

EXPERIENCE WITH GROIN FLAP IN THE MANAGEMENT OF HAND INJURIES

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Hand injuries of various types are one of the commonest problems faced in our plastic and reconstructive surgery unit. The incidence has increased in the recent past due to fast machanizations of our farms where unskilled persons in unsupervised situations work. Mutilating hand injuries may occur by the exposed moving parts of machines e.g., thresher, 'chara' machine, grinder etc. (Table 1). The injury has serious consequences

Table 1

Causative factors of hand injuries

S. No.	Causative factors	No. of cases
1	Thresher injuries	14
2	'Chara' machine	3
3	Electrical injuries	2
4	Grinding machine	1
	Total	20

in terms of length of hospitalisation, economic loss, permanent functional disability and psychological trauma. In such injuries, fresh or old, proper skin cover is mandatory to prevent further damage to the exposed underlying important structures and to reduce the morbidity and period of hospitalisation. The stiffness of the joints and the restriction of mobility of the tendons is minimised leading to early recovery. This also prepares the hand for any subsequent planned reconstructive procedure.

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Our experience with groin flap is documented in this paper.

Material and Method

The material of this study includes cases of acute injuries and post-traumatic deformities of hand requiring full thickness skin cover in 20 cases.

18 out of 20 cases were males. Persons between 10 to 20 years of age were the main victims (Table 2). Being the dominant side,

Table 2

Age incidence

Age	No. of cases
<10 years	1
10-20 yrs	11
21-30 yrs	3
31-40 yrs	4
>40 years	1
Total	20

the right hand was affected in 14 cases. In one case both hands were injured in a 10 years old boy due to contact with a live wire. The dorsum of the hands were most commonly involved. Isolated dorsal skin loss was found in 11 cases as compared to 2 cases of volar injury. Seven cases had dorsovolar injury.

Ipsilateral flaps were most commonly used, 12 right sided and 5 left-sided. Two contralateral flaps were raised. In the electrical

injury, mentioned above, simultaneous bilateral flaps were used (Table 3).

Table 3
Showing side of flaps

S. No.	Side of flap	No. of cases
1.	Ipsilateral	[Right 12
2.		[Left 5
3.	Contralateral (Left)	2
4.	Bilateral	1
Total		20

Variable sizes of flaps were raised according to the requirement. The largest was 12 cms wide and 14 cms long (Table 4). In two patients there was marginal superficial necrosis at

the distal end of the flaps which healed spontaneously. Few cases developed maceration of the flap which was well taken care of by keeping the wound free of dressing. The donor area was split skin grafted except in 2 cases where direct suturing was done after undermining the margins.

Applied Anatomical Consideration

It is a medially based single pedicled axial flap based on superficial circumflex iliac arteriovenous system. This vessel is the smallest branch of femoral artery arising in the femoral triangle. The inclusion of this vessel in the pedicle of the flap is mandatory for flap survival.

Table 4
Showing size of the defects and flaps, closure of the donor area, complication and day of detachment

S. No.	Defect in cms		Flap in cms		Closure of the donor area	Complications	Day of detachment
	Width	Length	Width	Length			
1	8	10	10	12	Skin grafted	—	26
2.	5	6	6	8	—do—	—	23
3.	6	6	6.5	8	—do—	—	25
4.	8	6	9	9	—do—	—	30
5.	9	10	10	12	—do—	—	26
6.	4	4	5	6	Direct suturing	—	23
7.	7	8	8	10	Skin grafted	—	27
8.	6	6.5	7	8	—do—	—	25
9.	6	6	7	8	—do—	—	24
10.	6	12	8	14	—do—	marginal necrosis	36
11.	9	10	10	14	—do—	—	23
12.	4	5	5	7	Direct suturing	—	23
13.	6	6	7	8	Skin grafted	—	24
14.	10	12	12	14	—do—	—	21
15.	10	10	10	14	—do—	—	30
16.	10	8	12	10	—do—	Marginal necrosis	40
17.	7	6	8	9	—do—	—	23
18.	5	6	6	8	—do—	—	25
19.	6	6	7	8	—do—	—	23
20.	7	6	8	9	—do—	—	26

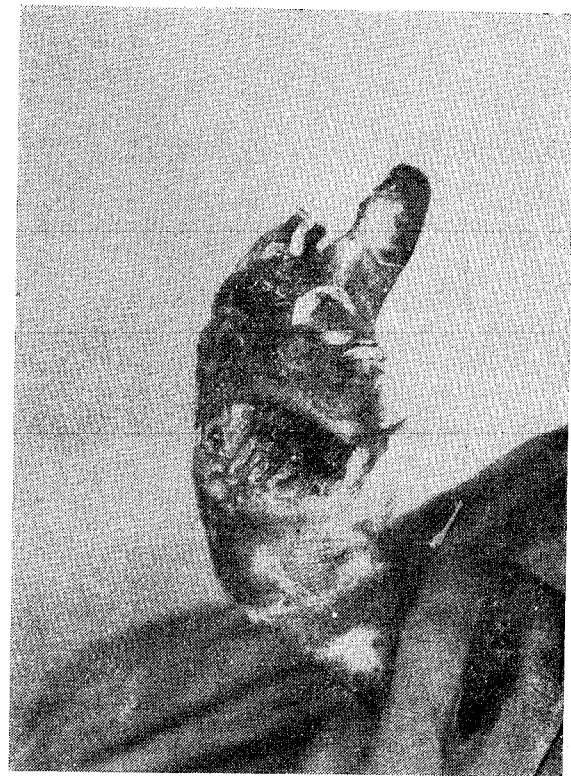
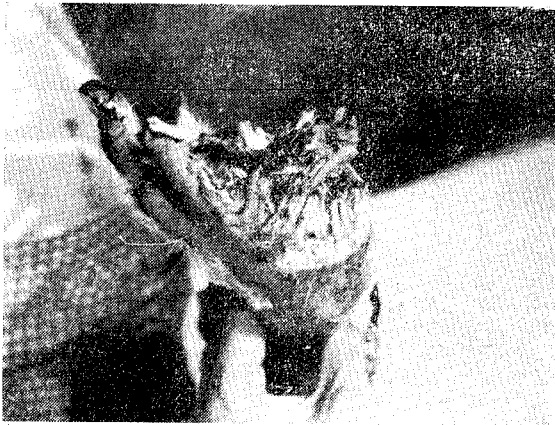
The flap is lifted from the deep fascia. On reaching the lateral border of the sartorius muscle, the fascia is incised to include it in the flap and, thus the inclusion of the vessel is made sure. The safe limit in raising the flap is the medial border of the muscle. The artery varies little in its site and course, and it is not essential to have it in the central axis of the flap (McGregor et al., 1972).

If the flap is raised paying proper attention to its applied anatomy and the basic rules of flap management, then chances of failure are rare.

Discussion

Hand injuries of varying severity are frequently seen in our casualty or outpatient department. Not all of them come immediately following injury, but some consulted us as late as two years. A number of patients were referred to us from other services in second or third week with granulating wound. These patients often presented with multiple fracture of metacarpals and phalanges, severed tendons, granulating wound and loss of transverse as well as longitudinal palmar arches (Figs. 1 & 2). Some presented with severe post-traumatic contracture with malunited

fractures of the metacarpals, collapse of the palm, destroyed tendons and adherent scars (Fig. 3, 4, 5 & 6). Majority of these patients required skin cover in the form of a flap so that subsequent bone and tendon surgery could be undertaken. In those seeking treatment immediately after injury, fractures were reduced and fixed, extensor tendons repaired and a flap cover given at the same time. Results in this small group were superior to others. Males in second or third decade were most commonly involved. Right hand was affected more frequently than the left. Injury due to thresher is most common along with other machines which are of common use in this part of the country. These machines usually do not have any safety devices or they are not used or even discarded by the people. The dorsal surface of the hands are mostly



Figs. 1 & 2 : Amputation at the metacarpal level with exposed vital structures following thresher injury.



Fig 3. Severe post traumatic contracture with adhered tendons and collapse of the palm.

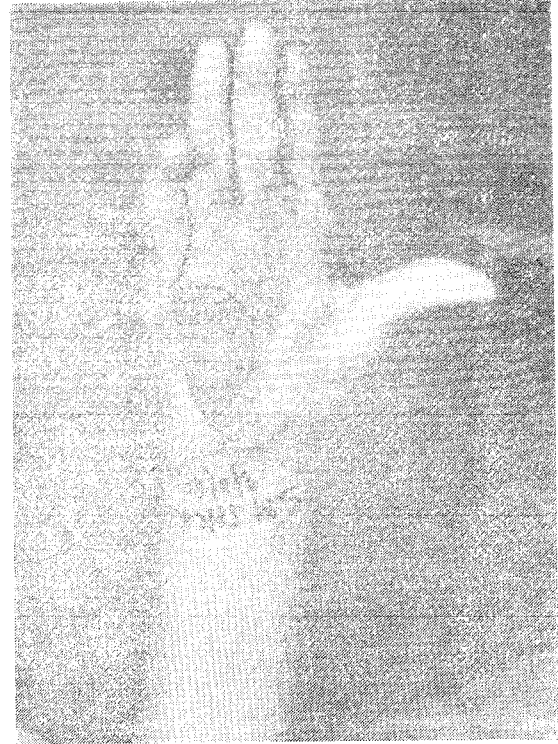


Fig. 5. Patient is able to do abduction of the thumb.



Fig. 4. Ten months following operation pati-

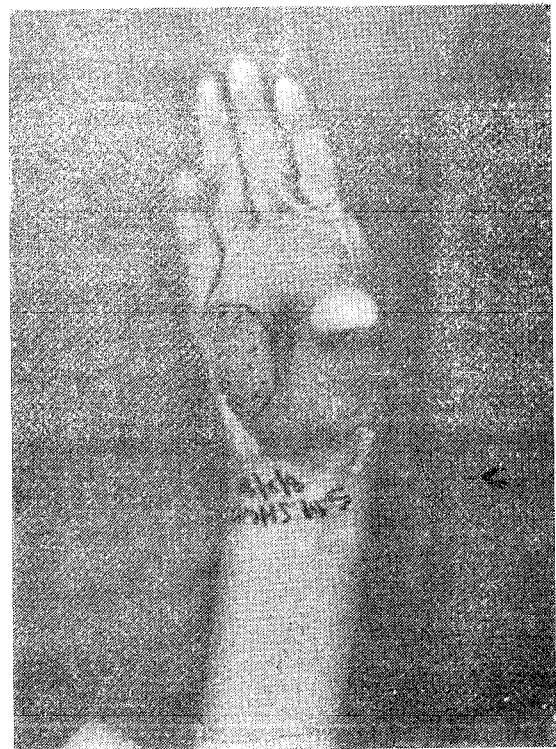


Fig. 6. Complete extension of the thumb is

damaged. This may be explained because the palmar aspect is partially protected by the substance in the grip of the hand. So the injury starts on the dorsum. If still the hand is not withdrawn or the machine is switched off, the volar surface as well is damaged.

Ipsilateral groin flap was commonly used. This versatile flap was first described in 1972 by McGregor and Jackson. Delay prior to detachment as suggested by McGregor (1972) was not done. Whenever possible metacarpal fractures were reduced and fixed before giving a groin flap cover. To maintain the position of the hand three strips of elastoplasts, two across the arm and one across the forearm are used. In case of skin loss confined to dorsum only, the initial inset of the flap was about 80 per cent (Fig. 7) whereas in dorso-volar injury it was about 60 per cent. We have not tubed the pedicle of the flap.



Fig. 7. Contralateral groin flap with about 80 per cent initial inset. Minimal dressing has been used. The donor area grafted.

Except on two occasions when it was possible to directly close the donor area, others were managed by split skin graft. In adults, it was possible to partially reduce the size of the defect by undermining and advancing the wound margins. Then the graft required is actually smaller than the original defect. Some authors have advocated approximation of the wound margin by wide undermining and hip flexion (Jackson, 1976). The graft of the donor site was extended to cover the under surface of the pedicle, so that no raw surface was left. By this procedure the exudation, maceration and infection is reduced to a great extent. Post-operatively minimal amount of local dressing was used so that the flap and the donor site can be inspected easily.

From the third postoperative day the patients were allowed active exercise. Oedema of the flap was not a major problem, because the veins are more numerous in number and also of greater diameter (Smith et al, 1972). These veins are reinforced by a lymphatic concentration towards the femoral canal (Mc Gregor, 1972).

Bilateral groin flap can be used if nursing care is adequate as was done in one case of electrical injury who had thumb index web space contracture requiring resurfacing the dorsal and volar aspects (Figs. 8 & 9).

The largest flap raised by us was of 12 cms width and 14 cms in length (Table 4). Although the widest flap mentioned in the literature was 20 cms (Jackson, 1976). Two patients in this series had patchy marginal necrosis at the distal end of the flaps along the suture line but they healed spontaneously.

At the time of discharge these patients are advised not to handle very hot or cold objects as flaps are still anaesthetic and avoid any other type of trauma. Protective sensations started developing after about 4 to 6 months,

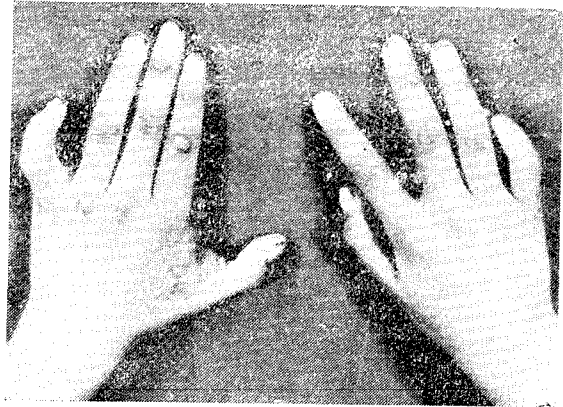
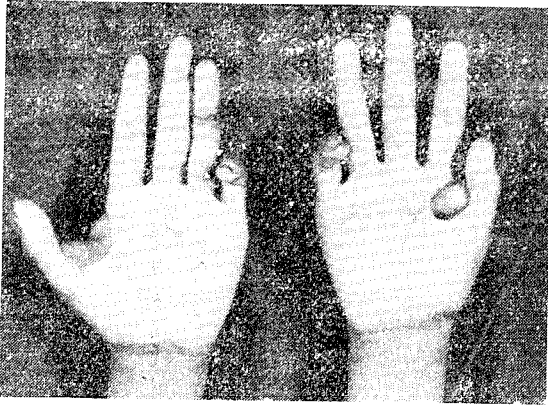


Fig. 8 & 9. Bilateral groin flap used for thumb index web space contracture following electrical injury.

and about 1 to 1½ years, a good quality sensation developed in all the flaps.

Advantages of Groin flap :

Being an axial flap it does not need delaying. This flap can withstand mild twisting, torsion and infection (Thind et al., 1976). The handling and suturing of the flap is relatively easier as this is single pedicled. After the initial period minimum fixation of the hand is required. This allows early active physiotherapy. So, the joint stiffness is markedly reduced specially in older age groups. As the hand can be moved through a wide arc on the end of the pedicle, dressing of the wound becomes easier. Depending upon the type of injury, the primary setting of the flap varies from 60 to 80 per cent. This facilitates detachment of the pedicle. Since the donor area has got minimal number of perforators, haemostasis and take of the graft is excellent. The flap contains practically no hair and minimal subcutaneous tissue. This makes it an ideal donor area for covering the hand. Lastly, the donor scar is not objectionable as it remains hidden.

Summary :

Our experience of resurfacing hand injuries of various types requiring full thickness cover, in a series of 20 cases, with groin flap is presented. Age incidence and local causative factors are analysed. The anatomical consideration of this versatile flap has been discussed in brief. Predominantly the right hand of the young male members are involved. Injury to dorsal and dorsovolar surfaces were of common occurrence. Ipsilateral groin flap were used in seventeen cases, contralateral flap in two cases and in one case bilateral groin flaps were given simultaneously. Flaps of various dimensions were used. The complications encountered were few and not of serious nature. The donor area was covered by split skin graft except in small size flaps where it was sutured directly. The average duration of hospital stay was 33 days. The various advantages of this flap have been discussed. We recommend this as an ideal flap in covering injured hands requiring full thickness skin cover.

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