Section: Plastic Surgery

Original Research Article

TREATMENT FOR HAND INJURIES WITH VARIOUS FLAP COVERS AT GOVT GENERAL HOSPITAL, GUNTUR

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Abstract

Background: Hand is one of the most important parts of human body due to its mechanical and sensory functions and it is one of the most developed structures in the human evolution. Intricate in design and function, hand is an amazing work of anatomic engineering. Therefore, any injury to the hand carries the potential for serious handicap. An injury to the hand can immediately compromise and chronically debilitate the patient's ability to perform the activities of daily living 1. There could be enormous personal and family suffering from pain, loss of function of the hand, or both. The loss of one's ability to work and to provide can lead to chronic depression as well as social isolation. It is therefore important that acutely injured hand is managed adequately to prevent infection, salvage the injured part, promote primary healing and restore its function 2. The hand is at risk of injury from number of causes for example, road traffic accidents, burns, occupational hazards, sporting and domestic accidents. The pattern of hand injuries in a community reflects their commercial, industrial, social, occupational or recreational activities. Reconstruction of hand defects in adults (grown ups) require early cover. For plastic and hand surgeons, reconstruction of soft tissue defects of the hand is a challenge. The choices are local flaps or distant flaps or free flap using using microvascular techniques. Free flaps are time consuming, require specialized equipments and intensive postoperative care. Distant flaps may require multiple stage reconstruction, prolonged hospitalization and immobilizationu. **Materials and Methods:** Place of study is Guntur Medical College Hospital, Guntur. Period of study is from November 2023 to March 2024. Sample size are 35. Method of study is Prospective study. Inclusion criteria are all patients who presented with injury of the hand and wrist Both sexes. Exclusion criteria is Post burn contractures of the hand. Mutilating injuries where hand cannot be salvaged. **Result:** In our study, eight types of flap procedures were performed in 35 patients. The type of flap procedure was decided depending on patient's comfort, site and size of defect. More than one procedure was performed in few patients, because of multiple site injury. Hypogastric flap was the commonest procedure performed in 13 out of 35 patients (37.14%). It was performed in patients with defect more towards ulnar side of hand and little finger. Groin flap is a work horse of hand injuries and was the second most common procedure performed in 10 patients (28.57%), followed by superiorly based abdominal flap in 8 patients (22.86%) with defects more towards radial side and thumb. Three patients underwent TFL flap while Cross finger flap and Fillet flap was the procedure of choice in 2 patients each. Cross finger flap was performed in patients with single digit injury (index finger injury). Fillet flap was chosen as procedure of choice for patients who underwent amputation of digits. Louvre flap was performed in one patient with 20 days old postelectrical burn defect over index and middle finger. pectoral flap was performed in one patient with postelectrical burn defect over volar aspect of right thumb. Apart from these main procedures, many patients underwent additional procedures. The most common additional procedures include disarticulation, SSG, K wire fixation. In one patient with electrical injury involving mandible and scalp, forehead flap for exposed mandible and Transposition flap for defect over occipital region was performed. **Conclusion:** Total number of patients with hand injury: 35.

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Incidence of hand injury in our Tertiary care centre :2.91 %. The common age group in our study was 21-30 years, with the age of the patients ranged from 4-60 years. The mean age of the patients was 29.11 years. Most of the patients in our study were male (88.57%) with the male: female ratio was 7.7: 1. Most common cause of hand injury in our study was electric burns (51.43%) followed by road traffic accident (28.57%). most common site of injury was dorsum of hand in 22 cases (62.86%) followed by fingers (seen in 28.57%) and wrist (seen in 22.86%). Right hand was affected in 19 patients (54.28%) while left hand was involved in 15 patients (42.86%). Most of the patients (18 out of 35) in our study presented on the same day of injury. Earliest flap cover was given on 2nd day of injury. In majority patients, flap cover was given within 1st week (10 out of 35) and 3rd week (9 out of 35) of injury. Maximum delay for the procedure was 62 days after injury due to late presentation (i.e after one month of inpatient). Eight types of flap procedures were performed in 35 patients. Hypogastric flap was the commonest procedure performed in 13 out of 35 patients (37.14%).

INTRODUCTION

Aims and Objectives

- To study the incidence of hand injuries in a Tertiary care centre.
- To study the etiology of hand injuries.
- To study different types of flaps for reconstruction of hand following different injuries.
- To study the success rate of different types of flap surgeries for hand injury.
- To study the incidence of complications of flap surgeriesn for hand reconstruction.

MATERIALS AND METHODS

Place of Study: Guntur Medical College Hospital, Guntur.
Period of Study: from October 2023 to March 2024
Sample Size: 35
Method of Study: Prospective study.
Sample Selection

Preoperative:

Postoperative
Inclusion Criteria
All patients who presented with injury of the hand and wrist Both sexes.
Exclusion Criteria
Post burn contractures of the hand.
Mutilating injuries where hand cannot be salvaged.

Preoperative:

Postoperative:

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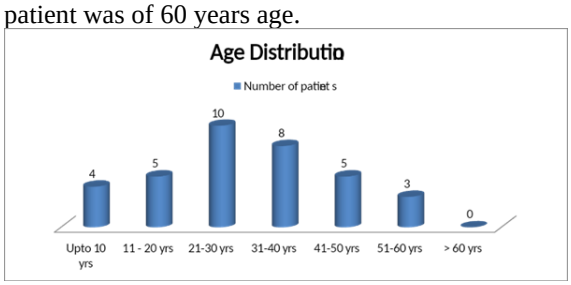
Preoperative:

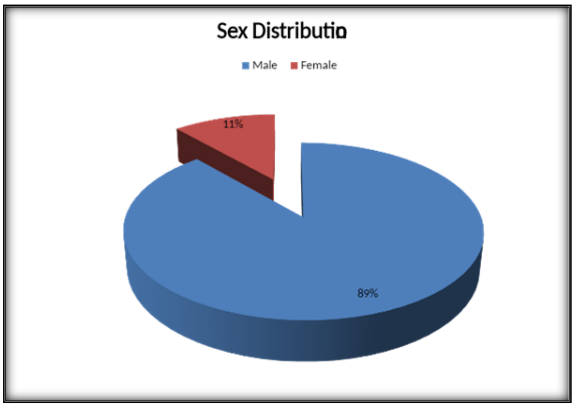
Preoperative:

RESULTS

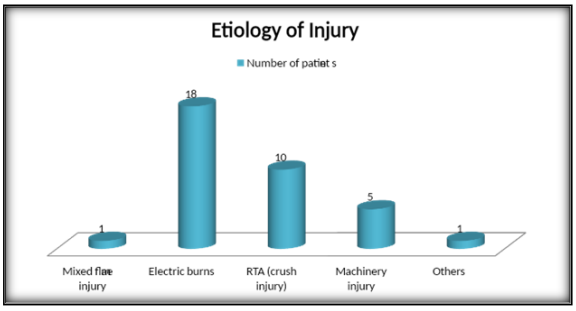
According to the above table (Table I), most common age group affected by hand injuries was 21-30 years (28.57%) followed by 31-40 years (22.86%). Only 4 patients were below the age of 10 years and all of them were affected by electric burns. The youngest patient in our study was 4 years old and the oldest patient was of 60 years age.

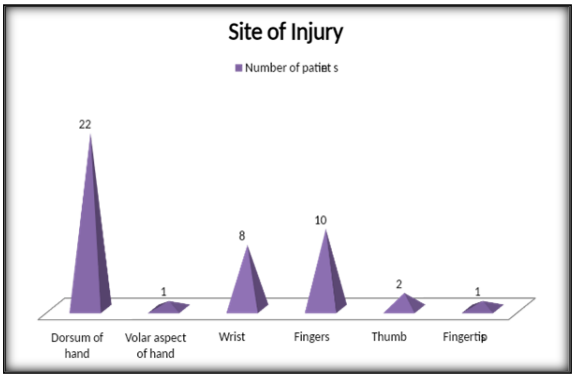


[Table 2] shows that, in our study 88.57% (31 out of 35) patients presented with hand injury were male and only 4 patients were female. This might be because, in our society males are predominantly involved in the field of electricity and machinery work.



According to [Table 3], most common cause of hand injury in our study was electric burns which were seen in 51.43% patients. Second most common cause was road traffic accident which was seen in 10 out of 35 (28.57%) patients. Out of these 10 patients, 4 had crush injury. 14.28% (5 out of 35) patients had machinery injury, mostly of sugarcane machine. One patient was affected by blast injury and another had injury because of snake bite cellulitis.





Above [Table 4] shows distribution of the site of injury. In some patients, more than one site was involved and few had injuries at other site of the body also e.g. scalp legs. Most common site involved in different type of hand injuries was dorsum of the hand (in 62.86%). Fingers were the second most commonly affected site seen in 28.57%. Wrist was affected in 8 out of 35 patients. Thumb was involved in 2 patients while in only one patient fingertips were injured.

[Table 5] shows the different type of flap procedures we performed in 35 patients. In some patients, because of multiple sites of injury, more than one procedure was performed. In few patients additional

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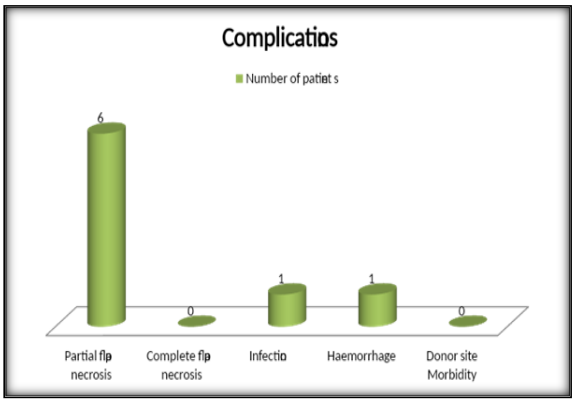
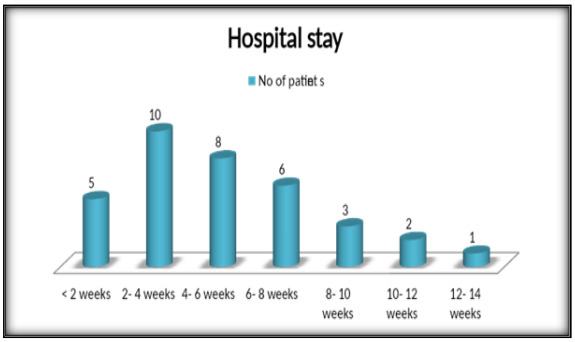
procedures like disarticulation, SSG, K wire fixation and other flap procedures like Transposion flap for scalp defect, Reverse Sural artery flap for defect over leg and foot were performed. In our study, most common flap procedure performed was Hypogastric flap (37.14%). Groin flap was the second most common procedure performed in 10 patients (28.57%). Superiorly based abdominal flap was performed in 8 out of 35 patients. In 3 patients we performed TFL flap and in 2 patients who underwent amputation of the digit, Fillet flap was performed. Louvre flap and Pectoral flap was performed in one patient each.

In our study, 6 out of 35 patients (17.14%) had partial flap necrosis. Of these 6 patients, four had partial necrosis of Groin flap and 2 had partial flap necrosis of inferiorly based Hypogastric flap. Only one patient had radial artery blow out and another had infection of the flap cove.





Hospital stay of the patients in our study ranged from 9 to 92 days. Most (10) of the patients were there in the hospital for 2 to 4 weeks. 8 out of 35 patients were discharged in 4 -6 weeks. While 6 patients stayed in hospital for 6-8 weeks. Only one patient prolonged hospital stay of 92 days (13.14 weeks) because of delayed admission after injury (came after one month after injury) and other associated multiple injuries.

Table 1: Age wise Distribution.

Age Group	Number of patients	Percentage
Upto 10 yrs	04	11.43%
11 - 20 yrs	05	14.28%
21-30 yrs	10	28.57%
31-40 yrs	08	22.86%
41-50 yrs	05	14.28%
51-60 yrs	03	8.58%
> 60 yrs	00	00
Total	35	100%

Table 2: Sex distribution

Sex of patients	Number of patients	Percentage
Male	31	88.57%
Female	04	11.43%

Table 3: Etiology of Injury

Type of injury	Number of patients	Percentage
Mixed flame injury	01	2.86%
Electric burns	18	51.43%
RTA (crush injury)	10 (04)	28.57%
Machinery injury	05	14.28%
Others	01	2.86%
Total	35	100%

Table 4:

Site of Injury	Number of patients	Percentage
Dorsum of hand	22	62.86%
Volar aspect of hand	01	2.86%
Wrist	08	22.86%
Fingers	10	28.57%

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Thumb	02	5.71%
Fingertips	01	2.86%

Table 5: Type of Procedure

Type of procedure	Number of patients	Percentage
Superiorly based Abdominal flap	08	22.86%
Hypogastric flap	13	37.14%
Groin flap	10	28.57%
Cross finger flap	02	5.71%
Fillet flap	02	5.71%
TFL flap	03	8.58%
Louvre flap	01	2.86%
Pectoral flap	01	2.86%

Table 6: Post operative Complications

Complications	Number of patients	Percentage
Partial flap necrosis	06	17.14%
Complete flap necrosis	00	00.00
Infection	01	2.86%
Haemorrhage	01	2.86%
Donor site Morbidity	00	00.00
Total	08	22.86%

Table 7: Hospital stay

Hospital stay in weeks	No of patients	Percentage
< 2 weeks	05	14.28%
2- 4 weeks	10	28.57%
4- 6 weeks	08	22.86%
6- 8 weeks	06	17.14%
8- 10 weeks	03	8.58%
10- 12 weeks	02	5.71%
12- 14 weeks	01	2.86%

DISCUSSION

The hand is a very intricate and important tool used for daily living activities. In the developing world, it establishes the individual in society, allowing them to meet social and economic responsibilities. It is therefore important to understand the causes of injury to this part of the body to minimize the occurrence of injury and to forestall poor treatment outcomes that may result in dramatic reduction in quality of life.

The ideal flap procedure to reconstruct the hand defects must provide same tissue match, sensibility, low donor site morbidity, minimal scar contracture, unrestricted mobilization, easy wound care, a one stage outpatient operation and one operative field. Although this is the ideal for flaps, there is yet to be a flap that provides most of these terms28. The anatomy of the hand allows cover of small skin defects with a great variety of local pedicle and island flaps.

However, for larger defects it is necessary that flaps from distant donor sites be used, either as free or pedicle flaps.

In our study, we included total 35 patients with hand injuries. The incidence of hand injuries in our institute is 2.91%. Most of the patients in our study were male (88.57%) with the male: female ratio was 7.7: 1. Male predominance (Male: Female 1.9: 1) was also seen in the study by Jalal Fattah 29. Similarly, in the study by A M Hashem, all 6 patients were males. The common age group in our study was 21-30 years, with the age of the patients ranged from 4- 60 years. The mean age of the patients was 29.11 years.

This might be because young people in this group areinvolved in various work fields specially in electricity related work. This is similar to the study by Ahmed Ali, the age of the patients ranged from 17-46 years with an average of 23 years. Most common cause of hand injury in our study was electric burns (51.43%) followed by road traffic accident (28.57%). Crush injury was seen in 4 out of 10 cases of road traffic accident. Machinery injury was seen in 5 patients. In one case, hand injury was snake bite. Blast injury was the cause of hand injury in one case.

However, road traffic accidents was the commonest cause of hand injury in the study by Muhammad Shahzad et al,[3] While in the study by Wael Ayad, crush injury (57.14%) was found to be the commonest cause of hand injury 34.

In the present study, most common site of injury was dorsum of hand in 20 cases (62.86%) followed by fingers (seen in 28.57%) and wrist (seen in 22.86%). Similarly dorsum of the hand was affected in 66.66% of the patients in the study by Dietmer et al. While in the study by Muhammad Shahzad et al, volar aspect of the wrist was the commonest site of soft tissue defect seen in 39.62% cases.

In our study, right hand was involved in 19 patients (54.28%) and left hand was affected in 15 patients (42.86%). while in one patient all fingers of both hands were affected by electric burn. In the study by Haitham Mohammed et al, right hand was involved

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in 64.1% while left hand account for 34%, both hand equal to 1.9% cases.

Most of the patients (18 out of 35) in our study presented on the same day of injury. This might be because majority of patients in our study were affected by electric burns and road traffic accident. Total 24 out of 35 patients presented in the first week of injury. 3 patients presented in 2nd and 3rd week after injury and 2 patients in 4th week after injury. 3 patients presented one month after injury.

In our study earliest flap cover was given on 1st day of injury. In majority (10 out of 35) patients, flap cover was given within 1st week and 3rd week (9 out of 35) of injury. Maximum delay for the procedure was 62 days after injury. This was because this patient was admitted in outside hospital for about one month with multiple injuries and then he was referred to us. He underwent multiple serial flap procedures for associated injuries and flap cover for hand injury was performed late.

In the study by Mohammad Shahzad et al 3, most of the patients were operated between the third and fourth week of injury. The earliest operation was done after the second week and maximum delay was 4.5 weeks. While in the study by M Meky 32, 2 out of 6 patients of complex hand injury were treated primarily during the first 24 hours after trauma, 3 patients presented 3 weeks after trauma so they were treated in a delayed primary manner, while one case presented with severe contracture 5 months after trauma. In Jimmy Chow et al36 performed delayed primary flap coverage in 25 patients within 1 month. Hand injuries are of three main types; cutting and slicing, crushing, degloving and avulsion 40,41 . The injuries may be of a variable combination of skin, soft tissues, tendons, nerves, blood vessels and bone damage. When bones and tendons are exposed for a long time they become dried, desiccated, infected and ultimately destroyed with loss of function. All these can easily be prevented by covering the exposed bones and tendons with a flap. As the hand performs unique mechanical function, it is imperative to provide good soft tissue coverage of the hand. Skin graft, when used, may cause wound contraction. All flaps include the entire thickness of skin and subcutaneous tissue along with their own blood supply. So they provide better and durable skin and soft tissue coverage.

They also provide subcutaneous fat through which tendons can glide. There is chance of minimum wound contraction as there is no myofibroblast within the flap 40,41.

In our study, eight types of flap procedures were performed in 35 patients. The type of flap procedure was decided depending on patient's comfort, site and size of defect. More than one procedure was performed in few patients, because of multiple site injury. Hypogastric flap was the commonest procedure performed in 13 out of 35 patients (37.14%). It was performed in patients with defect more towards ulnar side of hand and little finger. Groin flap is a work horse of hand injuries and was the second most common procedure performed in 10 patients (28.57%), followed by superiorly based abdominal flap in 8 patients (22.86%) with defects more towards the radial side and thumb. Three patients underwent TFL flap while Cross finger flap and Fillet flap was the procedure of choice in 2 patients each. Cross finger flap was performed in patients with single digit injury (index finger injury). Fillet flap was chosen as procedure of choice for patients who underwent amputation of digits.

Louvre flap was performed in one patient with 20 days old postelectrical burn defect over index and middle finger. pectoral flap was performed in one patient with postelectrical burn defect over volar aspect of right thumb.

Apart from these main procedures, many patients underwent additional procedures .The most common additional procedures include disarticulation, SSG, K wire fixation. In one patient with electrical injury involving mandible and scalp, forehead flap for exposed mandible and Transposition flap for defect over occipital region was performed.

In another patient with postelectrical burn defect over right parietal region of scalp exposing vitals, Inferiorly based Transposition flap cover was performed as additional procedure. Reverse Sural artery flap was performed in one patient with defect of right lower leg and dorsum of foot.

Groin flap was the commonest technique and was used to repair defects from avulsion wounds sustained through RTA. Cross finger flap was used to repair avulsion defects on the fingers and thumb, especially of artisans involved in the wood work industry. In our study 4 (11.43%) patients had partial flap necrosis of Groin flap which was managed by debridement and flap readjustment. Two (5.71%) patients with inferiorly based Hypogastric flap cover had partial flap necrosis. It was managed in one patient by debridement and flap advancement and in other patient by flap extension and readjustment. Radial artery blow out was seen in one patient with postelctric burn defects involving both hands. Infection of the flap cover was seen in one patient Infection of the donor wound was seen in 2 cases which were managed by frequent cleaning and dressing and antibiotics. While in the study by Jalal Fattah et al 29, marginal flap necrosis was noted in 6 (4.6%), partial loss of skin graft in 3 (2.3%), wound infection in 2 (1.53%), and joint stiffness in 2 (1.53%) cases.

One out of 30 flaps had distal flap necrosis involving 2cm that needed debridement and resuture to the edge of the defect and one flap had disruption that needed secondary sutures. Jhosh et al 37 in their study found marginal distal flap loss in 3 (10.71%) cases and distalflap loss upto 5% in one (3.57%) patient. Out of 150 patients studied, Average hospital stay of patients in our study was 35.68 days ranging from 9 to 92 days. Most (10) of the patients were there in the hospital for 2 to 4 weeks.

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CONCLUSION

Total number of patients with hand injury: 35.
Incidence of hand injury in our Tertiary care centre :2.91 %.
The common age group in our study was 21-30 years, with the age of the patients ranged from 4- 60 years.
Most of the patients in our study were male (88.57%) with the male : female ratio was 7: 1.
Most common cause of hand injury in our study was electric burns (51.43%) followed by road traffic accident (28.57%).
most common site of injury was dorsum of hand in 22 cases (62.86%) followed by fingers (seen in 28.57%) and wrist (seen in 22.86%).
Right hand was affected in 19 patients (54.28%) while left hand was involved in 15 patients (42.86%).
Most of the patients (18 out of 35) in our study presented on the same day of injury.
Earliest flap cover was given on 2nd day of injury. In majority patients, flap cover was given within 1st week (10 out of 35) and 3rd week (9 out of 35) of injury.
Maximum delay for the procedure was 62 days after injury due to late presentation (i.e after one month of in patient).
Eight types of flap procedures were performed in 35 patients.
Hypogastric flap was the commonest procedure performed in 13 out of 35 patients (37.14%)
Groin flap was the second most common procedure performed in 10 patients (28.57%), followed by Superiorly based abdominal flap in 8 patients (22.86%).
The most common additional procedures include disarticulation, SSG, K wire fixation.
4 (11.43%) patients had partial flap necrosis of Groin flap. Two (5.71%) patients with inferiorly based Hypogastric flap cover had partial flap necrosis.
Average hospital stay was 35.68 days ranging from 9 to 92 days. Most (10) of the patients were there in the hospital for 2 to 4 weeks.

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