

# Patterns of Etiologies and Soft Tissue Defects in the Upper Limb and use of Different Reconstruction Modalities

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A total of 48 cases of soft tissue defects of upper limb were managed during one calendar year. This included 34 males and 14 females. Post burn complication was the most common etiology. Ten cases had machine injury while other 6 cases had household trauma. Another group of six cases had injuries during fireworks at various ceremonies. Whereas 17 cases were dealt by simple measures like healing by secondary intension, primary closure and skin grafting, 31 cases needed soft tissue coverage with various flaps. Only ten cases were dealt with the help of local flaps while rest of the 21 cases needed various regional and distant flaps.

**Key words:** Soft tissue defects, upper limb injuries, reconstruction

Injuries of both upper and lower limbs are quite common. However, pattern of etiologies and hence soft tissue defects vary considerably. Whereas road traffic accidents are the most common cause of soft tissue defects of lower limb, the common etiologies in upper limb are burns, post burn complications, machine and blast injuries. Injuries in Pakistan take a considerable toll on individuals, families and health systems<sup>1</sup>.

It has been noted previously that development of preventive measures is hampered not only by limited health budget, but by a tendency to see injuries as random events, and hence as unpredictable and uncontrollable<sup>2</sup>.

Present paper also concludes that most of these injuries are not just random events rather majority of them result from carefree attitude of the society members. In this context these injuries are both predictable and controllable and simple preventive measures may reduce their number.

## Material and method:

This study was carried out at Department of Plastic and Maxillofacial Surgery, Services Hospital Lahore. Records of patients treated for various soft tissue defects of upper limb during year 2004 were reviewed. It was a retrospective observational study. Patients who presented at the department and were managed for soft tissue defects of upper limb were included in study. Patients seen in out patient clinic but not managed in the department were not part of this study.

## Results:

This study had a total of 48 patients, 34 (71%) males and 14 (29%) females. Teenage was the most commonly involved age group and a total of 21 (44%) patients were in this age group. (Table 1)

Most common etiology for soft tissue defects in this region was post burn complication. Twenty cases (42%) had soft tissue defects as a result of release of post burn contractures. Machine injury was responsible in 10(21%) cases while 6(12.5%) cases had ordinary household trauma. Another group of 6(12.5%) cases had soft tissue defects due accidental explosion of marriage bombs in

their hands. Road traffic accidents were another etiology in 3(6%) cases while rest of 3(6%) cases presented with infection and diabetic complications (Table 2).

Whereas 17(35%) cases were managed by simpler options like secondary healing, primary skin closure and split skin grafting, 31(65%) cases required utilization of various local and distal flaps to cover the soft tissue defects. Interdigitating triangular flaps of z plasty were the most commonly used flaps in this series and were utilized in 10 cases. Abdominal flaps were used in 5 cases. Latissimus dorsi flap, reverse radial forearm flap, posterior interosseous flap, cross finger flap and fillet flaps were utilized in three cases each while one of the cases had scapular flap (Table 3).

In none of the cases, there was total loss of the flap. In two of the abdominal flaps for coverage of the soft tissue defects at fingers the distal most parts of the flaps necrosed. But the wounds were managed with the redo from the available residual flaps and defects were covered. In one of the cases distal half of the posterior interosseous flap got necrosed and later on had to be covered with skin graft. Rest of the cases did well.

Table 1: Age distribution

Age	Male	Female	Total
1-10	7	3	10 (21%)
11-20	14	7	21 (44%)
21-30	7	1	8 (16.5%)
31-40	4	2	6 (12.5%)
41-50	2	-	2 (4%)
51-60	-	1	1 (2%)
	34(71%)	14(29%)	48 (100%)

Table 2. Etiologies

Etiology	No of patients
Post burn complications	20 (42%)
Mechanical trauma	10 (21%)
Household trauma	6 (12.5%)
Fireworks burn injuries	6 (12.5%)
Road traffic accidents	3 (6%)
Others	3 (6%)
Total	48 (100%)

Table 3. Reconstructive modalities

Option	No of cases
Z-plasties	10
Abdominal flap	5
Latissimus dorsi flap	3
Reverse radial forearm flap	3
Posterior interosseous flap	3
Cross finger flap	3
Fillet flap	3
Scapular flap	1

### Discussion:

Study was conducted to map out different etiologies and patterns of injuries. This aspect of upper limb trauma has not been widely explored in local literature. Although study period was only one calendar year it showed that certain patterns of injuries were more common.

Majority of the patients i.e., 44%, in this series were from teenage group. This is an age where one is most active and hence may ignore certain precautionary measures as well. It is therefore very important that the parents properly watch activities in this age group. Also precautionary measures for this age group must be enhanced while they are working at various machines like press or agricultural machinery.

In majority of the cases i.e., 42%, soft tissue defects were result of burn injuries or release of post burn contractures. It has been estimated that roughly three fourth of burn injuries occur due to very careless behavior of the burned persons<sup>3</sup>.

However, most of the post burn contractures either can be prevented or their severity reduced to minimum with proper care during rehabilitation period. But, majority of the contractures that present at our out door clinics are quite severe and result from either lack of compliance by the patient or improper counseling regarding physiotherapy of the effected limb.

Second common cause was mechanical trauma, resulting mainly in press industry or during use of agricultural machinery. These injuries are more severe as they usually combine the elements of cutting, crushing and avulsion<sup>4,5</sup>.

Many of these injuries can be prevented by simple precautionary measures and improving machine design to safe guard the workers. However, element of negligence and care free behavior plays important role in these injuries.

Another 14% of the cases were result of fireworks usually carried out at marriage ceremonies or at religious occasions like shab e braat. Both these occasions are marked by accidents. Most of the sufferers are kids. Newspapers keep on reporting horrifying accidents due to fireworks, which result in loss of human lives. However it is sad that we do not have proper legislation to restrict the use of fire works at marriage ceremonies or at other religious occasions.

Reconstruction of large soft tissue defects of upper extremity with exposed bones, joints, tendons, neurovascular structures and creases of joints are difficult and challenging problem for orthopedic, plastic and hand surgeons. Such defects and sensate surfaces require coverage with supple skin to carry out early reconstruction and rehabilitation<sup>6</sup>. Wounds involving only epithelium and dermis may be treated non-operatively and will heal by secondary intention<sup>7</sup>. Treating large wounds by this method may prolong healing time and also the resultant scar may be tender and cosmetically unacceptable. Silicone gel sheet application on such scars may however reduce these problems<sup>8</sup>. Skin grafting of large wounds may also lead to contractures. Good compression and massage of the grafted area may however give an acceptable result. The use of tissue expansion in the treatment of burn patients is popular, and several series have been published supporting its use in selected cases<sup>9,10</sup>. Tissue expansion, although costly and time consuming, is a good approach for the correction of burn deformity in upper and lower extremities.

In this series only 17 patients were managed by conservative measures like secondary healing, simple closure and skin grafting. Rest of the 31 cases required use of different flaps for coverage of soft tissue defects. Again the magnitude of soft tissue defects is evident from the fact that only 10 cases were managed with local flaps and rest of the cases needed other regional or distant flaps. Z plasty was the most common procedure among locally available options. In finger area cross finger can serve as a good regional option.

We noticed that other two regional options i.e, reverse radial artery flap, posterior interosseous flap were equally utilized. Use of reverse radial flap demands intact palmar arterial arch that may be injured in mutilated hand injuries and hence vascular status of hand must be carefully evaluated before this flap<sup>11</sup>.

In cases with compromised vascular status of hand a posterior interosseous flap may a good alternative<sup>12</sup>.

Fillet flap can be another good option in cases of blast injuries. It saves valuable normal soft tissue and utilizes tissue from the injury zone. However when local and regional options are not available, one has to depend on distant options. In this series these options were abdominal flap and latissimus dorsi flap. Both of these flaps worked well and the only complication noted during this series was partial necrosis of two abdominal flaps utilized for finger reconstruction.

We reached the conclusion that most of these injuries are preventable especially if minor changes are made in press and agriculture machinery to protect hand being caught in the machine. Second, proper legislation is required for fireworks routinely carried out at the ceremonies. Third, although three fourth of burn injuries result from irresponsible behavior of patient or people around but still severity of contracture can be reduced to

minimum by proper counseling and physiotherapy of the patient during the treatment of acute wounds.

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