

## DID THE COVID-19 PANDEMIC CHANGE HIP FRACTURE INCIDENCE IN ELDERLY?

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### ABSTRACT

The purpose of this study was to analyze the impact of the national lockdown on femoral neck fractures occurred in the elderly in an Italian city with more than 650 thousand people. We analyzed data related to patients over 65 years-old with femoral neck fractures admitted between March 9<sup>th</sup> and April 24<sup>th</sup>, 2020 to five public Hospitals in Palermo and four private Hospitals during lockdown. A total of 152 patients with hip fracture were observed with a significant reduction compared with the same period in 2017-2019. During the Lockdown period a reduction was observed of the mean age from 84.2 ±2.6 years old to 82.5±1.2 with a higher incidence in males, particularly in < 80-year-olds. The national lockdown resulted in a decreased incidence of proximal femur fractures in the under 80 years-old population, mainly in males. No significant differences were noted in older patients.

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### 1. Introduction

The outbreak of a new coronavirus, known as severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) causing coronavirus disease 2019 (COVID-19), began in December 2019 with the first case occurring in China [1]. On January 30th, 2020, the World Health Organization (WHO) declared COVID-19 a public health emergency of international concern [2]. Since February 2020, COVID-19 rapidly spread to various areas of Italy, with the highest number of reported cases in the European continent. This caused serious damage to people's health and a huge economic burden [3]. Even if not all Italian regions had the same incidence of COVID cases, the Italian government imposed the same strict measures to the entire Country to reduce as much as possible the infection. Sicily had a low incidence of SARS-CoV-2 with just 54 cases out of 9172 on March 9<sup>th</sup>, 2020.

The COVID-19 pandemic had a major impact on the Italian public health system, requiring a large investment on urgent activities related to coronavirus disease [4]. As the pandemic progressed, all health sectors were involved by changing their daily work activities. As far as the orthopedics sphere is concerned, various factors impacted work activities. In Hospitals, non-urgent outpatient orthopedic and elective surgery activities were suspended [5]. In addition, private radiological centers were closed, and a significant reduction of post-traumatic and post-surgical rehabilitation services was observed [6]. For these reasons, several patients treated for orthopedic diseases (such as THA, TKA, ACL reconstruction) couldn't undergo rehabilitation. With regards to the emergency department, admissions for traumatic causes also decreased dramatically since the start of the pandemic and the national lockdown [7]. Proximal femur fractures continued to be observed in older people, following low grade trauma occurred in the domestic environment.

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Despite this factor, there was a shared belief that the national lockdown determined a reduction of the incidence of proximal femur fractures in the young-old<sup>19</sup> population (< 80 years-old), as these patients present less bone fragility, are more active and spend more time outside their homes for daily activities.

The aim of this study was to evaluate the incidence of hip fractures during the lockdown period in a low-incidence COVID-19 city with about 650,000 inhabitants.

## 2. Material and methods

We collected and analyzed data related to patients over 65 years-old with hip fractures admitted between March 9<sup>th</sup> and April 24<sup>th</sup>, 2020 in the city of Palermo, Sicily, Italy. All five public Hospitals in Palermo were included in the study (AOUP Palermo, ARNAS Civico, Ospedali Riuniti Villa Sofia-Cervello, Buccheri La Ferla, Ospedale G.F. Ingrassia) and the four private Hospitals (Clinica Orestano, Clinica Noto-Pasqualino, Clinica Latteri, Clinica Villa Serena) with an Orthopedic Department, which were allowed to perform trauma surgery during the lockdown phase. To evaluate the potential effects of the lockdown, data about hip fractures were collected regarding the same period (March 9<sup>th</sup> and April 24<sup>th</sup>) including the years 2017, 2018 and 2019. Data of each Hospital were extracted using a specific medical software used for patients' admission by each Hospital. For each patient, the following parameters were collected: date of birth, age, sex, hospital admission date, surgery day, type of fracture (intracapsular vs extracapsular), type of surgery (nailing vs hip replacement [hemi/total hip arthroplasty]).

### Statistical analysis

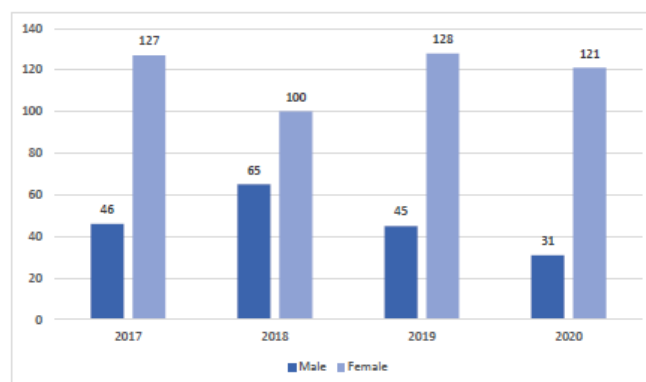
Frequencies were calculated for each parameter and for each year. The comparison between sex, age, type of fracture, and period observed (lockdown vs no lockdown) was carried out by using Chi-square test. Age at time of Hospital admission was dichotomized: patients  $\geq 65$  years-old and  $\leq 79$  years-old, and patients  $\geq 80$  years-old bases on the groups "Young Old" and "Old Old" previously accepted in the literature according the link between age and comorbidities. Data were analyzed by using SPSS statistical software, version 11.0 (SPSS, Inc., Chicago, IL, USA), and the level of significance was  $P \leq 0.05$  for all analyses.

## 3. Results

The total amount of proximal femur fractures observed during the lockdown period was 152 cases (Table 1). There were 121 females and 31 males. The incidence of hip fracture was lower during the lock-down period (152 cases) compared to the mean of cases observed in each year 2017- 2019 (mean  $170 \pm 4.6$  cases; min 165 – max 173), with a significant reduction of hip fractures in male subjects (31 cases in 2020 vs  $52 \pm 11.3$  in 2017-2019) (Figure 1).

	Lockdown Period	No Lockdown Periods (mean value 2017-2019)
Proximal femur fractures, n (%)	152	170
Males	31 (20.3)	52 (30.5)
Females	121 (79.7)	118 (69.5)
Age in years, mean $\pm$ SD	84.2 $\pm$ 2.6	82.5 $\pm$ 1.2
Intracapsular fractures, n (%)	52	64
Males	15 (28.8%)	25 (38.8)
Females	37 (71.2%)	39 (61.2)
Extracapsular fractures	100	106
Males	16 (16%)	27(25.4)
Females	84 (84%)	79 (74.6)

**Table 1. Comparison of proximal femur fractures (for age and type) between Lockdown period and No Lockdown period.**

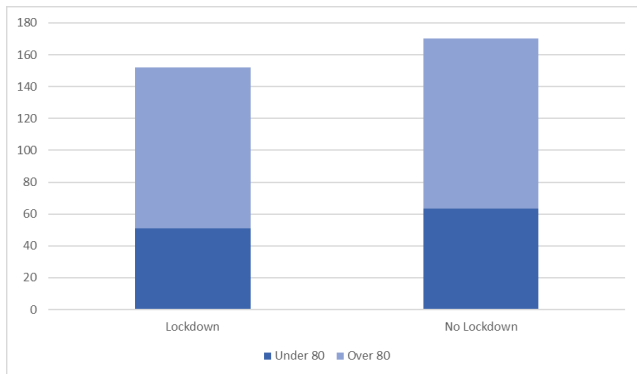


**Figure 1. Gender distribution of hip fractures during the same period of the last 4 years.**

This difference was not observed in female patients (121 cases in 2020 vs  $118.3 \pm 15.9$  in 2017-2019). The mean age during the lockdown period was  $84.2 \pm 2.6$  years and  $82.5 \pm 1.2$  years in the period 2017-19 with a statistically significant difference. During the lockdown period a significant reduction of fractures was observed in the <80 years-old group (51 cases in 2020 vs  $64 \pm 6$  cases in 2017-2019) (Table 2 and Figure 2). No significant differences were noted between males and females concerning patients over 80 years-old during lockdown and no-lockdown period.

	Lockdown Period	No Lockdown Periods (mean value 2017-2019)
Patients < 80 years old, n (%)	51	64
Males	12 (23.5)	21.6 (33.7)
Females	39 (76.5)	42 (66.3)
Patients > 80 years old, n (%)	101	106.7
Males	19 (18.8)	27.7 (26)
Females	82 (81.2)	79 (74)

**Table 2. Different distribution of hip fractures between over 80 years old and under 80 years old in the two different periods.**



**Figure 2. Number of Over 80 and Under 80 affected by hip fracture during Lockdown and No lockdown periods.**

#### 4. Discussion

COVID-19 spread rapidly to various areas of the world from Wuhan, Hubei province of China since December 2019 [1]. COVID-19 is characterized by strong infectivity, rapid spread, and general susceptibility [8]. The pandemic disease has changed individuals' lifestyles and has caused serious harm to people's health and a huge economic burden [3]. From the beginning of the pandemic until May 7<sup>th</sup>, 2020, a total of 3.672.238 patients were confirmed positive to the disease and 254.045 died worldwide [9]. On February 28<sup>th</sup>, 2020, the World Health Organization raised the risk assessment of spread and impact of COVID-19 to very high, at a global level [10].

In Italy, patients over 60 years old were those more affected by COVID-19, with a male to female ratio of 80% to 20%; with an older median age for women (83,4 years for women vs 79,9 years for men) [11].

Italy counts a high percentage of older people, and in particular men spend most of their time walking outdoors in public places. The Lockdown changed their habits reducing chances for trauma and incidence of fractures. From March 8<sup>th</sup> to June 3<sup>rd</sup>, 2020, the Italian Government implemented extraordinary measures aiming to limit viral transmission, including restrictions on freedom of movement, that intended to minimize the chances that non-infected people came into contact with infected individuals. In addition, the national and regional authorities allowed only urgent activities, and thus stopped those considered not urgent. Government measures and fear of contagion have also affected people's relationship with healthcare facilities, seen as possible places of infection. The COVID-19 pandemic left a deep mark in the health systems, leading to an important change in the way we intend the access to healthcare and its fruition [12,13]. During lockdown, the number of accesses to emergency rooms decreased greatly. In our institution we observed a severe reduction of hospitalization due to high-energy trauma fractures linked to the movement restriction imposed by the government. Despite this, we know that some kinds of fractures, mainly in elderly, occur typically at home due to low energy traumas. Specifically, hip fractures are one of the most common traumatic injuries among elderly, and these lesions are associated to functional loss and high rates of mortality [14]. In these subjects, simple domestic falls are sufficient to determinate fractures [15,16]. However, hip fractures could occur outdoors subsequent to a fall. These are typical among "young old" people and are often the result of the direct trauma to the trochanteric area when reaching the floor or against stairs or sidewalks [17]. Because of a severe

reduction in personal mobility that occurred during lockdown period, we expected a reduction in the incidence of femoral neck fractures in patients under 80 years old, mainly characterized by outdoor falls. According to our results, a significantly statistical reduction of hip fractures was noted in patients under the age of 80, and more specifically in males. A recent study [18] in two northern Italian Hospitals shows a decreased percentage of hip fractures in males during the first 8 weeks from the beginning of the Italian epidemic (in Piacenza 36.2% in 2019, 26.2% in 2020; in Parma 36.7% in 2019, 26.7% in 2020). The results of our study confirm what was already observed in northern Italy, affected by a high incidence of the pandemic disease. The study confirmed what we hypothesized about the reduction of hip fractures in the under 80s population, mainly in male patients.

This represents the first study related to the trend of hip fractures during the COVID-19 epidemic in a European city with more than 650 thousand people.

This study presents some limitations. First, these data only concern patients' admission for hip fractures and doesn't consider the total amount of accesses to the emergency room. Second, the general fear for the virus may have held back people from going to the Hospital, thus creating an underestimation of cases. Hence, only three years (2017-2019) were chosen to compare hip fractures observed during the lockdown period, potentially limiting the results obtained in our study.

#### 5. Conclusions

COVID-19 significantly changed peoples' habits, decreasing the number of trauma and access to the emergency room, particularly in the elderly category. The Governments' restrictions on circulation forced all people, especially elderly people with the fear of falling victim to this virus, to severely limit exits, thus reducing the risk of femur fracture. From this study, it is evident that the pandemic caused changes in the incidence of hip fracture in a densely populated city in southern Italy with a low-incidence of COVID-19.

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