

# Have There Been any Changes in the Epidemiology and Etiology of Maxillofacial Trauma During the COVID-19 Pandemic? An Italian Multicenter Study

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**Abstract:** Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) has had a significant impact on people's behavior. The aim of this study has been to evaluate how the SARS-CoV-2 pandemic has impacted the incidence and the features of maxillofacial fractures presented at 6 Italian tertiary centers. Clinical records of all the patients diagnosed for facial fractures between February 23 and May 23, 2019 and 2020 were retrospectively reviewed. Any differences in patient number and characteristics and fracture etiology and site between the 2 groups were then statistically analyzed.

There has been a 69.1% decrease in the number of incoming patients during the pandemic. The number of foreign patients has decreased significantly (23.3% versus 9.6%,  $P = 0.011$ ) while the average age has increased (38.6 versus 45.6 years old,  $P = 0.01$ ). Specific statistical significant differences for accidental falls (31.8% versus 50.1%,  $P = 0.005$ ) and sports injuries (16.9% versus 1.4%,  $P < 0.001$ ) were found. Concerning fracture sites, significant differences have been found in relation to nasal (22.5% versus 11.4%,  $P = 0.009$ ) and frontal sinus (0.9% versus 4.4%,  $P = 0.037$ )

fractures. In conclusion, SARS-CoV-2 pandemic has significantly changed the epidemiology and the etiology of facial traumas.

**Key Words:** COVID-19, fracture epidemiology, maxillofacial fracture, SARS-CoV-2, traumatology

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The extremely elevated infectious potential of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2),<sup>1</sup> associated with the problematic management of the early stages of the pandemic and the shortage of respiratory devices in the hospitals,<sup>2</sup> has forced governments to implement social and public health countermeasures. These have included social distancing, the closure of schools, the suspension of non-essential work and sports activities, a limitation of travel, and isolation at home for the majority of the population. It is well known how human lifestyles and behaviors influence fracture epidemiology.<sup>3–6</sup> Especially in a period of medical emergency, the epidemiological analysis of fracture patterns plays a crucial role in the development of a more efficient system for the planning of resource allocation.

Natural disasters and serious health emergencies have in the past influenced the epidemiology of pathologies that normally afflict the population.<sup>7–9</sup> In many ways, the SARS-CoV-2 pandemic can be considered one of these extraordinary occurrences and, therefore, it is reasonable to assume that an event with such a social impact will have drastically modified the epidemiology of fractures.<sup>10</sup> As far as we know, there are still no published reports evaluating the effects of the lockdown on maxillofacial fracture patterns.

The aim of this study has been to evaluate how the SARS-CoV-2 pandemic and the related public health measures have impacted on the incidence and the features of maxillofacial fractures.

## MATERIALS AND METHODS

The study involved 6 Italian maxillofacial departments in Naples, Milan, Verona, Catanzaro, Rome, and Sassari. The clinical records of all the patients diagnosed for facial fractures between February 23 and May 23, 2019 and 2020 were retrospectively reviewed. The patients were subdivided into 2 groups: "Group 2019" and "Group 2020." The data analyzed were: fracture etiology and site, nationality, gender, and age. All the fractures were diagnosed with radiological examinations and classified according to the AO-CMF criteria.<sup>11,12</sup>

The Group 2020 patients were managed following the latest guidelines to reduce the risk of infection for the health-care

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workers.<sup>13</sup> Every subject of this group was admitted in the hospital after a telephonic triage<sup>14</sup> during which the patient was questioned about signs or symptoms suggestive of SARS-CoV-2 infection.<sup>15–18</sup>

Differences between the 2 groups were analyzed using SPSS statistics 26.0 (IBM, Armonk, NY). Categorical variables were compared with the Fisher exact test. The level of statistical significance was set at  $P < 0.05$  with a 95% confidence interval.

## RESULTS

### Group 2019

This group included 236 patients (170 males mean age 37.1 years and 66 females mean age 43.5 years; 55 foreigners). The most frequent etiology encountered was accidental falls (75 patients, 31.8%) (Supplementary Digital Content, Table 1, <http://links.lww.com/SCS/C72>). Several etiology variations between the males and females were detected (Fig. 1). Accidental falls were responsible for 34.4% of the fractures in Italian patients and 9.1% in foreigners. In the latter group, the most frequent cause was assaults (36.4%) while in the Italian pool it was responsible for only 19.8% of the fractures.

The series of 236 patients showed 325 fractures in total (Supplementary Digital Content, Table 2, <http://links.lww.com/SCS/C72>). The most frequent fracture site was the mandible (115 cases, 35.4%), followed by nose (73 cases, 22.5%), zygoma (64 cases, 19.7%), and orbit (51 cases, 15.7%) (Supplementary Digital Content, Table 2, <http://links.lww.com/SCS/C72>).

### Group 2020

This group included 73 patients (53 males mean age 40.1 years and 20 females mean ages 53.6 years; 7 foreigners). The most frequent etiology encountered was accidental falls (37 cases, 50.7%) (Supplementary Digital Content, Table 1, <http://links.lww.com/SCS/C72>). Both men and women recorded, as the most common etiological cause, accidental falls (Fig. 1). Accidental falls were responsible for 51.6% of the fractures in Italian patients and 44.4% in the foreigners. The pool of 73 patients showed 114 fractures. The most frequent fracture site was the mandible (36 cases, 31%) (Supplementary Digital Content, Table 2, <http://links.lww.com/SCS/C72>).

### Results of the Statistical Analysis

A significant decrease in the number of incoming patients was recorded between these 2 quarters: 236 patients in 2019 versus 73 patients in 2020 (–69.1%) (Supplementary Digital Content, Table 3, <http://links.lww.com/SCS/C72>). Significant differences

were detected for age (38.6 versus 45.6 years old,  $P = 0.01$ ). Furthermore, there has been a significant reduction in the number of foreign patients (23.3% versus 9.6%,  $P = 0.011$ ). The study of the different causes of the fractures revealed specific statistically significant difference for accidental falls (31.8% versus 50.1%,  $P = 0.005$ ) and sports injuries (16.9% versus 1.4%,  $P < 0.001$ ) (Supplementary Digital Content, Table 1, <http://links.lww.com/SCS/C72>). Regarding fracture location, differences were significant for nose (22.5% versus 11.4%,  $P = 0.009$ ) and frontal sinus (0.9% versus 4.4%,  $P = 0.037$ ) sites (Supplementary Digital Content, Table 2, <http://links.lww.com/SCS/C72>).

## DISCUSSION

The measures put in place to stem the spread of SARS-CoV-2 have profoundly changed the lifestyle habits of people worldwide. The effects of the pandemic on the access to hospitals for head and neck cancer have already been reported by several authors.<sup>19,20</sup> However, there are no reports investigating the effects of lockdown on the epidemiology of facial fractures.

The most evident effect of the measures taken by the Italian government was a reduction of 69.1% in the number of presentations for treatment for facial fractures compared to the previous year (Supplementary Digital Content, Table 3, <http://links.lww.com/SCS/C72>). The most marked reduction (–88.3%) was recorded in the San Paolo Hospital of Milan. In these months, Lombardy was the region of Italy most seriously struck by the COVID-19 infection, bringing its healthcare system to the brink of collapse, and this implied a more restrictive action to contain the contagion and to limit the spread of the virus. This may be the reason why the San Paolo Hospital experienced such a decreased rate of hospitalization.

The mean age of the patients was significantly higher in the 2020 Group (38.6 versus 45.6 years old,  $P = 0.01$ ). Young and active people have in fact experienced the most radical change in lifestyle. The consequent elimination of activities involving a risk of injury among these subjects has caused a reduction in the occurrence of trauma. The benefits of this effect have been less evident among the elderly population, who are more prone to accidental fractures within the home environment. Furthermore, there has been a significant reduction in the number of foreign patients (23.3% versus 9.6%,  $P = 0.011$ ). This decrease is certainly related to the serious effects of the pandemic on the travel sector and, indeed, has been particularly evident in centers with high tourist flows (eg, Rome, Naples, and Milan). It is conceivable that it will exert a strong influence on the epidemiology of trauma in summer tourist centers, such as Sassari and Catanzaro, in the next few months.

As expected, the most significant impact has been on the etiology of the fractures (Supplementary Digital Content, Table 1, <http://links.lww.com/SCS/C72>). Accidental falls, particularly in the home environment, have experienced a significant exponential increase (31.8% versus 50.1%,  $P = 0.005$ ). On the contrary, the incidence of sports accidents has decreased dramatically (16.9% versus 1.4%,  $P < 0.001$ ), given that one of the first measures adopted provided for the suspension of any physical activity. Interestingly, the incidence of work injuries and RTAs has not decreased and, indeed, no significant differences have been recorded (Supplementary Digital Content, Table 1, <http://links.lww.com/SCS/C72>). An increase in the incidence of suicide attempts between the 2 groups has been detected but it has not proved to be significant. This sad statistic may reflect the negative impact of the pandemic on the economy, health, and relationships.<sup>21,22</sup> Many activities have been forced to close and many people have lost their jobs, creating a serious economic crisis. In Group 2020, 2 patients out of 73 attempted suicide. This statistic must not be underestimated in that it reports a small percentage of a

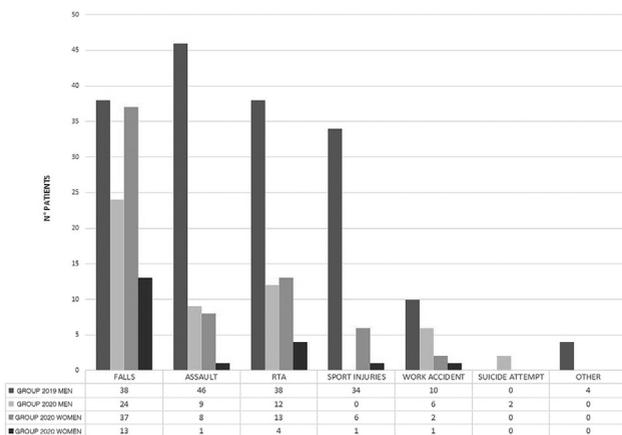


FIGURE 1. Etiology frequency based on sex and nationality.

greater number of people who did indeed succeed in killing themselves.

Concerning the fracture site, significant differences have been found in relation to nasal (22.5% versus 11.4%,  $P = 0.009$ ) and frontal sinus (0.9% versus 4.4%,  $P = 0.037$ ) fractures (Supplementary Digital Content, Table 2, <http://links.lww.com/SCS/C72>). Nasal fractures are typical results of low kinetic trauma, such as is caused by accidental falls. The decrease in the frequency of nasal fractures could be linked to an under-diagnosis. At a time when the hospital is seen as an outbreak of infection, some patients may have avoided seeking assistance for such traumas considering them to be only minor injuries.

## CONCLUSIONS

The epidemiology of maxillofacial fractures has changed markedly during the SARS-CoV-2 pandemic with an 88.3% reduction in admissions compared with the previous year. Countermeasures taken by the various national governments to combat the spread of the virus will affect people's lives for a long time. An awareness of the effects of these measures on the epidemiology of facial fractures is a fundamental factor in the decision-making process in relation to the allocation of resources and health personnel. Moreover, such knowledge may provide valuable information for the determination of the prevention measures necessary to reduce the incidence of facial injuries caused by accidental falls, an injury that has become the most common cause of maxillofacial fractures during the pandemic era.

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