

Recent Hand Injuries: Epidemiological and Lesional Aspects (About 291 Cases)

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Abstract

Introduction: Hand injuries are frequent and serious. Their consequences, sometimes irreversible, are the cause of major handicaps. The aim of our work was to describe the epidemiological and lesional aspects of hand trauma in the Orthopedics-Traumatology department of the CHU Aristide Le DANTEC. **Material and Method:** This was a continuous retrospective study over a period of 2 years. From June 1, 2015, to December 31, 2016, concerning all patients who came for a trauma recent hand, followed and whose file was found and completed. **Results:** Of 351 patients, we retained 291, 247 men for 44 women, aged in average age of 34 and carrying out different activities with a predominance of workers manuals (78.01%). Most of them came from the Dakar region (75.26%). THE work accidents predominated with 47.08%. The involvement of the right side was 58.76% of cases and concerned the dominant side in 56.35%. On the lesion level, there were 36.4% osteo- articular lesions, 30.58% lesions of the parts soft, 23% nail lesions and 9.9% complex lesions associating at least 3 lesions elementary. **Conclusion:** Recent hand injuries account for 13.49% of injuries in our service; they are severe, affecting the different structures of the hand, either singly or jointly. They involve the functional prognosis of the hand with socio-professional repercussions important.

Keywords

Trauma, Hand, Recent, Epidemiology, Lesions

1. Introduction

Traumatic pathologies of the hand are frequent and diverse. Indeed there is a wide range of injuries that can affect the hand and wrist with different inci-

dences. These hand lesions accounted for 8.02% of admissions to the Orthopedics-Traumatology department of the CHU Aristide le DANTEC in 2008 [1].

It is in this context that we initiated this work, the aim of which is to study the epidemiological and lesional aspects of hand trauma in the Orthopedics-Traumatology department of our establishment.

2. Patients and Method

Our study took place in the Orthopedics-Traumatology department of Aristide Le DANTEC Hospital. This hospital has become a Public Health Establishment (E.P.S.) since the hospital reform of 1998. It is one of the six reference centers in Dakar in the management of the pathology of the motor system. Our service also participates in the training of students in specialization in the same way as the general hospital Idrissa pouye de grand yoff, the main hospital of Dakar and the hospital center of the Order of Malta.

This is a continuous retrospective study over a period of 2 years from January 1, 2015, to December 31, 2016, carried out in the Orthopedic Traumatology department.

We included in this study all the patients who came to consult for a traumatic pathology of the hand, operated or not, followed in the department during this period.

Patients whose files were incomplete as well as patients lost to follow-up were not included in this work.

In total, we listed 351 files of patients with traumatic hand pathology and according to our inclusion and non-inclusion criteria, 291 were finally retained.

We have designed an operating sheet allowing, from emergency registers, specialized consultation of the hand as well as hospitalization records, the collection of data from civil status, traumatic pathology both clinically and radiographically, of the treatment.

3. Results

3.1. Descriptive Study

3.1.1. Epidemiological Aspects

1) Frequency

We observed 351 cases of hand trauma out of 2582 received in the emergency department, *i.e.* 13.59% of cases.

2) Age

The average age was 34.4 years, with extremes of 13 and 95 years. The 21 - 30 age group represented the most frequent with 33.68% of cases, followed by the 31 - 40 age group with 25.43% of cases.

3) Gender

We found 247 men and 44 women, for a sex ratio of 5.6.

4) Professionals

Occupations were diverse and varied. By type of activity, manual workers

(MW) accounted for 227 patients (78.01%).

Pupils and students made up 21.99% of the workforce. By sector of activity, manual workers were divided into power workers (138 or 61%) and precision workers (89 or 39%).

5) Place of residence

Patients came mainly from the various departments of the Dakar region (219 patients or 75.26%).

3.1.2. Etiopathogenic Aspects

The circumstances of occurrence were classified into 8 groups: accidents in the home, at work, on the road, in sport, on the public highway, brawls, assaults and special accidents.

Work-related accidents concerned 137 patients, or 47.08% of hand injuries, of which 14 (10.2%) were due to router accidents. The 123 other types of work-related accident were miscellaneous and unspecified.

3.1.3. Clinical Aspects

1) Distribution by affected side

The right side was affected in 171 patients (58.76%). Trauma was bilateral in 3 patients (1.3%).

2) Distribution of lesions by dominant limb

Our study included 273 right-handed (5 93.81%), seventeen (17) left-handed (5.84%) and ambidextrous (0.34%) patients. In 164 cases, the lesion was located on the dominant limb (56.3%).

3) Existence of a skin lesion

Of the 291 patients, 162 cases (55.67%) were open traumas. In 1 patient, the lesion was open on one side and closed on the other.

4) Lesion types

There are 4 groups of lesions:

- Osteoarticular injuries including fractures, dislocations and sprains (106 cases)
- Soft tissue lesions involving skin, tendons, muscles, vessels and nerves (89 cases).
- Nail lesions: we have singled them out, even though they are usually complex (67 cases).
- Complex lesions, of which there were 3, concerned those with at least 3 of the above-mentioned elements, as well as traumatic amputations (29 cases).

a) Osteoarticular lesions

i) Fractures

Metacarpal fractures: Fractures of the 5th metacarpal were the most common (20 cases or 50%). The majority were located at the neck.

Phalangeal fractures: 30 cases (58%) involved the distal phalanx, followed by the proximal phalanx.

Concerning the location of the fracture line, the tassel of P3 was preferentially affected in 20 cases (39%). The rest involved other segments of the phalanges.

ii) Dislocations

They were divided into: three (3) distal interphalangeal dislocations involving the 3rd finger in 2 cases and the 4th finger in 1 case; 2 metacarpophalangeal dislocations of the thumb, one of which was anterior and the other posterior; 1 proximal interphalangeal dislocation of the 4th finger.

iii) Sprains

There were 9 sprains, including 5 at the metacarpophalangeal joint of the thumb, 3 at the proximal interphalangeal joint of the 4th finger and 1 at the proximal interphalangeal joint of the 3rd finger.

b) Tendon injuries

Apart from patients with complex lesions, there were 12 (4.12%), including 8 cases (6.6%) of tendon section and 4 cases (33.3%) of tendon rupture. Tendon sections included 5 lesions of the deep flexor tendons, 4 of which were in zone II and 1 in zone III of the IFSSSM, associated with 4 lesions of the superficial flexor tendon. No tendon sections were found. Tendon ruptures mainly concerned 3 mallet fingers and 1 button finger.

c) Nail lesions

Of the 67 nail traumas, nail bed lesions, pulpal lesions, amputations, subungual hematomas and matrix lesions were found in descending order. The combination of nail bed lesion and P3 fracture was found in 18 cases (23.7%). In 11 cases (61%), the fracture was predominantly located in the tassel of the distal phalanx. These lesions affected the middle finger in 20 cases, the index finger in 17 cases, the ring finger in 16 cases, the thumb in 14 cases and the little finger in 9 cases. We had 9 amputations, which were classified as complex lesions.

d) Complex lesions

There were 29 complex lesions, dominated by the spinning top hand, followed by amputations and vascular-nerve and tendon wounds.

There were 12 amputations. They involved the 3rd finger in 5 cases, the 2nd finger in 4 cases and the 4th finger in the remainder.

3.2. Analytical Study

We made 6 types of comparisons of our results:

- by crossing the dominant and affected sides (**Table 1**);
- between the side affected and the type of trauma (open, closed or associated) (**Table 2**);
- by cross-referencing the type of lesion and the side affected (**Table 3**);
- by cross-referencing the type of lesion and the circumstances in which it occurred (**Table 4**);
- by cross-referencing lesion type and sector of activity (**Table 5**);
- by cross-referencing the type of injury with the sector of activity (**Table 6**).

4. Discussion

It will focus on the epidemiological and lesional aspects of hand trauma. This

Table 1. By crossing the dominant and affected sides.

Dominant hand	Studied hand			Total
	Left and right	left	right	
both	1	0	0	1
left	0	5	12	17
right	2	112	159	273
Total	3	117	171	291

Table 2. Between the side affected and the type of trauma (open, closed or associated).

	Type of Trauma			Total
	Associate	Opened	closed	
Left and right	1	0	2	3
Left	0	78	39	117
Right	0	84	87	171
Total	1	162	128	291

Table 3. By cross-referencing the type of lesion and the side affected.

Types of lésions	Studied hand			Total
	both	Left	right	
Contusion	1	11	31	43
sprain	0	2	7	9
Isolated wound	0	17	16	33
Phalangeal fracture	1	22	28	51
Metacarpal fracture	0	7	33	40
Tendon injury	0	7	5	12
Interphalangiennne dislocation	0	3	3	6
Complex lesion	0	8	21	29
Traumatic wound and contusion	1	0	0	1
Nail trauma	0	38	29	67
Total	3	117	171	291

Table 4. By cross-referencing the type of lesion and the circumstances in which it occurred.

Types de lésions	Circumstances in which								Total
	Avp	A S	Rixe	AP	AC	AT	AD	Agression	
Contusion	1	4	9	2	7	9	11	0	43
sprain	0	1	0	0	0	8	0	0	9
Isolated wound	1	2	5	2	0	20	2	1	33
Phalangeal fracture	3	4	8	2	4	22	8	0	51

Continued

Metacarpal fracture	0	4	13	1	6	8	8	0	40
Tendon injury	0	0	4	0	0	6	2	0	12
Interphalangienne dislocation	0	1	3	1	0	1	0	0	6
Complex lesion	0	0	2	1	1	23	2	0	29
Traumatic wound and contusion	0	0	1	0	0	0	0	0	1
Nail trauma	3	0	3	4	5	40	12	0	67
Total	8	16	48	13	23	137	45	1	291

P = 0.002.

Table 5. By cross-referencing lesion type and sector of activity.

	Sector d'activité			Total
	SW	PW	STU	
Contusion	15	20	8	43
sprain	4	3	2	9
Isolated wound	16	7	10	33
Phalangeal fracture	22	15	14	51
Metacarpal fracture	13	14	13	40
Tendon injury	2	5	5	12
Interphalangienne dislocation	1	2	3	6
Complex lesion	20	7	2	29
Traumatic wound and contusion	0	0	1	1
Nail trauma	20	9	8	67
Total	138	89	64	291

P = 0.00.

Table 6. By cross-referencing the type of injury with the sector of activity.

	Type Trauma			Total
	Open/close	Opened	closed	
SW	0	99	39	138
PW	0	35	54	89
STU	1	28	35	64
Total	1	162	128	291

P = 0.00; SW = strength worker; PW = precision worker; STU = student.

study has certain limitations, despite a rather interesting cohort of patients. These are:

- Untraced files;

- Incomplete files;
- Uncompliant patients.

4.1. Epidemiological Aspects

We found a proportion of 13.59% of traumatic hand injuries in relation to the total number of patients seen in trauma emergencies. In 2008, the figure was 8.02% [1]. Very few studies have been carried out to determine the extent of hand trauma in Africa. SEYE *et al.* [2], in 1994, found a frequency of 271 patients per year over 12 years. In the West, reliable statistics are available on the incidence of these traumatic lesions, as the management of hand disorders is well codified in well-defined structures with a correct archiving system. In France, the Réseau de Prévention Main de L'Institut Chirurgical de la Main et du Membre Supérieur (ICMMS) (Hand Prevention Network of the Surgical Institute of the Hand and Upper Extremity) has found a frequency of 15% to 40% of hand trauma among traumatic emergencies [3]. In other countries, such as Denmark, they account for 28.6% of traumatic injuries, or 3.7 per 100,000 inhabitants per year. [4] [5] [6] [7] [8]. Our figures fall far short of the reality, given that in Africa, hand injuries have a false reputation for being benign and healing without sequelae. Many patients don't seek medical attention. Sometimes, they turn to bonesetters, and in most cases, the lesions are found to be residual, making treatment difficult.

There was a strong predominance of young patients (age range 21 - 30: 33.68%) and males (sex ratio 5.6/1). In Nairobi, KAISHA *et al.* found an average age of 28.2 years [9]. They were joined by Hey *et al.* [10], in Singapore, who found 88% were male, the majority aged between 20 and 30 [10]. For OBERT *et al.* [6], hand trauma affects a young population (average age 31). The same is true for OZÇELIK [11], SERINKEN [12] and SOROCK [8], in Turkey and the USA, with male patients aged around 30 during their working lives [8] [11] [12]. This male predominance has also been found in Douala [13] and Antananarivo [14], with a sex ratio of 3:1 and 9:1 respectively, in subjects in their 3rd decade of life, most of whom were victims of accidents at work [13] [14]. In our series, the most common circumstances for the occurrence of hand injuries were work-related accidents (47.08%), followed by fights (16.49%) and domestic accidents (15.46%). The literature review identified the most frequently encountered etiological circumstances. In decreasing order of frequency, these were work accidents, leisure accidents, domestic accidents, followed by fights and assaults [6] [8] [9] [11] [12] [14] [15] [16] [17]. According to a study by the European Federation of Hand Emergency Services, in 2002, 62% of hand injuries were due to domestic accidents, 28% to accidents at work and 10% to road accidents [3].

Manual workers were affected in a statistically significant way ($p = 0.000$) during an accident at work. In the study by LANGLAIS [18], they accounted for 96%. As shown by other studies [2] [9] [18] [19] [20], the majority of injuries were sustained by males. Men are more likely to be involved in manual work, which is the most frequent source of accidents, whereas women are more likely

to be victims of domestic accidents.

Risk factors incriminated in the occurrence of these accidents during work activities include the use of unsuitable equipment or materials, lack of training and concentration, inappropriate work environment, overwork, taking narcotics, as well as the physical and psychological state of the worker [1] [7] [21]-[27]. In developed countries, these injuries occur in leisure accidents (35%), domestic accidents (34%), work accidents (26%) and traffic accidents (15%) [4] [5]. Indeed, the resulting injuries and their after-effects have an impact on the socio-professional life of patients [28]. Their socio-economic repercussions, through the number and duration of work stoppages they cause, have led to the reinforcement of the system of protection in the use of work tools at company level. This is not the case in our countries, where no awareness-raising campaigns have been conducted in this area, as most of the population work in the informal sector and/or on their own account. In the West, accidents in the home are more numerous than those in the workplace, as the population makes extensive use of increasingly high-performance and often dangerous household appliances. These results support the theory that hand injuries are the preserve of young, active males. They represent the most numerous and active socio-professional strata, and are therefore the most exposed to accidents. With regard to the origin of our patients in relation to the care centers, most of them came from the different departments of Dakar, mainly from Dakar-Plateau, which accounted for 75.26% of patients. The rate decreases as one moves away from the city.

As far as emergencies are concerned, we note that patients consult us close to where they live or where the accident occurred. Although our hospital is one of the leading facilities for hand surgery, it should be noted that at present, other hospitals on the outskirts and in the regions have orthopaedic surgeons who can treat most hand injuries. Nevertheless, patients from Guédiawaye, Thiès and Rufisque all had complex hand injuries.

4.2. Lesional Aspects

The right hand was affected in 58.76% of cases. The dominant side accounted for 56.5%, similar to the results of OGEMDI *et al.* [29] and LADJOUZI [30], who found respectively 56.8 and 63.63% involvement of the dominant limb [29] [30].

In view of these results, it is highly unlikely that the dominant hand is a significant precursor of the hand studied. However, PORAC *et al.* [31] found that the risk of hand trauma was the same for right- and left-handers alike. Unlike us, trauma in their series was most often noted on the dominant hand. This has also been found by other authors [15] [26] [29] [32] [33].

Traumatic injuries to the hand are diverse and varied. In our study, osteoarticular lesions predominated with 36% of cases, compared with the results of African series where osteoarticular lesions predominated with 82.4%, 63.3% and 60% respectively for SEYE, RABEMAZAVA and FARIKOU [2] [13] [14]. These were mainly phalangeal fractures. Very few studies report injuries to the nail

apparatus [34], which accounted for 23% of all injuries in our study. We have individualized them within their own nosological framework, and they are most often associated with bone lesions. European series are more focused on manual workers [8] [12] [35], table saws [36] and mountaineers [37]. In other cases, lesions are found after a domestic accident [38]. In the various reports, traumatic amputations and soft tissue injuries are more common [7] [8] [15] [36] [39] [40] [41] than osteoarticular injuries [4] [17].

Open trauma was noted in 55.67% of cases. We found no articles specifically studying the ratio of closed to open lesions. Only RABEMAZAVA *et al.* identified 72 open fractures versus 43 closed fractures in 221 cases of osteoarticular lesions. Elsewhere, it was the nature of the lesions—fractures, dislocations or even lacerations [4] [7] [14] [15]—that was specified. We did not identify any statistically significant difference between the risk of having a closed lesion and that of having an open lesion, nor any study to date that might explain it. There was no significant difference between the right and left hands with regard to the risk of skin lesion, with 49.1% and 50.9% respectively ($p = 0.000$). On the other hand, most of the injuries were open, with 47.4% among power workers, 30.6% among precision workers and 21.9% among students. Closed injuries mainly affected the right hand. There was no correlation between circumstances and the occurrence of open or closed lesions. SERINKEN *et al.* found no correlation between profession, age, social status, sector of activity and type of injury in general [12]. MORENO *et al.* made the same finding [26]. On the other hand, we have noted that complex traumas are mainly found among forced labourers (71% of them), the majority being nail traumas (36.2%). Conversely, closed traumas were more common among precision workers (60.7%), mainly contusions (10.8%). Finally, students were more likely to suffer phalangeal and metacarpal fractures, which accounted for 42.1% of injuries observed ($p = 0.00$). However, it should be pointed out that although nail trauma remains dominant (23.2%), there is no significant difference between contusion (14.77%), phalangeal fracture (17.53%) and metacarpal fracture (13.75%).

5. Conclusion

Recent trauma to the hand is common. They affect structures of the hand, either individually or in combination, and are the prerogative of the young, adult males, most of them forced laborers.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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