

AVULSION INJURIES OF EXTREMITIES

CHERIAN M. KOSHY AND K. RAMAKRISHNAN NAIR

SUMMARY

Twenty consecutive cases of avulsion injuries of the extremities who did not have associated loss of skin or fractures were analyzed. Traffic accidents were mainly responsible for such injuries. The flap survival was good in patients having subfascial avulsion. Patients with crushed flaps had an unpredictable course. Our overall results are being presented.

Avulsion is the term derived from the Latin word 'Avellere' meaning to tear off or to peel off. Skin therefore is peeled off from a plane beneath albeit different in different parts of the body. Thus in the scalp it is through the loose areolar tissue and is commonly seen in women with long hairs working with rotary machines. In the scrotum it is just beneath the dartos muscle. Penoscrotal avulsion again has a constant mechanism of causation and pattern of injury. The mechanism of causation in limb avulsions however needs to be highlighted.

Increasing industrialisation, high speed traffic, and insufficient safeguard against their occurrence have made more people today exposed to these hazards with their extremities becoming more vulnerable.

Limb avulsions matter much because structures like tendons, neurovascular bundles and underlying bones are liable to get exposed. The present study was therefore undertaken to study the pattern of injuries and the subsequent behaviour of the avulsed flaps.

Material and Methods

Twenty consecutive cases of avulsion injuries of limbs without fractures of the underlying bones were analysed (Table 1 and 2). For better understanding of its pathologic anatomy and behaviour, patients who had associated loss of skin were excluded from this study. The mechanism of causation, the plane of avulsion,

Table 1. Region wise distribution

Region	No. of cases
Upper limb	6
Lower limb	14

Table 2. Etiology of avulsion

	No. of cases
Road traffic accidents	14
Industrial accidents	4
Domestic accidents	2

the area of avulsion, the base of the avulsed flap (Table 3) and the viability of the skin initially and subsequently were noted. Patients

Table 3. Base of avulsed flap

	No. of cases
Proximally based	8
Distally based	12

whose avulsed flaps had ischaemic changes were managed conservatively to salvage them. Patients who had outrightly avascular flaps were subjected to debridement and were later considered for either a local or a distant flap cover or split skin grafting depending on individual merits.



Fig. 1. Distally based subcutaneous avulsion of leg.

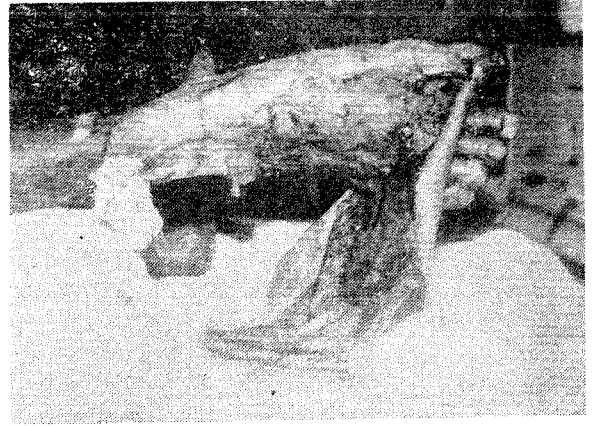


Fig. 2. Distally based anterior avulsion with viable toes.

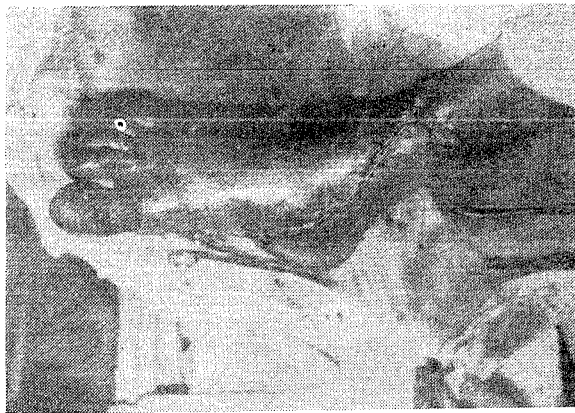


Fig. 3. The avulsed limb treated with skin grafting.

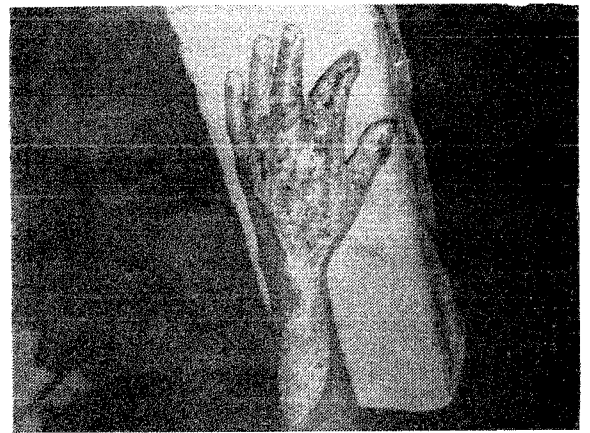


Fig. 4. Avulsion of the dorsum of the hand and index finger with exposed tendons.

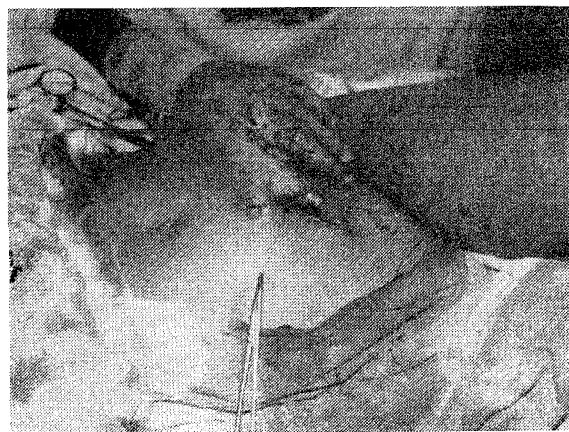


Fig. 5. The avulsed hand and finger covered by an abdominal flap.

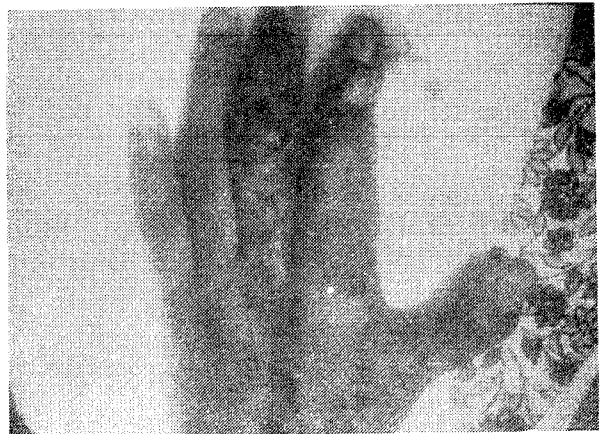


Fig. 6. The hand after flap division.

Observations and Discussion

Majority of cases were males within the age group of 30 to 40 years. The cases studied were classified in two groups i.e. the favourable and the unfavourable. The former encompasses those where the plane of avulsion (Table 4) is subfascial and the base of the avulsed flap is proximal. In the unfavourable group are those patients in which more than half the circumference of the limb is involved, is partially crushed, the avulsed flap is distally based and the plane of avulsion is subcutaneous. (Figs. 1 and 2).

Table 4. Plane/nature of avulsion

	No. of cases
Subcutaneous plane	9
Subfascial plane	9
'Physiological avulsion'	1
'Ring avulsion'	1

However, it has to be noted that these factors can occur in isolation or in combination. Therefore the perspective has got to be balanced. The type of the surgical procedures carried out are shown in Table 5.

Table 5. Surgical procedures

	No. of cases
Skin grafting	10
Suturing	6
Flap coverage	4

Proper triage reduces morbidity and hospital stay. Skin grafting is usually safe and sufficient (Fig. 3).

Ring avulsion is an entity by itself. The avulsion is circumferential, with tendency for tendon or neurovascular injury. Early flap cover is usually indicated to restore a functional finger. Upper limb avulsions are usually dorsal (Fig. 4). They run the risk of functional impairment of the hand, hence the importance of early flap cover (Fig. 5 and 6).

In 'Physiological avulsion' the skin surface is intact, but there is disruption at the level of the deep fascia with undermining. The vascular network of the skin is damaged by the sudden extreme tension set up by the shearing strain. Early excision and skin cover is indicated to preclude progressive damage, (McGregor, 1980).

Skin survival in limbs is dependent on its blood supply through fasciocutaneous and septocutaneous perforators. These have been studied region wise. Cormack (1984) has described their anatomical patterns in the upper limb. The role of fasciocutaneous flaps in coverage of soft tissue defects of the lower limb have been elucidated by Ponten (1981).

With these, we are wiser today in the management of the avulsed extremity, and thus to restore life, limb and livelihood.

Conclusions

Nine cases of subfascial and an equal number of subcutaneous avulsions were observed in the present study of twenty cases of avulsion injuries of the extremities. One case each of physiological avulsion and circumferential avulsion was also observed during the course of the present study, suggesting that the later category of avulsions are rare.

REFERENCES

1. CORMACK, G. C. AND B. G. H. LAMBERTY : 'Fasciocutaneous vessels in the upper arm', Application to the design of new fasciocutaneous flaps. *Plast. Reconstr. Surg.*, 1984; 74 : 244.
2. MCGREGOR, IAN. A. : 'Fundamental techniques of Plastic Surgery', Seventh edition, Edinburgh, London and New York, Churchill Livingstone, 1980, page 194.
3. PONTEN, B. : The fasciocutaneous flap : Its use in soft tissue defects of the leg. *Brit. J. Plast. Surg.*, 1981; 34: 215-220.

The Authors

DR. K. RAMAKRISHNAN NAIR, M.S., M.Ch., *Professor and Head of the Deptt.*, Plastic and Reconstructive Surgery, Medical College, Trivandrum-11.

DR. CHERIAN M. KOSHY, M.S., *Post Graduate Student*, Deptt. of Plastic and Reconstructive Surgery, Medical College, Trivandrum.

Request for Reprints

DR. K. RAMAKRISHNAN NAIR, M.S., M.Ch., Parvathi Vilas, Ambujavilasom Road, Trivandrum-1.