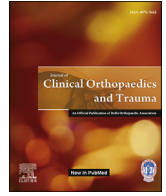




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How hand and wrist trauma has changed during covid-19 emergency in Italy: Incidence and distribution of acute injuries. What to learn?



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ABSTRACT

Background: the purpose is to gather and analyze the statistical datas of wrist and hand injuries admitted to the Hand and Reconstructive Microsurgery and Replantation Hub center of Careggi Hospital, Florence during the first two months of COVID-19 epidemic in Italy. The Authors investigated how the drastic changes in daily activities modified the epidemiology of hand trauma lesions.

Methods: The Authors analyzed the characteristics of hand and wrist traumatic disorders during the months of February and March comparing 2019 to 2020. Collected data included age distribution, traumatic etiology, diagnosis and type of surgical procedures.

Results: The total number of orthopedic and trauma patients significantly decrease in 2020 compared to 2019 (3360 vs 1470). The number of hand and wrist injuries didn't show a significant difference between 2019 and 2020 instead (192 vs 131). The overall number of patients hospitalized and surgically treated at our Operative Unit (OU) was 168 in 2019 and 120 in 2020. Male patients resulted prevalent (60,7 M vs 39,3F/2019; 63,2 M vs 36,8F/2020). In terms of patient age, in 2020 we registered a significant reduction of cases in the 20-35-year-old age group and a significant increase in the 51–65 and 66-80-year-old age groups. Traffic-related, sport-related and fortuitous injuries significantly decreased in 2020, while the number of domestic accidents significantly increased. Analyzing the Hospital Discharge Records (HDR), we found a significant increase in the number of proximal and middle phalanx fractures; no significant differences were found for other kinds of discharge diagnosis. As for the choice of surgical treatment options, no differences were found between 2019 and 2020.

Conclusion: Even during drastic movement restrictions and the prolonged suspension of work and leisure activities secondary to COVID-19 epidemic in 2020, hand and wrist traumas rate remained almost the same compared to the same period of the previous year. Nevertheless, a significant change in the etiology and patient age was registered. In fact, sport and traffic-related traumas decreased respect to domestic traumas, while the previous prevalent involvement of young adults was surpassed by accidental hand traumas in the elderly and active adults.

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1. Introduction

Acute injuries of the hand and wrist are common traumatic

lesions in the emergency department (ED).

Battiston et al. analyzed the Italian health authority database and extracted a total of 2 million patients diagnosed with an upper extremity trauma in 2013 and reported an average of 197.000 upper extremity injuries presenting to an ED. The most involved anatomic sites were fingers (38.4%), followed by shoulder (16.8%), distal third of the forearm (15.3%), wrist (15.2%), elbow (10.5%), and arm (3.7%). The domestic environment proved to be the most dangerous background (45.4%), while 16.2% of injuries were work-related. Other common sites were school (6.6%), public spaces (4.1%), and street (2.5%). Authors reported two peaks of incidence: one

Abbreviations: OU, Operative Unit; HDR, Hospital Discharge Records; ED, Emergency Department; ISS, Superior Institute of Health Italy; ICU, Intensive Care Units; ICD-10, International Code of Diseases.

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between age 9 and 14 years and another around age 65–87 years (data recorded by Superior Institute of Health-Italy- ISS).¹

Giustini et al. reported about 880.816 ED accesses per year due to hand injuries in Italy, with an incidence rate of approximately 14 per 100,000 inhabitants. Analyzing the HDR, they found that approximately 201,940 hospitalizations were due to upper limb injuries (incidence rate: 3,40 cases per 100,000 inhabitants per year).⁸ Traumas involving the distal part of the upper limb represent a serious economic, social and public health problem with physical and psychological influence on daily and work activities. In Italy, the first cases of COVID-19 were reported in February 2020 and after a serious increase in infection rate in the northern part of the country, the government established nationwide quarantine measures in an effort to stem the spread of coronavirus. In this perspective, national health policy was directed towards the development of new intensive care units (ICU) dedicated to COVID-19 patients' care at the expense of unnecessary units.² Like in other traumatological fields, the management of major hand and wrist trauma, which usually requires hospitalization and surgical treatment, was made even more challenging by this national emergency.⁷

How can movement restrictions, the effects of quarantine itself and the changes in health policies influence the type and incidence of hand and wrist trauma? No data have been published yet to describe the variation in the incidence of upper limb trauma during COVID-19 epidemic.

Our study is aimed to estimate the incidence of hand and wrist injuries in the Hand and Reconstructive Microsurgery and Replantation Hub center of Careggi Hospital, Florence by means of the data derived from HDR.

2. Materials and methods

Data were collected from the medical records of the orthopedic emergency room and outpatient hand surgery activities, seeking for the injuries concerning the wrist and the hand. In these documents, injuries were classified according to the International Code of Diseases (ICD-10) and derived from HDR. Pediatric patients were excluded. The study included patients hospitalized and surgically treated at the Hand and Reconstructive Microsurgery and Replantation Hub center of Careggi Hospital, Florence, comparing between data of the February–March period of 2020 and data of the same period of the previous year. Conservatively treated patients were excluded. The data characterization was performed through the analysis of 1) diagnosis of admission, 2) diagnosis of discharge, 3) Top 5 performed surgical procedures. To compare discrete quantitative variables, we used the Chi-Squared test with the Yates correction for small samples. The level of significance adopted in all analyzes was 5% with a 95% confidence interval. Statistical analysis was performed using the Statistical Package for Social Sciences, Version 13 (SPSS Inc., Chicago, Illinois).

3. Results

Analyzing the data from February to March 2019, the orthopedic and trauma patients were 3360 and 192 of these had a hand or wrist injury (5.6%). The number of patients hospitalized and operated was similar in 2019 and 2020 (87.5 vs 91.6%). The 87.5% (168) were hospitalized to our Operative Unit and surgically treated. Males have a higher incidence rate than females (60.7 vs 39.3). From February to March 2020, the traumatological patients were 1470 (significantly reduced than 2019) and 131 of these presented hand and wrist injuries (8.9%). The 91.6% (120) were hospitalized to our Operative Unit and surgically treated. Males have a higher incidence rate than females (63.2 vs 36.8). Regarding patients' age

distribution, we found a significant reduction of hand trauma cases in the 20–35 age group and a significant increase in the 51–65 and 66–80 age groups in 2020 compared to 2019 (Table 1, Fig. 1). In terms of traumatic etiology, in 2020, there was a significant reduction of traffic accident (5,8 vs 36,4%), sport accident (0,8 vs 16,8%) and fortuitous accident (0 vs 11,3%), while domestic accidents significantly increased (60 vs 13,6%) (Table 2, Fig. 2). The analysis of the discharge diagnosis in our HDR showed that in 2020 there was a significant reduction only in the ICD10 code for "Closed fracture, one or more proximal or middle phalanges" (Table 3, Fig. 3). As for the kind of surgical procedures performed in 2019 and 2020, we didn't find any statistically significant difference (Table 4, Fig. 4).

4. Discussion

In February and March 2020 when the COVID-19 outbreak, which would have soon become a pandemic, was spinning out of control, the Italian government quarantined the entire population of 60 million inhabitants. This drastic act strongly impacted the economic and daily activities of the Italian people. Daily, the EDs, especially the Trauma centers, are steadily under pressure even in normal conditions. During COVID-19 epidemic, a new type of symptomatic patient overcrowded the triage areas. Coughing, feverish patients thronged hospital hallways, while doctors struggled to save their lives and to economize the valuable beds in intensive care units. All eyes of the world were turned to the Italian unfolding disaster. In this scenario, what has changed in hand and wrist traumatic lesions? Were the hospitals really overbooked by patients with respiratory diseases?^{3,4}

The Authors describe the distribution of hand and wrist traumatic lesions analyzing the database of Careggi Hospital of Florence, scanning the most popular surgical procedures performed in the discipline of Hand and Reconstructive Microsurgery Unit. This unit represents the hub center for replantation procedures of the upper limb at the service of 3 millions of citizens who live in Tuscany and neighboring regions.¹ In the medical literature, a similar study has not been published before, as COVID-19 epidemic has generated a unique condition, never occurred in previous times. In human history, this is the first time that similar restrictions of personal freedom are imposed on a national and international scale in conditions of peace. Probably, there have been periods of lockdown during wars or in case of political earthquakes, but they have usually occurred in second and third world countries, without an efficient healthcare system. The only one condition that could be close to the Italian quarantine may be the proceedings adopted by Japanese authorities during the radiation disaster of the Fukushima nuclear accident. Tanigawa et al. reported the data from March 2011 to June 2012 related to workers employed to build the No. 4 reactor, followed by the development of stable cooling systems to achieve a stable cold shutdown of the reactors. A total of 19,594 workers were involved in the restoration process at the Fukushima Daiichi nuclear power plant and the distribution of the traumatic events changed a lot in the hospitals close to the nuclear central. The "civilian" limb injuries decreased while the "worker's" limb traumas (open and close fractures of the femur, scapular fractures, contusions, etc) increased.^{5,6}

Table 1
Age distribution of traumas between 2019 and 2020.

Age Groups	20–35	36–50	51–65	66–80	80–100	Tot
2019 n (%)	77 (44)	50 (29,8)	32 (19,1)	10 (6,0)	2 (1,1)	168 (100)
2020 n (%)	11 (9,2)	42 (35,1)	46 (38,3)	20 (16,6)	1 (0,8)	120 (100)

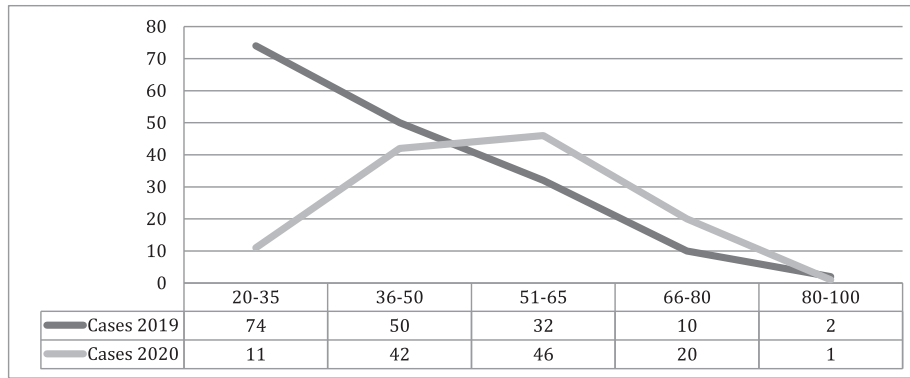


Fig. 1. Trauma causes distribution between 2019 and 2020.

Table 2
Trauma causes distribution between 2019 and 2020.

Trauma Causes	2019 n (%)	2020 n (%)
Traffic Accident	61 (36,4)	7 (5,8)
Work Related	35 (20,8)	38 (31,7)
Domestic	23 (13,6)	72 (60,0)
Sport Related	28 (16,8)	1 (0,8)
Fortuitous	19 (11,3)	0 (0)
Unknown	2 (1,1)	2 (1,7)
Total	168 (100)	120 (100)

The Authors underline the results derived by this study: the quarantine act restrictions caused a drastic decline in the incidence of orthopedic and trauma patients and consequently, the number of hand and wrist traumas decreased too. This data may be interpreted as the consequence of the real reduction of activities *tout court*, but even as a precise decision of the patient not to access the ED after “minor injuries”, relying on domestic self-care. However, another interpretation may be connected with the lockdown itself. The reduction of work activities forced the workers to spend their

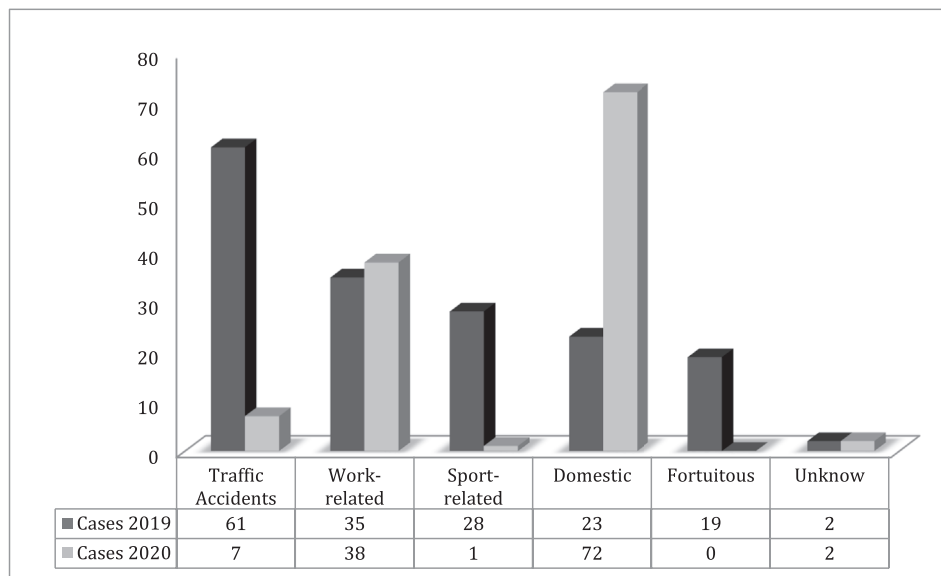


Fig. 2. Distribution of discharge diagnosis between 2019 and 2020.

Table 3
Diagnosis of discharge distribution between 2019 and 2020.

Diagnosis of discharge	2019 n (%)	2020 n (%)
Closed fracture, metacarpal bones, not specified site	21 (12,5)	18 (15,0)
Traumatic amputation of the fingers of the hand	24 (14,2)	22 (18,4)
Closed fracture, one or more phalanges, unspecified	32 (19,0)	17 (14,1)
Closed fracture, one or more proximal or middle phalanges	13 (7,7)	19 (15,8)
Closed fracture, wrist navicular (scaphoid)	9 (5,3)	2 (1,7)
Wound of fingers with complications	29 (17,3)	12 (10)
Fracture of distal third of forearm, unspecified	35 (21,0)	27 (22,5)
Closed fracture of carpal bone	5 (3,0)	3 (2,5)
Total	168 (100)	120 (100)

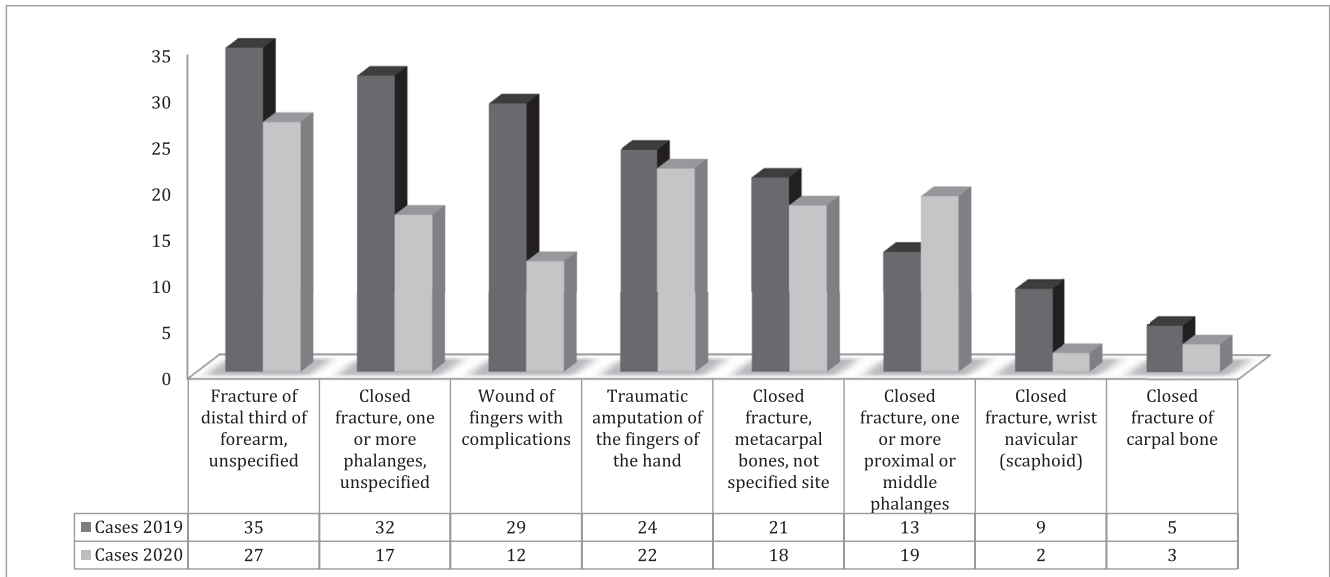


Fig. 3. Distribution of performed surgical procedures between 2019 and 2020.

Table 4

Surgical procedures performed between 2019 and 2020.

Surgical Procedures	2019 n (%)	2020 n (%)
Open reduction of fracture with internal fixation, radius and ulna	35 (20,8)	27 (22,5)
Open reduction of fracture with internal fixation, carpals and metacarpals	35 (20,8)	23 (19,2)
Open reduction of fracture with internal fixation, phalanges of hand	45 (26,8)	36 (30)
Replantation/revascularization	24 (14,3)	22 (18,3)
Other suture of tendon/nerve of hand and wrist	29 (17,3)	12 (10)
Total	168 (100)	120 (100)

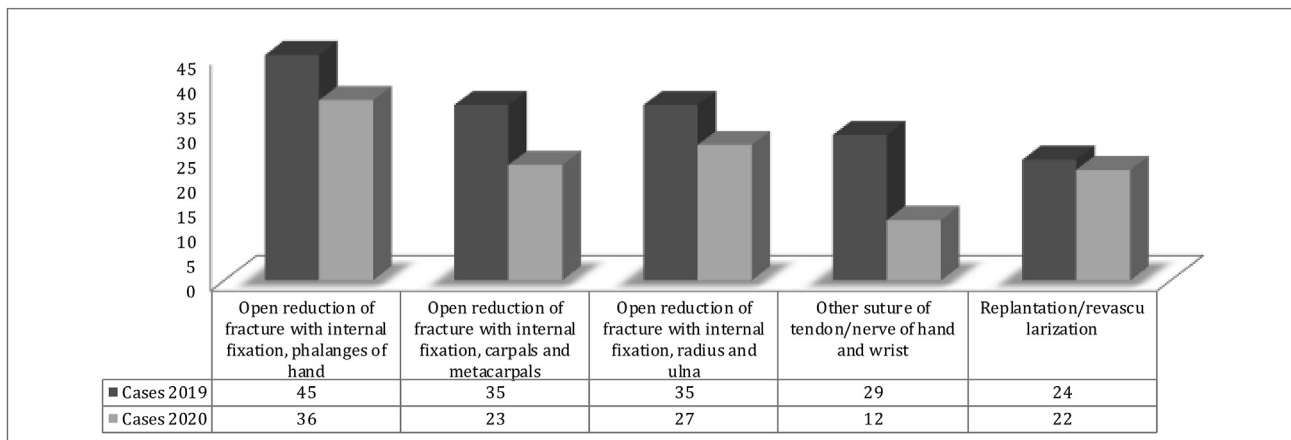


Fig. 4. Surgical procedures performed between 2019 and 2020.

mandatory holiday times, so only a few patients had a real need for an early return to daily activities and conservative treatment could be one of the best choices. Nevertheless, within the overall amount of traumatic patients, the incidence of hand and wrist injuries improved from 5.6% to 8.9% in 2020. In general, Tuscan people sustained less traumatic injuries, but the incidence of upper limb trauma increased during the COVID-19 quarantine. The predominance of the male gender was confirmed by data (more than 60%); whereas the distribution of hand and wrist lesions drastically changed. Analyzing the top 5 surgical procedures in inpatients,

traumas moved from sport and traffic-related injuries in the young adult population to work-related and domestic hurts in the elderly and in the adults. In 2020, adult and older patients sustained as many traumatic events as the previous year, probably because they were engaged in domestic, landscaping and bricolage working. Even during drastic movement limitation and restriction of work activities secondary to COVID-19 epidemic in February and March 2020, hand and wrist traumas rate remained almost the same compared to the same period of the previous year. Their prevalent distribution changed from sport and traffic-related traumas to

domestic traumas and they mainly involved active adults and the elderly rather than young patients. Finally, during coronavirus lockdown hand injuries remained a major –sometimes underestimated–health problem. The Authors expect that data related to Tuscany could be similar in the northern regions of Italy and the same research could be conducted in a wider scenario like western European countries.

Part of social and economic resources could be used to help healthcare authorities to create a prevention network of hand traumatic injuries. These activities should be improved and spread by public institutions and scientific societies of hand and micro-surgery concerned with hand and wrist traumatic lesions.

Authors' contributions

AP was the creator and the major contributor in writing the manuscript. DCA recorded all datas related to the article. AMN analyzed and interpreted the patient data regarding the type and number of hand trauma lesions. CS was the code reviewer contributor to the article datas and drafting of the manuscript.

All authors read and approved the final manuscript.

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Declaration of competing interest

None.

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