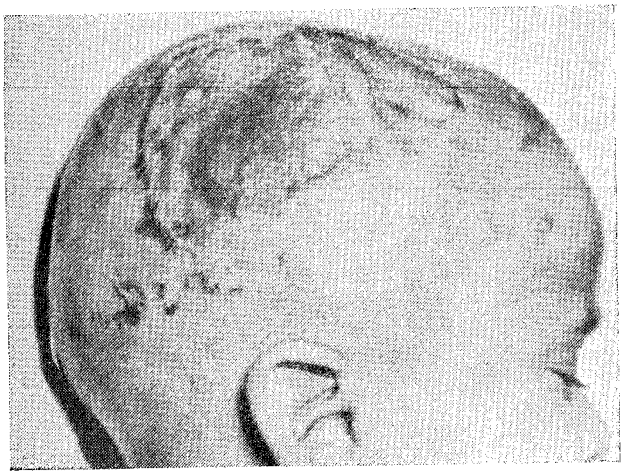


Fig. 8

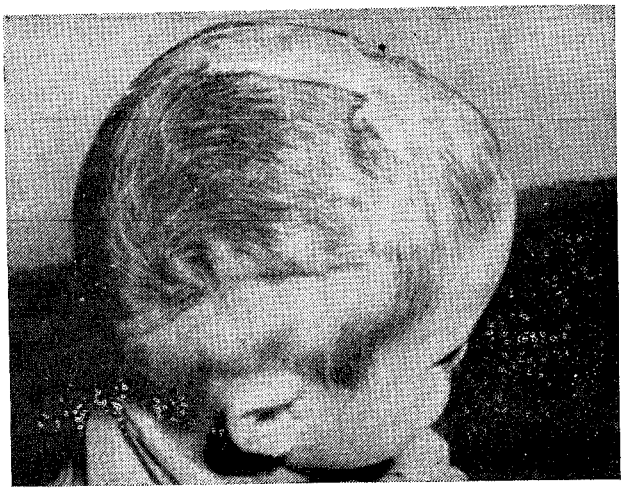


Fig. 9

Fig. 6, 7, 8, 9 Illustrating repair of scalp defects by using transposition flaps described. The closure achieved was tension free and without skin folds along base of flap.

Comments :

Transposition flaps designed thus have been used in patients having defects in scalp following excisions for malignancy, scarp avulsions, and electrical burns. In all these tension free, accurate skin closure without skin folds or dog ears around the base was achieved (Fig. 6--9) avoiding any haematoma collection and infection. This has proved to be a safer design especially suited to scalp where skin is relatively inelastic and less extensible.

Bibliography :

1. McGregor, I. A. : The transposed flap, in "Fundamental Techniques of Plastic Surgery" London, Churchill Livingstone pp 124; 1972.

2. Limberg, A. A. : Design of local flaps in "Modern Trends in Plastic Surgery" Edited by Thomas Gibson, London, Butterworthe, pp 38—61; 1966.