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ORIGINAL ARTICLE

Effect of social distancing during the COVID-19 pandemic on the occurrence of maxillofacial fractures in a Finnish Tertiary Trauma Centre

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ABSTRACT

Objectives: To evaluate the effects of the COVID-19 pandemic on the occurrence of facial fractures in a tertiary trauma centre.

Materials and methods: All facial fracture patients evaluated by an oral and maxillofacial surgeon during the first stage of the pandemic in spring 2020 were included in the study and compared to the corresponding periods in 2017 and 2018. Differences in age, sex, timespan from accident to diagnosis of facial fracture, injury mechanism, fracture type, treatment method, associated injuries (AIs), and alcohol consumption at the time of injury were analyzed between the forementioned time periods.

Results: The total number of patients ($n = 107$) during the COVID restriction period did not differ from the previous years (116 and 113 patients in 2017 and 2018, respectively, $p=.368$). Injury mechanism was less often assault during 2020 compared with previous years (14.0% in 2020 versus 31.8% in 2018 and 30.2% in 2017). Non-intracranial AIs were more common in the COVID period (28% in 2020 versus 14.2% in 2018 and 21.6%). The distribution was statistically significant ($p=.041$). Alcohol use prior to injury varied between years ($p=.023$). Alcohol was more often related to the injuries in 2020 compared to the previous years.

Conclusions: COVID restrictions did not affect the overall facial fracture occurrence, but there was a significant decrease in assaults. The proportion of alcohol-related injuries did not decrease despite restrictions.

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Oral and maxillofacial trauma; aetiology; COVID-19; associated injuries

Introduction

SARS-CoV-2 virus (COVID-19) emerged at the end of 2019 in Wuhan, China, and caused a global outbreak. In mid-March 2020, WHO declared a pandemic status for COVID-19 [1–3]. The pandemic has caused nations to order multiple travel and movement restrictions and limit personal and social gatherings and activities.

On 12 March 2020, the Finnish government recommended social distancing as a way of controlling the outbreak, and on March 16th the Emergency Powers Act was implemented. Under the Emergency Powers Act, the rights and everyday lives of individuals can be restricted only if this is necessary to protect the population. On 17 March, contact teaching from the elementary school upwards was banned, and social gatherings of 10 people or more were prohibited. Restaurants and bars were closed on 4 April 2020. Restrictions were partially lifted towards the end of spring due to successful control of the outbreak, and, for example, restaurants and bars were allowed to re-open on 1 June [4]. By the end of 2020, Finland had had over 36,000 confirmed cases.

The aetiology and epidemiology of oral and maxillofacial injuries vary depending on many factors. The main causes for facial injuries in more developed countries are interpersonal violence (IPV), traffic accidents (motor vehicle and pedestrian), falls, sports and leisure activities [5]. Alcohol plays a notable role in these injuries; in a recent study, 55% of facial fracture patients were under the influence of alcohol at the time of injury [6]. Overall, the rate of trauma can be controlled by legislative means such as laws for the use of seat belts and helmets and restrictions and interventions regarding driving under the influence of alcohol [7]. Cameron et al. [8] showed that alcohol outlet (bars, nightclubs, etc.) density correlates with the amount of violence in the area.

We hypothesized that the occurrence of facial injuries, especially injuries caused by assaults, would be lower due to the social restrictions imposed during the COVID outbreak.

Materials and methods

Study design

To investigate the effect of COVID-19 and restrictions on the aetiology and treatment of maxillofacial fractures, a

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retrospective cohort study was performed. Patient data of a tertiary trauma centre of the Helsinki University Hospital, Helsinki, Finland in a 11-week period between 12 March and 31 May 2020 was evaluated and compared with the corresponding time periods in 2017 and 2018. This emergency department has a catchment area of approximately 1.6 million inhabitants.

Inclusion criteria

Patients 18 years of age or older with any facial fracture were included in the study.

Study variables

The outcome variable was occurrence of facial fractures during the time periods under review. Predictor variable was COVID pandemic. As additional variables, differences in age, sex, timespan from accident to diagnosis of facial trauma (days), injury mechanism, fracture type, treatment method (surgical/non-surgical), associated injuries (AIs) (yes/no), and alcohol consumption at the time of injury (yes/no/unknown) were analyzed between the time periods of interest.

Injury mechanism was categorized as assault, bicycle accident, motorized vehicle accident, fall at the same level, fall from heights, and other. Fracture type was categorized as follows: isolated mandibular, zygomatic complex (ZC), orbital, nasal or maxillary, upper third (orbital roof or frontal sinuses), combined midface, combination of facial thirds (including panfacial), and other. Injury was categorized as an AI if there was a fracture or ligament injury outside the facial skeleton, blunt cervical vessel injury, intracranial injury, or a thoracic or intra-abdominal injury.

The study protocol was approved by the Internal Review Board of the Head and Neck Centre, Helsinki University Hospital, Helsinki, Finland (HUS/356/2017 and HUS/58/2020).

Statistical analysis

We used the software package IBM SPSS for Macintosh (version 26.0, IBM Corp., Armonk, NY) for statistical analyses. Categorical variables were cross-tabulated and analyzed with Pearson's Chi-square test, or Fisher's exact test if the expected cell values were below 5. As *post hoc* analyses, the *Z* test was used for pairwise comparisons with a Bonferroni correction for multiple comparisons. The strength of the association was assessed with Cramer's V. One-way analysis of variance was used to compare differences between study groups in continuous variables. We considered p-values $<.05$ as statistically significant throughout the study.

Results

Altogether data of 336 patients (107 in 2020 and 113 and 116, respectively, in 2018 and 2017) were evaluated. The total number of patients during the COVID restriction period did not differ from the corresponding periods of the previous years ($p=.368$). Timespan from accident to diagnosis remained at the same level as in the previous years (mean 1.1 versus 1.1 days in 2018 and 1.0 days in 2017). No differences were found in sex, age or fracture type between years. Descriptive statistics are presented in Table 1.

Distribution of injury mechanisms was not statistically significantly between studied years; however, assaults occurred less often during the pandemic period compared with the previous years (14.0% in 2020 versus 31.8% in 2018 and 30.2% in 2017). The difference was statistically significant in the post hoc analysis.

The use of alcohol prior to injury varied statistically significantly between years ($p=.023$). Alcohol was more often related to injury in 2020 compared to the previous years.

Distribution of non-intracranial AIs was statistically significant between studied years ($p=.041$). Non-intracranial AIs were most common in the COVID period (28% in 2020 versus 14.2% in 2018 and 21.6%). In addition, Treatment was more often surgical in 2017 compared to 2018 and 2020.

Discussion

The effects of COVID-19 restrictions on facial fracture occurrence and aetiology were analyzed. According to Google mobility data, there was a 62% decrease in mobility around transit stations and a 45% decrease around retail and recreation areas in the regions surrounding Helsinki compared with pre-lockdown time [9]. These figures reflect the effects of social distancing policies, but interestingly the policies did not impact the overall facial fracture rate, as it remained at the same level during the restrictions compared with previous years. However, there was a significant change in the distribution of injury mechanisms as we hypothesized; the proportion of facial fractures caused by assault decreased from 31.8 and 30.2% in 2018 and 2017, respectively, to 14.0% in 2020. The recently published articles by Boutray et al., Ludwig et al., and Yeung et al. all reported a significant decrease in facial trauma patients, respectively in France, USA, and London, UK during the lockdown [10–12]. Reasons for this difference are unknown; however, one hypothesis is that as the pandemic situation in spring 2020 was more severe in USA, France, and the UK than in Finland, and this could have had an effect on the ramifications and severity of the lockdown [13]. Intriguingly, Ludwig et al. reported a significant increase in assaults [11]. This is contrary to our findings and raises a question about potential differences in these two groups and the impact of lockdown measures in these two countries. Assaults and facial injuries are connected to the density of people and bars/nightclubs [8]. The decrease in assaults in our findings can be explained by distancing restrictions and closing of these types of establishments.

Blackhall et al. reported a change in the treatment methods of oral and maxillofacial patients during the lockdown in UK [14]. They discussed about the increase in non-surgical treatment methods to reduce the time of surgery and therefore limit potential exposure to COVID19-virus. They also reported a significant reduction in the number of facial fractures. This highlights the differences in the protocols and

Table 1. Study variables stratified by time period.

Characteristic	2020 ($n = 107$)	2018 ($n = 113$)	2017 ($n = 116$)	p Value*
Age (years)				
Range (median)	20–91 (53)	18–102 (45)	18–100 (49.5)	
Mean ± SD	52.5 ± 20.22	47.9 ± 20.65	51.0 ± 22.74	.256
Sex				.105
Male	68 (63.6)	82 (72.6)	69 (59.5)	
Female	39 (36.4)	31 (27.4)	47 (40.5)	
Timespan from accident to diagnosis				
Range (median)	0–54 (0)	0–10 (0)	0–20 (0)	
Mean ± SD	1.1 ± 5.43	1.1 ± (1.79)	1.0 ± 2.55	.981
Range (median) in 18–69-year-olds	0–54 (0)	0–10 (0)	0–20 (0)	
Mean ± SD in 18–69-year-olds ($n = 262$)	1.4 ± 6.33	1.2 ± 1.89	1.2 ± 2.81	.921
Range (median) in 70-year-olds or older	0–2 (0)	0–4 (.5)	(0–4) 0	
Mean ± SD in 70-year-olds or older ($n = 74$)	.3 ± .60	.9 ± 1.23	.4 ± .91	.100
Injury mechanism				.081
Assault	15 (14.0)[a]	36 (31.9)[b]	35 (30.2)[b]	
Bicycle	12 (11.2)	15 (13.3)	11 (9.5)	
Motorized vehicle accident	4 (3.7)	4 (3.5)	7 (6.0)	
Fall at the same level	47 (43.9)	42 (37.2)	42 (36.2)	
Fall from heights	13 (12.1)	6 (5.3)	7 (6.0)	
Other	16 (15.0)	10 (8.8)	14 (12.1)	
Fracture type				.487
Isolated mandibular	16 (15.0)	26 (23.0)	28 (24.1)	
Isolated zygomatic complex	30 (28.0)	24 (21.2)	26 (22.4)	
Isolated orbital	25 (23.4)	20 (17.7)	17 (14.7)	
Isolated maxillary	3 (2.8)	4 (3.5)	5 (4.3)	
Isolated nose	7 (6.5)	7 (6.2)	6 (5.2)	
Combination mid-face	8 (7.5)	17 (15.0)	13 (11.2)	
Upper third	4 (3.7)	3 (2.7)	1 (.9)	
Combination of thirds	12 (11.2)	11 (9.7)	20 (17.2)	
Other	2 (1.9)	1 (0.4)	0	
Treatment				.026
Surgical	30 (28.0)	31 (27.4)	49 (42.2)	
Non-surgical	77 (72.0)	82 (72.6)	67 (57.8)	
Associated injury (excluding intracranial)				.041
Yes	30 (28.0)	16 (14.2)	25 (21.6)	
No	77 (72.0)	97 (85.8)	91 (78.4)	
Intracranial injury				.300
Yes	18 (16.8)	11 (9.7)	16 (13.8)	
No	89 (83.2)	102 (90.3)	100 (86.2)	
Any associated injury				.067
Yes	40 (37.4)	26 (23.0)	36 (31.0)	
No	67 (62.6)	87 (77.0)	80 (69.0)	
Use of alcohol at the time of the injury				.023
Yes	40 (37.4)	26 (23.0)	38 (32.8)	
No	38 (35.5)	62 (54.9)	43 (37.1)	
Unknown	29 (27.1)	25 (22.1)	35 (30.2)	

Data presented as n (%) if not otherwise specified. NS: non-significant; NA: not applicable.
*Using Pearson's Chi-square, Fisher's exact, or Mann–Whitney U test.
[a,b]Different subscript letters denote subsets of categories whose column properties differ significantly from each other in post hoc analysis.

lockdown measures put in place during the first steps of the pandemic and reflect the state of the pandemic in different countries during the spring of 2020. In the present study, treatment was more often surgical in 2017 compared to 2018 and 2020, which was not, however, related to COVID. Reduced surgical treatment rates are explained by a recent change in the treatment policy of orbital fractures in our clinic. From 2018 forward asymptomatic orbital blow-out fracture patients and patients with mild symptoms have more often received close follow-up instead of surgery, which has reduced the need for orbital fracture surgery.

There was a relatively high number of patients with AIs (37.4%) in 2020. A significant difference was detected in non-intracranial AI occurrence in 2020 compared with previous years, however, there was no significant difference in intracranial injuries (16.8% in 2020 versus 9.7% in 2018 and 13.7% in 2017). The reason for the increase in AIs is unknown, but one hypothesis is that it arises because of an increase in falls and an older patient cohort in 2020. Toivari et al. [15] showed in 2019 that these two aetiological factors contribute to a higher risk for AIs.

Alcohol use has been related to increased facial injury risk and severity in various studies [16,17]. It has been shown to be a major factor in facial injuries, especially in IPV and traffic accidents [18]. Quite interestingly, the patients in 2020 had used alcohol prior to injury compared to previous years (37.4% in 2020 versus 23.0% in 2018 and 32.8% in 2017). The Finnish National Supervisory Authority for Welfare and Health (Valvira) data show that the overall alcohol sales in Finland during the 3months (March–May) in spring 2020 decreased only 1.8% compared with the previous year despite restaurants and bars closing on 4 April 2020 [19]. Thus, the COVID restrictions seemed to decrease facial fracture rates caused by assaults, but not the alcohol consumption

preceding facial fracture. However, patients did not report the amount of alcohol used.

The previous finding regarding alcohol sales combined with the overall injury rate not differing significantly is intriguing. It means that according to our data, the total facial injury rate is not solely dependent on the use of alcohol, and, more importantly, although the number of assault-associated injuries decreased significantly, this did not affect the total facial injury rate. One hypothesis is that the use of alcohol occurred mainly in the home and it caused the increase in falls. Unfortunately, the hypothesis is speculative since our retrospective data do not specify the circumstances of injury, and the true rates of facial fractures may be underestimated. Our data arealso based on a relatively short period of time, so comparisons over a longer time period should be conducted in the future, in which case further differences of pandemic and restrictions may be detected. It is possible that patients did not seek treatment during the pandemic period as often as during non-pandemic times and the lockdown caused by the COVID may have increased for example domestic violence.

Conclusion

COVID restrictions did not affect the overall facial fracture occurrence, but there was a significant decrease in assaults. Non-intracranial AIs were more common during the COVID restriction period compared to the previous years. Further studies are required to determine whether, for example, domestic violence has gone unreported and patients seek treatment for sequelae.

Disclosure statement

No potential conflict of interest was reported by the author(s).

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