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STUDY OF EPIDEMIOLOGY OF HAND SURGERY CASES IN INDIAN SCENARIO

Orthopaedics

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ABSTRACT

PURPOSE: - To study the epidemiology of hand surgery cases in Indian scenario.
METHODS: - Retrospective study of hand surgery cases operated in the year 2015-2016 at a tertiary centre in India and the cases were further sub classified into 9 types and the age and sex distribution was estimated.
RESULTS: - A total of 2060 cases were operated in the year 2015-2016, which were sub classified into 9 categories. Fracture fixation and tendon injuries alone constituted around 55% of cases followed by nerve affections, plastic procedures, deformity correction, tumors, congenital anomalies, miscellaneous cases and infections. Hand injuries and affections mostly inflicted socio - economic morbidity to the youngest population (up to 96% patients were <60 years) and 77.98% were males.
CONCLUSION: - The study clearly underlines the importance and need of delivery of adequate hand surgery services in a developing country like India to mitigate the social and economic effects of hand affections.

KEYWORDS

epidemiology, hand surgery, India

INTRODUCTON: -
The hand is functionally evolved to be highly specialized but unfortunately, there is a lack of dedicated centers for hand surgery. There has been no study to estimate the incidences of hand surgery cases as well as the spectrum of hand affections. The objective of the paper is to study the demography and epidemiology of hand surgery cases managed at a tertiary center level in India and understand the importance of hand surgery as a highly specialized branch. The study is also expected to be helpful in resource allocation for hand surgery and human resource development directed at providing specialized hand surgery care. The study was based in a tertiary center level hospital in western India which has a high volume of hand surgery cases.

METHODS: - The study was conducted in a retrospective manner and case information was obtained from the hospital records of the year 2015 – 2016. Institutional review board approval and proper consent was obtained. The cases have been classified into 9 categories and then further sub classified –

I. Nerve Affections
II. Tendon Injuries
III. Fracture fixation
IV. Plastic procedures
V. Congenital anomalies
VI. Deformity correction
VII. Infections
VIII. Tumors
IX. Miscellaneous

RESULTS: -

I. Nerve Affections [1,2] –
A total of 482 cases were operated which included 110 cases of median nerve, 88 cases of ulnar nerve, 71 cases of radial nerve, 92 cases involving both median and ulnar nerves, 82 cases involving digital nerves, 27 cases of brachial plexus injuries 3 and a 12 cases of posterior interosseous nerve were operated. Most of these cases were traumatic, in a young age group, occurring across all socio economic groups. Most cases were repaired primarily or delayed primary and the rest were repaired secondarily. Nerve grafting was done as and when required in both primary and secondary cases. (Table 1)

Of the 482 cases, 225 cases included other structural injuries along with nerve injury.

Table 1 Nerve Affections

S. no	NERVE	CASES	WRIST	FOREARM	ARM
1.	Median	110(22.82%)	72	28	10
2.	Ulnar	88(18.25%)	53	28	7
3.	Median + Ulnar	92(19.08%)	77	15	-
4.	Radial	71(14.73%)	-	-	71
5.	Digital	82(17.01%)	-	-	-
6.	Brachial Plexus**	27(5.60%)	-	-	-
7.	PIN	12(2.48%)	-	12	-

**Brachial Plexus injuries are also managed by the department of plastic surgery at this institute. This data may hence, not accurately reflect the total load of such cases.

II. Tendon injuries [4] –

A total of 526 cases were operated including 301 cases of flexor tendon injuries and 222 cases of extensor tendon injuries. These injuries were seen more in labour class due to machine injuries, affecting mostly the younger age group. Tendon grafting was done wherever required. (Table 2)

Table 2
Tendon Injuries
Flexor tendons –

Primary and Delayed Primary repair	Secondary Repair	Zone I	Zone II	Zone III	Zone IV	Zone V
235	66	102	76	43	35	45

Extensor tendons –

Primary and Delayed Primary repair	Secondary Repair	Zone I	Zone II	Zone III	Zone IV	Zone V	Zone VI	Zone VII	Zone VIII
189	33	22	63	47	29	33	20	3	5

III. Fracture fixation (Table 3) –
This category has been subdivided into phalangeal fractures, metacarpal fractures [5], carpal bone injuries [6], fractures of the lower end radius [7], acute and chronic joint dislocations and non-unions. 602 cases were operated, of which 337 cases had multiple fractures of hand bones.

289 cases of phalangeal injuries included 157 closed and 132 open cases. 154 cases of proximal phalanges and 65 cases of middle and 70 of distal phalanges were operated.

194 cases of metacarpal injuries were operated of which 68 cases were

open and 126 cases were closed injuries.

59 cases of lower end radius fractures included 6 open and rest closed cases.

47 joint dislocations included 23 cases of inter phalangeal joint dislocations, 16 cases of metacarpophalangeal joint dislocations, 5 cases of carpometacarpal joint dislocations, 2 cases of transscaphoid perilunate dislocations and 1 case of scapholunate dissociation. Of the total cases, 39 cases were acute dislocations and 8 cases were chronic dislocations.

13 cases of non unions were operated. These included 10 cases of scaphoid non union, 2 cases of proximal phalanx non union and 1 case of metacarpal non union.

A population based study in British Columbia, Canada showed fifty percent phalangeal fractures, 42% metacarpal fractures, and 8% multiple fractures.[8]

Table 3
Fracture Fixation

PHALANGES	METACARPALS	LOWER END RADIUS	JOINT DISLOCATION	NON – UNIONS
289 (48.00%)	194 (32.22%)	59 (9.80%)	47 (7.80%)	13 (2.15%)

IV. Plastic procedures –

A total of 268 cases were operated which included groin flaps, abdominal flaps, cross finger flaps, neurovascular flaps, filitization, local flaps and debridements. These cases included amputations, open injuries and follow up cases of emergency debridements and fixation which required coverage (Table 4).

Table 4
Plastic Procedures

GROIN FLAP	ABDOMINAL FLAP	CROSS FINGER FLAP	NEUROVASCULAR FLAP	FILITIZATION	LOCAL FLAP	DEBRIDEMENT
40	4	32	3	20	12	157

V. Deformity Correction –

A total of 76 cases were operated for deformity correction. (Table 5)

The 59 cases of contractures included 46 cases of interphalangeal joint contractures, 3 cases of wrist contractures, 5 cases of web space contractures and 5 cases of Dupuytren's contracture. The 46 cases of IPJ contractures had 28 cases of post burn, 12 cases of post traumatic and 6 cases of post infective contractures. 3 cases of wrist contractures were all post burn injuries. 5 web space release surgeries were performed of which 4 were first web space release and a single 2nd 3rd web space release.

Phalanx deformities include 5 cases of mal united phalanges, 5 cases of Boutonniere's deformity and a single case of swan neck deformity. The mal united phalanges had 3 cases involving proximal phalanges and a single case of distal phalange.

Table 5
Deformity Correction

CONTRACTURES*	MALUNITED LOWER END RADIUS	PHALANX DEFORMITY
59	6	11

*Contractures are also managed by the department of plastic surgery at this institute. This data may hence, not accurately reflect the total load of such cases.

VI. Congenital anomalies[9] –
In all, 20 cases of congenital anomalies were operated which included 10 cases of syndactyly (6 cases of simple and 4 cases of complex syndactyly), 2 cases of camptodactyly, 2 cases of radial club hand, 5 cases of trigger thumb release and a single case of polydactyly. (Table 6)

Table 6
Congenital Anomalies

S. No	ANOMALY	NUMBER OF CASES
1.	Syndactyly	10
2.	Camptodactyly	2
3.	Radial Club Hand	2
4.	Trigger thumb	5
5.	Polydactyly	1

VII. Infections –
We dealt with 8 cases of chronic osteomyelitis involving phalanges and metacarpals, performed 4 incision and drainage and a single case of septic arthritis wrist was operated.

VIII. Tumors –
This category included cases with obvious swelling or radiologically / clinically suspicious lesion which required further invasive procedures for management. Such lesions have been classified anatomically. Most lesions involved fingers (30 cases), 13 lesions were present in the wrist, 10 in the palm and 3 lesions in the distal radius. (Table 7)

Table 7
Tumors

FINGERS	PALM	WRIST	DISTAL RADIUS
30	10	13	3

IX. Miscellaneous – The miscellaneous cases included foreign body removal (6 cases), capsulotomy of stiff MCP joints (4 cases), UCL Injury thumb requiring reconstruction (4 cases), Keinbock's disease (1 case) and a single case of implant removal (Herbert screw from scaphoid) and rubber band syndrome. (Table 8)

Table 8
Miscellaneous Cases

Foreign Body Removal	6
Stiff MCP Joint Capsulotomy	4
UCL Injury thumb	4
Keinbock's disease	1
Implant removal	1
Rubber band syndrome	1

Overall, the cases can be arranged in a decreasing order of frequency [10, 11] as Fracture fixation

602 (29.22%), Tendon injuries 526 (25.53%), Nerve affections 482 (23.89%), Plastic procedures 268 (13.00%), deformity correction 76 (3.68%), Tumors 56 (2.71%), congenital anomalies 20 (0.97%), Miscellaenous 17 (0.82%) and Infections 13 (0.63%). (Table 9)

Table 9

Fracture fixation	602 (29.22%)
Tendon Injuries	526 (25.53%)
Nerve Affections	482 (23.39%)
Plastic procedures	268(13.00%)
Deformity correction	76 (3.68%)
Tumors	56 (2.71%)
Congenital anomalies	20 (0.97%)
Miscellaneous	17 (0.82%)
Infections	13 (0.63%)
TOTAL	**2060**

The age distribution was striking as 95.78% of patients were <60 years of age, which happens to be the most productive age group economically. 40.27% patients were less than 20 years and 55.11% cases belonged to 21 – 60 years age group. (Table 10)

Table 10

Age Distribution

0-20 years	21-60 years	>60 years
40.67%	55.11%	4.20%

Males formed a significantly higher percentage of cases at 77.98% compared to females who made 22.02% of cases.(Table 11)

Table 11
Sex Distribution

MALE	FEMALE
77.98%	22.02%

DISCUSSION : - So, it can be concluded from the above results that –

1) Hand surgery is a complex branch that deals with a wide variety of cases across all age groups and socio-economic classes. It hence demands a speciality status not only in academic terms but also in terms of facilities being provided at primary and secondary health care levels by trained personnel. Recognition of such affections as nerve and tendon injuries, infections at the primary or secondary level itself can lead to timely referral and improved prognosis. A few injuries can be dealt with at the primary level itself. Training directed at this can lead to decreased load over higher centres.
2) The above results can be considered as very reliable as it provides a cross section of the prevalence of hand surgery cases based on the records from one of the only few dedicated hand surgery tertiary centers in north India which is also one of the largest public sector health care centre in the country. This data can be very well utilized for assessment of the infrastructure required for further establishing a hand surgery centre.
3) Most of the cases are traumatic injuries as reflected by the percentages of cases of fracture fixations, nerve and tendon injuries and plastic procedures. These are debilitating injuries which require specialized management and cannot be treated by an orthopedic surgeon untrained in hand surgery. If not treated adequately, these eventually lead to significant disability. A special set of clinical and surgical skills are required for recognition, assessment, planning, surgical execution and follow up of these cases. With only a few facilities, the number of experts trained in hand surgery every year, in Indian perspective are very low as compared to the prevalence of these cases. There is an imminent need of establishing institutes dedicated to hand surgery to respond to the lacuna in the field.
4) The age distribution also strongly emphasizes that hand surgery should be promoted at all levels of healthcare as most cases (71.72%) are traumatic and are affecting the economically and socially most viable age groups4. As compared to any other orthopedic trauma which has a greater impact on middle aged and elderly, hand affections almost eccentrically affect the younger age groups. This indicates the higher prevalence of disability due to hand affections as compared to any other trauma. Moreover, these affections have a bias towards greater involvement of the lower socioeconomic strata which is already compromised. The social and economic conditions of these people further deteriorate due to any such injury. It thus remains an enigma that why hand surgery is deprived of the patronage that it rightly deserves. The governments should actively indulge in developing facilities and residents should be encouraged to train as hand surgery experts.
5) The study also provides valuable data for developing training modules for health care personnel which can be oriented to suit the needs of health care system. More emphasis can be laid upon fracture fixations, nerve and tendon injures as these cases are larger in number and more disabling as well. Few injuries can be treated and most can be recognized at lower levels of health care system. Even education of OT assistants and staff is quite different as the requirements of hand surgery vary considerably from routine orthopedic OT. This data can be well utilized to identify the stress areas during any such programme.
6) The need of suitable resource allocation whether in terms of human resource or infrastructure at all levels can be effectively addressed by using this data.

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