

## Traumatic Hand Injuries presenting to Orthopedic Unit of a Regional Referral Hospital, Oman

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### ABSTRACT

**INTRODUCTION:** Hand is a prized component of human body with a unique function and structure. Any injury to this part can lead to significant disability. In the changing mechanized world we see more cases of hand injuries every day of varying patterns. A better understanding of such injuries can help us to identify those individuals at risk, plan proper management protocols and preventive measures in order to reduce the incidence and improve prognosis.

**METHODOLOGY:** This is a retrospective study conducted over period of 12 months (01/01/2018-31/12/2018) in which Ninety cases of hand injuries who presented to our department were included. The clinical notes of these patients were reviewed from the hospital computerized patient data and all relevant information was recorded in the predesigned perform as regards demographic data, occupation

place, causes, pattern of injury, and treatment done. HISS (Hand injury severity score) was used for assessment of final functional outcome after analysis of all variables.

**RESULTS:** Ninety patients (66 males/24 females) with mean age of 26.4years were enrolled in our study. Majority of patients were Omani nationals (85.5%) followed by expatriates (14.5%) with 64 (71.1 %) patients presenting within 03-06 hrs of injury to hospital. Maximum number of injuries 46 (51.1%) were observed during time interval from 07 am to 05 pm during months of September and November. Majority of patients numbering 37 sustained injuries while at work (machine injuries /fall of heavy objects) followed by household and motor vehicle accident (MVA) related injuries. Highest percentage of injuries was observed in household workers 28 (31.2%) followed by unskilled workers 23 (25.5%). The Little finger (25.6%) and ring finger (21.1%) were most commonly injured digits. Distal phalanx was the most commonly involved region of finger. Combined injuries along with Open fractures and dislocations accounted for majority of injuries seen in our study. Final results were good in 44 (48.9%) with moderate grade of HISS in 48 (53.3%) cases.

**CONCLUSION:** Hand injuries in this part of world are mainly occupational related injuries which to great extent are preventable. Proper education, training at work place with proper safety measures will help in preventing large number of such injuries.

**Key words:** Hand Injuries, Demography, Fracture dislocation, Tendon injury

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### INTRODUCTION

Hand is a complex intricate organ with variety of functions ranging from simple grasp, fine movements, touch sensation and dexterity which constitute important tool in mans day to day living activities. Hand injuries account for 5-10% of all injuries seen in emergency

department and 28% of all injuries of musculoskeletal system<sup>[1]</sup>.

Hand injuries when occurring in association with other injuries are often neglected in developing world. Majority of injuries are seen in young adults and affecting dominant hand<sup>[2]</sup>. These injuries can be functionally disabling, psychologically crippling and economically disastrous for the patient. The aim of the treatment is to restore function, pain relief and cosmesis so the management of such injuries needs to be precise and comprehensive so as to restore function at the earliest.

The Common causes of hand injuries include machine injuries, sharp objects, falls of heavy weights and motor vehicle accidents (MVA) and the presentation of such injuries can vary from simple lacerations to traumatic amputations<sup>[2]</sup>. In our hospital we don't have specialized hand unit so majority of cases of hand injuries are being managed by orthopedic department.

The present study was undertaken with the main objective to evaluate the pattern of hand injuries along with its management, outcome and identify the complications and morbidity caused by these injuries and suggest preventive measures which in future can help to decrease such injuries.

## METHODOLOGY

A retrospective cross sectional descriptive study was carried out in the department of orthopedics Nizwa regional referral hospital, Al Dakhliya Governorate, Oman. The study included ninety patients who presented with acute hand injuries from 1st January 2018 to 31<sup>st</sup> December 2018. Other 12 patients during this period with incomplete documentation and follow up were excluded. For the purpose of study Hand injury was defined as any injury occurring distal to wrist crease.

Data was collected using combination of electronic hospital case note review, radiographic review and clinical assessment notes and compiled on structured form which included variables: Age, sex, occupation, hand involved, place mode and duration of injury, part of hand involved, type and extent of injury and management modalities. Plain radiographs of hand were obtained in all cases.

Campbell and Kay Hand injury severity score (HISS) was used to assess the severity of Injury<sup>[3]</sup>.

The data was analyzed using SPSS version 16. Descriptive statistics along with percentages of all data was recorded.

## RESULTS

Total of ninety patients were included in our study. Males 66 (73.3%) and females 24 (26.6%) out of which majority were Omani nationals (85.5%) followed by expatriates all from Indian subcontinent (14.5%) (Table 1). Age of the patients ranged from 15 to 60 years with maximum number of injuries observed in age group of 21-40 years (Tables 2, 4) with mean age of 26.4 years.

Maximum number of injuries 46 (51.1%) were observed during time interval from 07 am to 05 pm. followed by 32 (35.5%) from 05 pm to 12 midnight and only 12 (13.4%) cases were recorded from 12 midnight to 07 am. Maximum number of cases in our study were recorded in September and November months. As per occupation 23 (25.5%) patients were unskilled workers (labourers, helpers, farm workers), 14 (15%) were skilled workers (mechanics, fitters, welders, painters, plumbers) followed by household workers 28 (31.2%), students 07 (7.8%), employees 02 (2.2%) and others 16 (17.8) (Table 2).

Time of presentation: 64 (71.1%) patients arrived in hospital within 03-6 hours of injury and 14 (15.5%) after 06 hours of injury. Only 05

**Table 1** Socio -Demographic Distribution of patients.

S.no	Character	Number			Percentage
1	Gender		Omani	Expats	Omani/Expat
	Male	66 (73.3%)	55	10	83.8% /15.1%
	Female	24 (26.6%)	22	2	91.7% /8.3%
	Total	90	77 (85.5%)	12 (13.3%)	
2	Age (years)		Males	Females	
	0-20	20 (22.3%)		06 (17.7%)	
	21-40	33 (36.6%)		07 (07.8%)	
	41-60 or more	19 (21.1%)		05 (05.6%)	

**Table 2** Distribution of patients according to occupation.

S.no	Occupation	Number	Percentage
1	Unskilled workers	23	25.50%
2	Skilled workers	14	15.50%
3	Household workers	28	31.20%
4	Employees	2	2.20%
5	Student	7	7.80%
6	Others	16	17.80%

**Table 3** Time interval between Injury and first presentation to hospital.

S.no	Variables	Number	Percentage
1	< 0-1 hrs	5	5.50%
2	1-3 hrs	8	8.90%
3	3-6 hrs	64	71.10%
4	> 6 hrs	14	15.50%

**Table 4** Distribution of patients according to cause of Injury.

S.no	Mode of Injury	Number	Percentage
1	MVA	10	11.10%
2	Machine	17	18.90%
3	Fall of heavy objects	20	22.20%
4	Entrapment	16	17.70%
5	Glass Injuries	12	13.30%
6	Knife Injuries	9	10%
7	Animal Bites	2	2.20%
8	Others	4	4.55%

**Table 5** Distribution of hand Injuries as per age and causative mechanism.

S.no	Variable	Age Group			Total
		0-20	21-40	41-60	
1	MVA	02 (20%)	06 (60%)	02 (60%)	10 (11.1%)
2	Machine	05 (29.5%)	09 (52.9%)	03 (17.6%)	17 (18.9%)
3	Heavy object	06 (30%)	10 (50%)	04 (20%)	20 (22.2%)
4	Knife Injury	02 (22.2%)	05 (55.61%)	02 (22.2%)	09 (10%)
5	Glass Injury	03 (25%)	06 (50%)	03 (25%)	12 (13.3%)
6	Entrapment	09 (56.31%)	03 (18.7%)	04 (25%)	16 (17.7%)
7	Animal bites	0 (0%)	0 (0%)	02 (100%)	02 (2.2%)
8	Others	01 (25%)	01 (25%)	02 (50%)	04 (4.5%)
	Total	26	40	24	70

(5.5%) patients presented in first hour and 08 (8.9%) within 03 hours of injury (Table 3).

Patients injured at work place accounted for 37 (41.1%) while 53 (58.9%) patients sustained injuries other than workplace (MVA, door entrapment injuries, glass/ sharp object injuries, etc). Machine

and crushing injuries accounted for nearly 27 (30%) of all injuries followed by MVA 10 (11.1%) (Tables 4, 5, 6).

Little finger (25.6%) and ring finger (21.1%) were most commonly involved digits followed by thumb (20%), Index (17.8 %) and middle finger (15.6%) respectively. Distal Phalanx was the most commonly injured phalanx in the digits (Table 7).

In 82 (91.1%) of patients the dominant hand was involved and non dominant in 08 (8.9%) patients. No case of bilateral hand injury was reported in our study (Table 8). Open fracture dislocations was the most common injury sustained followed by tendon injuries (Table 9).

Management: 59 (65.5%) patients were managed non operatively by immobilization, strapping and plaster immobilization. 31 (34.5%) patients were managed operatively (Table 10).

The commonest complication observed was persistent pain with joint stiffness and in 09 patients more than one complication was noted (Table 11). Results were Good in 44 (48.9%) cases (Table 12) with Moderate HISS in 48 (53.3%) cases (Table 13).

## DISCUSSION

Hand is an important tool used for day to day living which fulfills individuals social and economic responsibilities. Hand injuries are

**Table 6** Hand Injuries distribution as per site and mechanism.

	Variable	Location of Injury				Total
		work	Road	Home	Other	
1	MVA	01 (1.44%)	09 (90%)	0 (0%)	0 (0%)	10
2	Machine	11 (64.9%)	04 (23.5%)	02 (11.8%)	0 (0%)	17
3	Heavy object	08 (40%)	04 (20%)	06 (30%)	01 (11.1%)	20
4	Knife Injury	02 (22.2%)	0 (0%)	06 (66.7%)	01 (11.1%)	9
5	Glass Injury	04 (33.3%)	02 (16.7%)	05 (41.7%)	01 (8.31%)	12
6	Entrapment	04 (25%)	03 (18.7%)	09 (56.3%)	0 (0%)	16
7	Animal bite	0 (0%)	0 (0%)	01 (50%)	01 (50%)	2
8	Others	01 (25%)	01 (25%)	01 (25%)	01 (25%)	4
9	Total	31	23	30	6	90

**Table 7** Site of Injury in the hand as regards position of Phalanges.

S.no	Variable	Proximal	Middle	Distal
1	Thumb	07 (38.9%)	-	11 (61.1%)
2	Index finger	02 (12.5%)	05 (31.3%)	09 (56.2%)
3	Middle finger	01 (7.1%)	05 (35.8%)	08 (57%)
4	Ring finger	03 (15.8%)	06 (31.6%)	10 (52.6%)
5	Little finger	03 (13.4%)	08 (35%)	12 (52%)

**Table 8** Distribution of Injury according to dominant Hand.

	Variable		Number	Percentage
1	Dominant	Right	82	91.10%
		Left	0	0%
2	Non-Dominant	Left	8	8.90%
		Right	0	0%

**Table 9** Types of Injuries.

S.no	Variable	Number	Percentage
1	Laceration /Degloving	17	18.80%
2	Fracture	20	22.20%
3	Amputation	9	10%
4	Dislocation	12	13.40%
5	Tendon Injury	9	10%
6	Combined Injuries	23	25.60%
	Total	90	100%

rarely fatal but can lead to serious disability. In this part of world with fast infrastructure development and lot of construction related activities where large number of expatriate workers are employed. Injury remains by far the second main cause of fatalities at 27.3 per 100,000 persons per year<sup>[4]</sup>. Very little literature is available on hand injuries in this region. The study was undertaken to study patients with acute hand injuries admitted to Nizwa hospital in order to identify risk factors, hand injury prevention and safety recommendations in this country.

In our study young males were predominantly affected (male: female ratio of 07:02) with maximum number of cases (51.2%) occurring during working time. In all expatriate male patients injuries occurred at place of work in contrast to Omani nationals where injuries predominantly were due to other causes not related to work place. The percentage of hand injuries and number of males in our study was lower as compared to other studies<sup>[1,4,5]</sup>. Work place related injuries among young males (21-40 years) accounted for majority of injuries followed by injuries sustained at home by women and children. Majority of women sustained sharp knife / glass injuries whereas door entrapment injuries were found in children thereby highlighting the importance of safe home environment and education for prevention of such injuries<sup>[4,6]</sup>.

Fall of heavy objects and machine injury were leading causes for hand injury in our study which is same as reported by other authors<sup>[2,4,6]</sup>. Major risk factors for occupational hand injuries were malfunctioning equipment, working overtime, distraction, rush to

**Table 10** Management of patients.

S.no	Variable	Number	Percentage
1	Conservative	59	65.50%
2	Operations	31	34.50%
	a. Terminalization / closure	9	29.30%
	b. Fracture stabilization	8	25.80%
	c. Tendon repair	9	29.30%
	d. Plastic surgical referral	5	16.20%

**Table 11** Complications.

S.no	variables	Number
1.	Joint stiffness/ Ankylosis	7
2.	Deformity	2
3	Persistent pain	10
4.	Keloid formation	2
5.	Infections	2
6.	Late complications	0
7.	More than one complication	7
	Total	32

**Table 12** Results.

S.no	Variable	Number	Percentage
1	Excellent	26	28.90%
2	Good	44	48.90%
3	Poor	20	22.20%

**Table 13** Severity of hand Injuries.

S.no	Grade	HISS	Number	Percentage
1	Minor	< 20	28	31.10%
2	Moderate	21-50	48	53.30%
3	Severe	51-100	14	15.60%
4	Major	> 100	0	0%

finish job, lack of protective measures, inexperience, inattention and unfamiliarity with the job allotted<sup>[7,8]</sup>.

Violence related injuries were not observed in our study in contrast to 10.8% violence (gunshot) related hand injuries by Ihekine et al<sup>[5]</sup>. Camel bites (2.2%) were the only reported animal bites related hand injuries seen which is also reported by other authors from this region<sup>[4]</sup>. The digits were the most affected site of injury with Little and ring fingers being most affected in comparison to other studies where Index and Middle fingers are most affected<sup>[6,9]</sup>. The distal phalanx was the most affected part of digit probably due to it being the most exposed part in occupational injuries<sup>[10]</sup>.

Varying patterns of injuries ranging from simple lacerations to amputations were seen in our study but open fractures dislocations were the most common type of injuries observed along with tendon injuries which are similar to as reported in other studies<sup>[6,9,10]</sup>. The frequency of cases was high during months of September and November in contrast to other studies where incidence is higher during summer<sup>[4]</sup>. Hospital stay of our cases was on average 5.6 days which is comparable to other series.

The overall results were Good in 48.9% cases. Poor outcome after hand injury usually is result of delayed initial management and in adequate rehabilitation. Our study HISS was found to be Moderate in 53.3% cases which is comparable to other studies from developing world<sup>[1,5]</sup>.

## CONCLUSION

Hand injuries are seen commonly in young males mostly related to occupational hazards of varying types. Awareness and education about safe use of machines at work place along with formulation and implementation of safety protocols in this sector can help in long run to prevent such injuries and thereby reduced disability arising from such injuries. Acute hand injury management curriculum should be made mandatory for all aspiring Orthopedic and plastic surgeons along with setting specialized hand surgery unit in all trauma catering hospitals.

## Limitation of Study

This study had limitation of being retrospective with small sample size. More detailed analysis can be done by a prospective study, larger sample size and longer follow up.

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