

USE OF THIN FLAP IN RECONSTRUCTIVE SURGERY

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The present day position of the skin flap has crossed the long way during its evolution from pocket flap to tube flap and ultimately open flap. But after traversing this long run the girth or bulkiness of the flap is still a problem specially for covering the areas like face, hand and fingers.

Many methods have been modified progressively by many authors (Colsom et al, 1967; Kelleher et al, 1970; McGregor, 1979) to make a flap thin which also require subsequent stages and are not free from complications.

The present day concept of blood supply to the skin has changed planning of flap to a great extent. The blood supply of the skin is dependent upon the dermal and subdermal plexus of arteries and veins, not upon the bulk of subcutaneous fat. (Daniel, & William, 1973).

With this concept a flap can be planned and made thin or defatted to the level of subdermal plexus. It is this network of vessels which is the life line of the pedicle flap and not the occasional deep perforating

vessels coursing through the entire thickness of the subcutaneous fat. Over and above the subdermal plexus of vessels send branches to the subcutaneous fatty tissue and divert good amount of blood to subcutaneous tissue and thus deprive the skin. Excess fat in a flap increases circulatory demand of the pedicle. So if subcutaneous tissue is divided just under the subdermal plexus then whole blood will be diverted to the skin. (Daniel and William, 1973, Colsom et al, 1967) have used thin flap for reparative hand surgery but his work did not receive the attention it deserved. Thomas in 1980, used radically thinned flap for covering raw area of hands, thumb and for resurfacing neck contracture. The work of the present paper is based on use of radical thin flap in reconstructive surgery.

MATERIAL AND METHOD

The study includes analysis and report of 25 cases dealt by thin flap during last 3 years period from 29-9-80 to 31-12-83, having defects at the different areas of the body shown in Table-1.

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Table—I

The different areas of defects covered by thin flap.

Areas of the body covered by thin flap	No. of Cases	Type of flap used
Elbow Region		
Front	3	Random—4
Back	1	
Forearm and Wrist	5	Random—3 Bipedicle—2
Hand: Front	4	Axial—3
Back	4	Random—5
Fingers	5	Random—5
Lower Leg	1	Random—1
Neck	1	Random with delay—1
Face	1	Tubed—1
Total	25	25

Out of 25, in three cases the flaps were taken from axial supply area and in 22 cases the flaps were taken from random supply area. The length to breadth ratio was 1 : 1 for random flap and 1 : 5 : 1 to 2 : 1 for axial flap. The table II showing the range of length to breadth ratio used for thin flap.

Table—II

The range of length to breadth ratio used.

Type of flap used	No. of cases	Percentage	Range of length to breadth ratio
Axial	3	12	1.5 : 1-2 : 1
Bipedicle	2	8	1.5 : 1.1 : 1
Random with Delay	1	4	1 : 1 : 7
Random	19	76	1 : 1 - 1.5 : 1
Total	25	100	

The recipient area was prepared first by excising dead, devitalised and scar tissue. After excision the measurement of the defect was taken by a tape and flap was planned on suitable donor site according to the size of the defect, keeping in mind the length to breadth ratio of thin flap. After planning, the incision was made and flap raised by sharp dissection at subdermal level, keeping a thin layer of fat only to protect the subdermal plexus of vessels. (Fig. 1) The flap was made so thin that it become translucent to light. (Fig. 2) The flap was handled very carefully and gently, as little mishandling can damage the subdermal plexus and can invite infection producing flap necrosis. Proper haemostasis was secured. The donor site was covered by split thickness skin graft and tie over dressing was applied. Then the thin flap was draped over recipient raw area and fixed by interrupted stitches of fine silk (3° — 4°). Care was taken so that, there was no tension, kink or pressure (at the base of the flap). After three weeks the flap was detached from donor site and final attachment was completed.

The raw area of degloved right forearm following an automobile accident was covered by the biggest flap having 14 cm. breadth and 7 cm. length. A case of giant hairy nevus occupying the left half of face was excised and covered by thin tube flap from left arm (Fig. 3 & 4). Another cases of post burn neck contracture was treated by thin open jump flap from abdomen.

RESULT

Analysis of the results are shown in Table-III. Out of 25 cases, total flap

survival were in 13 cases i.e. 52%. In 7 cases i.e. 28% there were marginal flap necrosis, amongst which only 3 cases required secondary skin grafting and in 4 cases the loss was so minimal that it did not require any secondary procedure. In 5 cases i.e. 20% there were epidermal loss, only at the margin which also did not require any secondary skin grafting.

Table III
Analysis of Results in 49 Cases

Type of flap used	No. of cases	No. & % of cases with marginal flap necrosis	No. & % of cases epidermal loss only
Axial	3
Bipedicle	2
Random and Delay	1
Random	19	7(28.1)	5(20%)
Total	25	7	..

The three cases, which required secondary skin grafting, were of larger flaps where length to breadth ratio of the thin flap could not be maintained due to the size of the defect. The cases where marginal flap necrosis were noticed were complicated by post operative wound infection and they did not maintain the position of proper lie which lead to tension and kink at the base of the flap. Above all, the smaller flaps behaved in a better way than the larger flaps and were uncomplicated. The incidence of flap necrosis was not seen in axial, bipedicle and delayed flaps. It has also been observed that, thin flap matched well with the contour of the body anatomically aesthetically and functionally it works better than other flaps.

DISCUSSION

The undesirable aspect of thick flap is well known in plastic surgery. Many methods are in use to make a flap thin, which includes (a) raising a thick flap and thinning done subsequently, (b) transferring skin on crane principle (c) raising skin flaps from areas where subcutaneous fat is less and lastly (d) raising thin flap at subdermal level (Thomas, 1980). This thin flap at subdermal level is easy to transfer and free from trouble at the final site of attachment.

It is evident from the present work that in making a thin flap the length to breadth ratio is an important factor. If source of blood supply is good as in axial flap, then length to breadth ratio can be increased to 1.5:1, or 2:1. In random thin flap the length to breadth ratio is limited to 1:2 which is just reverse that of a thick flap. The blood supply of the skin does not depend upon subcutaneous fat. The subcutaneous fat in thick flap acts as splintage to the flap and thus protect the subdermal plexus from injury, kink, tension or pressure. This splintage effect is lacking in thin flap, making the flap vulnerable to kink or pressure. This may be the cause behind the reversed of length to breadth ratio in a thin flap compared to thick flap.

In spite of maintaining the limited ratio of length to breadth in thin flap, there was peripheral flap necrosis in 7 cases. The probable cause behind it in our opinion is that, a thin flap contains a very thin layer of fat to protect only the subdermal vessels, which does not carry large collecting veins for venous drainage, leading to venous stasis in the flap

tissue anoxia and ultimately flap necrosis at the peripheral part. The flap necrosis was seen only in random thin flap, not in axial, bipedicle or delayed flaps. The cause may be the lack of arterial perfusion pressure. In a thin flap little pressure, kink or mishandling produces obstruction to the flow of circulation and thus reduces perfusion pressure and can produce flap necrosis at periphery. So it is important to plan a thin flap from areas where arterial perfusion pressure is good. It is important to keep in mind that the base of axial thin flap must be made thicker than the periphery to include the axial flaps, the base of the flaps were made thicker.

In our experience the aesthetic value of thin flap is much superior for covering areas like hand, face and finger. We have seen by using thin flap in the case of a giant hairy nevus over face which matched beautifully with the contour of the face without producing any bulkiness or asymetry compared to opposite side. The same was true in treating the case of contracture at the wrist and covering raw area of electrical injury at the web space.

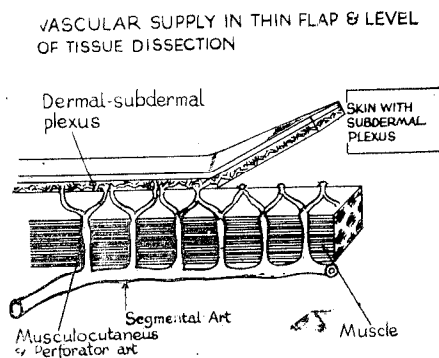


Fig. 1. Level of tissue dissection.

The return of sensation in thin flap is much quicker than thick flap. In most of the cases sensation returned within one year of operation.

CONCLUSIONS

The aesthetic and functional result of a thin flap is much superior than thick flap for reconstruction of hand, finger and face.

The length to breadth ratio in a thin flap should be maintained to 1 : 2 for random flap and 1.5 : 1 to 2 : 1 for axial flap.

Smaller the flap better is the result, bigger flap are prone to marginal necrosis.

The arterial perfusion pressure is also important alongwith length to breadth ratio in planning a thin flap.

Return of sensation is much quicker than thick flap.

SUMMARY

Method of planning and dissection of radically thin flap is described, and was utilised to cover the different areas of the body in 25 caases. Their results are analysed.

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Fig. 2. Thin flap elevated.



Fig. 3. Giant hairy nevus of left half of face.



Fig. 4. Post operative photograph of thin flap cover over left side of face.

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