

## Role of Groin Flap in Acute Hand Injuries

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**A**CUTE hand injuries are probably the commonest emergencies in a Plastic Reconstructive Surgery Service. This sudden increase is due to rapid and random industrialisation without proportionate skill in the use of agricultural and industrial machinery associated with inadequate safety measures. The requirements of skin cover is acute in view of gross mutilation, exposure of bones and tendons etc. A good skin cover reduces morbidity, hospitalisation, minimises stiffness and leads to early functional recovery. This also prepares the hand for any subsequent planned reconstructive procedures.

Axial flaps (outside the head and neck area) like groin flap and Bakamjian flap have been discovered in the very recent past. The groin flap has proved its usefulness beyond doubt in resurfacing acute hand, forearm and isolated degloving injuries of the thumb. The aim of this short paper is to document our experiences with the use of this flap and to emphasise certain technical points so as to make it a safe and sure procedure.

### Material and Method :

The material for this study is selected from various cases of acute hand injuries requiring immediate full thickness cover.

The nature of injury and the causative factors are tabulated below :—

Table 1. (Causative Factors)

1. Toka (Fodder Cutter) Injuries	8
2. Thresher Injuries	15
3. Sawing Machine Injuries	2
Total	25

Table 2. (Nature of Injuries)

1. Transmetacarpal Amputation	10
2. Amputations of One or More Fingers with Loss of Skin over the Dorsum and Medial Side of the Hand	13
3. Partial or Total Amputation of Thumb	2
Total	25

### Anatomical Considerations of Groin Flap :

The femoral artery gives off three branches in the proximal part of the femoral triangle. Out of these, the superficial circumflex iliac is probably the smallest but very consistent branch. It originates independently or in some cases in common with superficial epigastric from the femoral trunk about an inch below the mid-inguinal point, runs laterally below and parallel to the inguinal ligament to a point an inch below the

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anterior of superior iliac spine where it divides into three terminal branches each anastomosing with a branch of the superior gluteal, lateral circumflex iliac and deep epigastric arteries. The vessel pierces the deep fascia at a variable point but certainly medial to a vertical line dropped from a point 2.5 cm medial to the anterior superior iliac spine. This has a practical bearing in raising the flap. The accompanying vein travels still more medially and pierces the cribriform fascia or joins the saphenous vein.

The groin flap is medially based, single pedicle direct flap having an inbuilt, autonomous arterio-venous axis of superficial circumflex iliac artery with an area of an ellipse on either side of the inguinal ligament. A single vessel is involved and its omission from the flap may be disastrous. In view of the above, anatomical consistency is essential.

### Markings

The femoral pulsation at the mid-inguinal point is noted and a point 'A' is marked 2.5 cm below this. Another point 'B' is marked 2.5 cm below the anterior superior iliac spine. The line AB gives in general the surface marking of the artery (Fig. 1).

### Raising of The Flap

The flap is mapped out in the usual reverse fashion. An impression of the defect (after wound excision) is taken with a wet lint piece and the pattern is placed over the prospective area of the flap keeping special care to include the line of the artery already marked within the flap which

need not be absolutely central. In the region of the anterior superior iliac spine, it should extend equally above and below this bony point.

While raising the flap, initially, the skin alone is lifted from the deep fascia but as the dissection reaches over the sartorius, the deep fascia is also raised along with the flap in order to include the vessel in the flap. Medially, the flap may be raised upto the medial border of the sartorius muscle with safety. Practically, only an occasional perforator is encountered during this process and a meticulous dissection should be nearly bloodless. The donor site is skin grafted which covers the pedicle of the flap as well to obviate any raw surface. Special precautions should be taken not to damage the femoral vessels in the medial part of the defect while grafting the donor site.

### Setting of the Flap

The setting of the flap into the defect is done in two layers. In the case of transmetacarpal amputation stumps and tubing for thumb reconstruction it has been nearly 100 per cent while in all other cases it has been as much as 70 to 80 per cent.

### Site of the Flap.

Normally, contralateral groin flap is best suited for most defects involving the dorsum and transmetacarpal amputation stumps as it enables adequate fixation with minimal effort without any tendency for distraction. In the case of tubing for thumb resurfacing/reconstruction or first

web space defects, an ipsilateral flap is preferable as it affords more comfortable setting and maximum utilisation of the flap. Of course, the fixation is little unsound as the limb moves away from the trunk but since the patient is confined to the bed for the first week or ten days, it does not materially affect the suture line and thereafter the union is fairly firm to enable the patient to be ambulatory with minimal or no fixation at all.

#### **Fixation.**

It is usually achieved by three 10 cm wide encircling strips of elastoplast, two across the arm and one across the forearm below the point of the elbow.

#### **Delay and Separation of the Flap.**

Separation of the flap is done any time after three weeks. There is no utility in the preliminary delay as it would be along the axial territory. But if the flap is to extend well beyond the vascular territory it may be worthwhile to delay the random component of the flap, but it is not possible to do so in cases of acute hand trauma.

Delay prior to separation as recommended by McGregor et al (1972) has not been practised by us as a matter of routine and we had no major loss of flap. We had an occasional, minimal marginal necrosis at the suture line which may be due to mild infection or thinning of the margins in an attempt to achieve accurate apposition.

#### **Discussion.**

The groin flap was first described by McGregor et al (1972) as an analogy to

the Bakamjian flap though the hypogastric flap with its arterial nature was reported much earlier by *Shaw and Payne* (1946) but the true significance of the later was not appreciated. It is an axial pattern flap utilizing the autonomous arterio-venous axis of the superficial circumflex iliac vessels. Though any flap centred over the saphenous opening incorporating the arterial pattern of inguinal 'cart-wheel' would survive to a limited extent yet these are not true groin flaps unless it incorporates the above mentioned arterial axis.

We have used this flap as a matter of routine for cases of acute hand injuries requiring full thickness resurfacing. We confirm the existing known merits in its favour and add a few observed by us as follows:

1. Being an arterial based flap, it resists mild twists, torsions and infection remarkably in emergency cases which are potentially contaminated and infected.
2. There is no risk in primary tubing and setting of the flap in degloving injuries of the thumb, a substitute for tubed pedicle flap.
3. It can be raised in an absolutely outrageous length/breadth ratio. The breadth can be as dictated by the requirements and length can be within 2/3 of the lateral border of sacrospinalis. Dimensions of 1.5 or 2x7 inches for the transmetacarpal amputation stump has been adequate.
4. It affords comfortable position and a fair degree of play for the upper limb and requires minimal fixation. In actual fact,

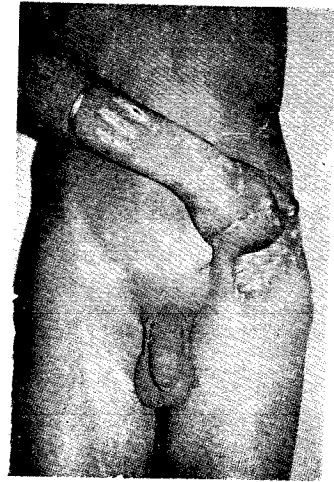
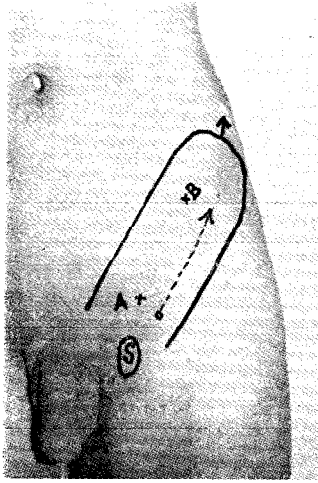


Fig. 1—Markings for a groin flap. A—Midinguinal point as indicated by the femoral pulsation. B—Anterior superior iliac spine. Dotted line with arrow head indicates surface marking for lateral circumflex iliac artery S—Saphenous opening.

Fig. 2—Transmetacarpal amputation following 'Toka' injury.

Fig. 3—Groin flap for amputation stump in Fig. 2.

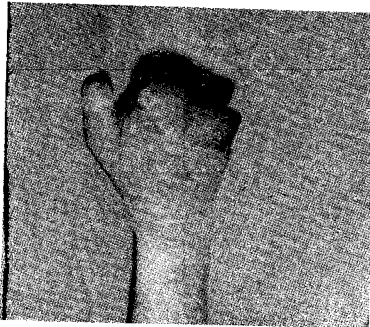


Fig. 4—Final result for Fig. 2.



Fig. 5—Loss of skin over the ulnar and dorsum of hand with crushed little finger following 'Thresher' injury.



Fig. 6—Groin flap for Fig. 5.

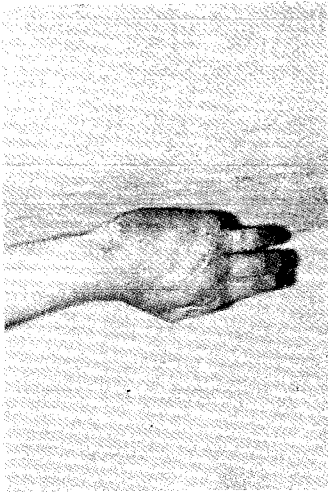


Fig. 7—Final result for Fig. 5

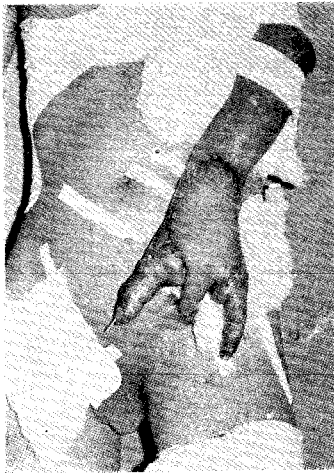


Fig. 8—Groin flap for 'Thresher' injury with loss of 2, 3 and 4 fingers. Thumb and little finger fixed by Kirschner wire



Fig. 9—Tubed groin flap for injury thumb.

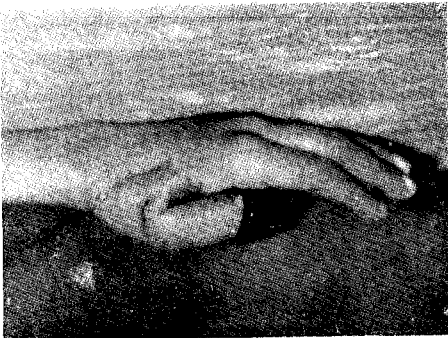


Fig. 10—Result after flap separation.

fixation of any type is redundant after 10 or 12 days and active movements of the uninvolved parts of the hand are encouraged.

5. The flap is practically hairless with minimal subcutaneous tissue-an asset for hand resurfacing.

6. The initial setting of the flap is anything from 80 to 100 per cent which offers maximum attachment, facilitates separation as the pedicle is very narrow and obviates all raw surfaces. Thus, the area remains nearly 'dry' post-operatively.

7. The donor bed has virtually no perforators. So, the dissection is bloodless and graft take is optimal.

8. The donor site is cosmetically over

the area concealed by the underwear and is not objectionable.

In view of the above, the groin flap has everything to recommend its use as an emergency resurfacing for hand injuries.

### Summary

The clinical experience of resurfacing acute hand injuries requiring full thickness cover in a series of 25 cases with groin flap has been presented. The anatomical basis of this unique and versatile flap has been discussed and its special merits have been brought out. We recommend the use of this flap as an emergency procedure in cases of acute hand trauma in view of its suitability speed, safety, adaptability and dexterity.

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