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RESEARCH ARTICLE

OPEN HAND INJURY PATTERN IN ORTHOPEADIC IN GMC JAMMU- A RETROSPECTIVE STUDY

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Abstract

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Introduction: The aim of study to analyze the pattern of open hand injuries in patients attending the emergency department in GMC jammu.

MATERIAL AND MATHOD: This study is on 100 patients of open hand injury attending orthopedics emergency and OPD from March 2013 to March 2014 at GMC Jammu. All age groups including both males and females were taken up for the study. Data obtained on admission including, name, age, sex, occupation, hand involved, time of injury, time of arrival to hospital, type of machine or weapon causing injury, mode of injury, whether patient was intoxicated at the time of injury, whether patient was overworked or working over time, light was good or poor, and whether patient was skilled or unskilled. On clinical and radiographic examination Fracture pattern, neurovascular injuries and tendon injuries were documented. Data obtained were analysed and presented in frequencies.

Results:

Data of 100 patient of open hand injuries attending orthopaedic emergency and OPD of GMC Jammu from March 2013 to March 2014 were analysed and presented in frequencies. Majority of patient were in 2nd and 3rd decade of life and were males. Right hand was involved in most of our patients. The most common cause of injury was work or machine related (45%). Majority of patients were farmers and un- skilled workers by occupation. Digits are most commonly involved and phalanges are most common fractured bones. Flexor tendons and digital nerves are other common structures injured.

Conclusion: From this study it was observed that most hand injuries are largely due to preventable causes (occupational/ assaults) and and appropriate preventive strategies at work-place would reduce the incidence of hand injuries.

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INTRODUCTION

Hand and fingers are body parts most often injuried in work places. In the united states, annually, more than one million emergency department visits are due to work related hand trauma. For acutely injuried hand restoration of function is the goal of treatment. Hand injurie are common accounting for around 10% of patients attending emergency. Hand is a complex body part having 27 bones and 27 muscles responsible for fine motor movements.

Widening mechanism of industry, agriculture has increased incidence of injuries to hand. Main cause of hand injuries are machines, which are cuttrey, shop equipments, printing presses, power saws, thresher machines, wringer machines, corn pitchers, assault with sharp and blunt weapons, RTA, door knives, broken glasses or fall on heavy objects. The aim of the study is to evaluate the epidemiology of the various causes of hand injury and the pattern of injuries to plan accordingly for prevention and management of hand injuries.

MATERIAL AND MATHOD:

This is study on 100 patients of open hand injury attending orthopedics emergency and OPD from March 2013 to March 2014 at GMC Jammu. All age groups including both male and female were taken in the study. Closed hand injury, animal or human bites, burns and patients with previous hand injuries were excluded from this study. Hand injury was defined as any injury distal to carpal creases in single or bilateral hands. Proper history of patient taken on admission including, name, age, sex, occupation, address, hand involved, time of injury, time of arrival to hospital, type of machine or weapon, mode of injury, whether patient was intoxicated at the time of injury, whether patient was overworked or working over time, light was good or poor, whether patient was skilled or unskilled.

EXAMINATION: On admission hand involved (right or left), site of injury (palmar or dorsum), zone involved and type of injury (weather Incised wound, Lacerated wound, Crush Injury, fracture dislocation, avulsion, puncture) were noted.

Distribution of zones as per Aken classification.

Aken classification

PALMAR

- Zone 1 distal to insertion of sublimes tendon
- Zone 2 critical area of pulleys between distal to palmar creases and insertion of sublimes tendon
- Zone 3 from distal margin of transverse carpal ligaments to distal palmar crease
- Zone 4 zone covered by transverse carpal ligament

DORSUM

- Zone 1 distal to insertion of central slip of extensor tendon at proximal end of middle phalanx
- Zone 2 from metacarpal neck to proximal interphalangeal joint.
- Zone 3 from distal border of dorsal carpal ligament to metacarpal neck
- Zone 4 area under dorsal carpal ligament.
- Zone 5 proximal to proximal margin of dorsal carpal ligament

INVESTIGATIONS: Radiograph of hand including AP, lateral and oblique view were taken, CT scan of hand if required, radiograph Chest PA View, other body part radiographs if required, ECG, RFT, LFT and other relevant investigations were done.

INTIAL MANAGEMENT: Wound was thoroughly washed and irrigated with normal saline, savlon, betadine and debridement was done under local anesthesia depending upon injury. Skin was closed primarily except when there was marked swelling or wound was markedly contaminated or more than 12 hour old injury. Tendon injuries were primary repaired in 80% of cases. Nerve injuries were treated by primary epineural repair. Fractures were treated conservative by Plaster of paris or ORIF with k-wires depend on fracture type. All cases were given I/V antibiotics or oral antibiotics and analgesia.

RESULTS:

Relevant data of 100 patients of open hand injuries attending orthopaedic emergency and OPD of GMC Jammu from March 2013 to March 2014 were analysed and presented in frequencies. Majority of patient were in 2^{nd} and 3^{rd} decade (51%, Table 1) of life with males outnumbering females in the ratio of 2.2:1 (Table 2).

Age in years	No. of patients	Percentage
1-10	12	12%
11-20	20	20%

Table 1 Age groups affected

21-30	31	31%
31-40	17	17%
41-50	9	9%
51-60	6	6%
61-70	5	5%
Total	100	

Table 2 Gender distribution

Male	69	69%
Female	31	31%

Right hand was involved in 66% of cases, left hand in 30% and both hands were involved in 4% of cases (Table 3). Majority of patients presented in the evening hours of the day (Table 4).

Table 3 Hand in	volved	
Right	66	66%
Left	30	30%
Both	4	4%

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8 am to 6 pm	22	22%
6 pm to Midnight	72	72%
Midnight to 8 am	6	6%

52% of patients sustained injury during work hours and injuries that occurred at home constitute 20% of patients (Table 5). The other factors that affected pattern of hand injuries were extra working hours (40%), poor light (18%), drinking alcohol (9%) and machinery defects (14%) (Table 6). Table 5 Place of injury

Work	52	52%
Off work	28	28%
At home	20	20%

Table 6 Other factors influencing hand injuries

Over work or over time	Poor light	Alchol intake history	Defect in	Any other factors
work			mechine	
40	18	9	14	19
40%	18%	9%	14%	19%

Majority of patients were farmers and un-skilled workers by occupation (Table 7). The most common cause of injury was work or machine related (45%). Other causes included assaults (22%), Accidental injuries (11%), RTA (9%), glass injuries (7%), Falls (3%), and others (3%) (Table 8).

The most common injury was traumatic amputation in 28% of patients. Other injury patterns were crush injury in 26% of patients. Incised wound in 24% of patients and lacerated wound in 22% of patients (Table 9).

	Table 7 O	ccupation of paties	nts				
Farm-	Un skilled	Skilled worker	Govt -	Busnes-	Student	Housvives	Others
er	worker		empolyee	man			
22	24	10	9	11	10	7	7
22%	24%	10%	9%	11%	10%	7%	7%

Table 8 Mode of injury

Mechine RTA Acci injur	dental Glass injuries ies	Fa	Miscellaneous	Violence
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45	9	11	7	3	3	22
45%	9%	11%	7%	3%	3%	22%

Table 9	Type of injury		
Incised	Lacerated	Crush	Traumatic amputation
Overworked 24	22	26	28
24%	22%	26%	28%

The most commonly effected zone was zone 2(table 10).

	Table 10 Site o	f injury			
Zone involved	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5
	25(25%)	35(35%)	26(26%)	10(10%)	4(4%)

Digits are the most common site of injuries constituting about 48 % of injuries. Thumb was most commonly involved (14%, Table 11).

Table 11 Site of	of injury		
Site	No. of cases	Percentage	
Thumb	14	14%	
Index finger	9	9%	
Long fingers	8	8%	
Ring finger	8	8%	
Little finger	9	9%	
Palm	22	22%	
Dorsum of hand	26	26%	
Carpus	4	4%	

Phalanges are the most common fractured bones (70.8%) followed by metacarpals (27.8%). Phalanges of thumb and index finger are the most common fractured bones (14%) (table, 11,12,13). Table 12 Fracture distribution

Table 12 Tracture distribution			
Bone involved	No. of bones	Percentage	
Phalanges	56	70.8%	
Metacarpal	22	27.8%	
Carpals	1	1.2%	

Joint dislocations was seen in 11 patients. Interphalangeal joint was the most common joint involved (8%).

Table 13	Joint	dislocation
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Joint	No. of cases	Percentage
Inter phalangeal	8	8%
Metacarpophalangeal	3	3%
Carpometacarpal	Nil	00

Table 14	Phalangeal	fracture	distribution
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Site	Proximal (No./%)	Middle (No./%)	Distal phalanx(No./%)
Thumb	6(10.7)	8(14.2)	
Index finger	5(8.9)	4(7.1)	5(8.9)
Long fingers	3(5.3)	2(3.5)	4(7.1)
Ring finger	3(5.3)	3(5.3)	5(8.9)
Little finger	4(7.1)	2(3.5)	2(3.5)

Structure invoved	No. of patients	Percentage
Extensor tendon	6	6%
Flexor tendon	14	14%
Ulnar nerve	1	1%
Median nerve	1	1%
Radial nerve	0	0%
Digital nerve	7	7%
Vessels	2	2%

Flexor tendons (14%) are most common tendon injured followed by extensor tendons (6%). Digital nerves are injuried in 7% of patients.

DISCUSSION:

All the age groups were affected by hand injury. However 2nd and 3rd decade of life constitutes most of the patients (51%). These findings were consistant with results of other studies.¹⁻⁴ Wanjohi study shows similar age group distribution constitutes 39.9% of patients with hand fractures⁵. These results are also consistent with others in Northern Ireland and Qatar^{2,3} Most of the patients were males (69%) with a male to female ratio of 2.2:1. These figures are consistent with in Northern Ireland (2.2:1) and Denmark (1.6:1).^{2,5,6,7,8}. Unlu reported that 70% of his patients were male.¹³ Most patients in our study had right hand injured (66%) and is consistent with the study of Beaton et al.⁹ 52% of patients sustained injury during working hours and injuries that occurred at home constitute 20% of patients. In Hong Kong 65% cases occurred at work, 15% at home, and 6.5% were due to road traffic accidents.^{10,11} The other factors that affected pattern of hand injuries were extra working hours (40%), poor light (18%), drinking (9%) and machinery defects (14%). Acute hand injury has been observed as the leading cause of occupational injury treated in United States hospital emergency departments (e.g., laceration, crush or fracture).¹²

The most common cause of injury was work or machine related (45%). and assaults (22%). This pattern depends on the socio-economic state of the patients and development of the country.^{2,9} The large group of work or machine related injuries suggests that preventive strategies directed towards the work place may lead to reduction in number of patients with hand injuries. Try bus¹⁷ and associate reported that 34% of their patients were injured by mechanical equipments.¹² Digits are the most common site of injuries constituting about 48 % of injuries. Thumb was most commonly involved (14%) followed by index and little finger and carpus was the least affected. This finding is consistent with the study in Ireland. This differs from Shaheen's study.⁷ in which the long finger was the most affected with index finger and thumb next in predominance. The distal phalanges of the index long fingers and ring fingers were the most affected sites explained on the fact that they are leading parts of the body. Phalanges are most commonly fractured bones. These finding are consistent with those in The Netherlands.¹⁴ Hove eta¹⁵ in Belgium observed that the phalanges, metacarpals, and carpal bones accounted for, 46%, 36% and 18% of the fractures, respectively.¹⁵

In our study nerve injuries were seen in 9% of patients higher than the findings of Nieminen et al in Finland who reported a prevalence of 2%.¹⁶Nieminen's study had a similar prevalence of nerve and tendon injuries. Tendon injuries were found in around 20% of patients.

Conclusion:

Hand injuries are a common problem at the accident and emergency units worldwide. From this study it is observed that most hand injuries are largely due to preventable causes (occupational/ assaults) and and appropriate preventive strategies at work-place would reduce incidence of hand injuries. The key to management of hand is attention towards early debridement and wound coverage with post-operative splinting in the functional position followed by early mobilization and physiotherapy.

If preventive measures are taken most of hand injuries are avoidable which include

--skilled and well trained people should be allowed in machine works

--safety devices should be used in machines and factories

--counselling, education and learning should be made time to time to unskilled labourers.

- ... proper light, rest between works should be ensured.
- .. people under influence of alcohol and drugs should not be allowed in workplace.

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