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Original Research

The Effect of the COVID-19 Pandemic on Maxillofacial Trauma treated in a Hospital Emergency Room: a Comparative Study

O Efeito da Pandemia de COVID-19 no Trauma Maxilofacial atendido em Pronto-Socorro Hospitalar: um Estudo Comparativo

El Efecto de la Pandemia de COVID-19 en el Trauma Maxilofacial en la Sala de Urgencias de un Hospital: un Estudio Comparativo

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Abstract

Background: The COVID-19 pandemic has greatly impacted medical and surgical activities, and a decline in maxillofacial trauma incidence was noticed during the lockdown period. Objective: To evaluate the effects of the COVID-19 pandemic on the incidence of maxillofacial trauma in patients treated in a level I trauma center hospital. Methods: Data from patients seen between January and December 2019 (the pre-pandemic group), and during the same period in 2020 (the pandemic group), were analyzed. Personal data, causes and types of maxillofacial trauma sustained were extracted and statistically compared ($p<0.050$). Results: There were 1034 patients in the pre-pandemic group and 890 patients in the pandemic group. There was an increase in the number of motor vehicle accidents and a decrease in the number of sports accidents ($p<0.001$) in the pandemic group. The pandemic group exhibited a decrease in the number of patients with maxillofacial fractures, and dentoalveolar trauma, and an increase in the number of soft tissue injuries ($p<0.001$). Compared with those of other studies, our results confirmed a decrease in the number of maxillofacial trauma patients, with variations in personal data for various reasons. Conclusion: There was a decrease in the incidence of maxillofacial fractures and dentoalveolar trauma and an increase in the incidence of soft tissue injuries, with variations in the types of these traumas, indicating the possible influence of differences in the causal factors during the pandemic.

Descriptors: COVID-19; Maxillofacial Injuries; Jaw Fractures; Epidemiological Studies.

Resumo

Fundamento: A pandemia de COVID-19 impactou muito as atividades médicas e cirúrgicas, e um declínio na incidência de trauma maxillofacial foi relatado durante o período de lockdown. Objetivo: Avaliar os efeitos da pandemia de COVID-19 na incidência de trauma maxilofacial em pacientes tratados em um hospital de trauma nível I. Métodos: Foram analizados os dados de pacientes atendidos entre janeiro e dezembro de 2019 (grupo pré-pandemia) e durante o mesmo período de 2020 (grupo pandemia). Dados pessoais, causas e tipos de trauma maxillofacial sofrido foram extraídos e comparados estatisticamente ($p<0.050$). Resultados: Houve 1034 pacientes no grupo pré-pandemia e 890 pacientes no grupo pandemia. Houve aumento do número de casos de acidentes de trânsito e uma diminuição do número de acidentes esportivos ($p<0,001$) no grupo pandemia. Houve diminuição do número de pacientes com fraturas maxillofaciais e de trauma dentoalveolar e um aumento do número de trauma de tecidos moles ($p<0,001$) no grupo pandemia. Comparados com os de outros estudos, nossos resultados confirmaram uma diminuição no número de pacientes de trauma maxillofacial, com variações nos dados pessoais por razões diversas. Conclusão: Houve uma diminuição na incidência de fraturas maxilofaciais e trauma dentoalveolar e um aumento na incidência de lesões de tecidos moles, com variações nos tipos desses traumas, indicando a possível influência das diferenças nos fatores causais durante a pandemia.

Descritores: COVID-19; Traumatismos Maxilofaciais; Fraturas Maxilomandibulares; Estudos Epidemiológicos

Resumen

Antecedentes: La pandemia de COVID-19 ha tenido un gran impacto en las actividades médicas y quirúrgicas, y durante el período de bloqueo se informó una disminución en la incidencia de traumatismos maxilofaciales.Objetivo: Evaluar los efectos de la pandemia de COVID-19 en la incidencia de trauma maxilofacial en pacientes atendidos en un hospital de trauma nivel I. Métodos: Se analizaron datos de pacientes atendidos entre enero y diciembre de 2019 (grupo prepandemia) y durante el mismo período de 2020 (grupo pandemia). Se extrajeron y compararon estadísticamente datos personales, causas y tipos de traumatismo maxilofacial sufrido ($p<0,050$). Resultados: Hubo 1034 pacientes en el grupo prepandémico y 890 pacientes en el grupo pandémico. Hubo un aumento en el número de accidentes de tránsito y una disminución en el número de accidentes deportivos ($p<0,001$) en el grupo de pandemia. Hubo una disminución en el número de pacientes con fracturas maxilofaciales y traumatismo dentoalveolar y un aumento en el número de traumatismos de tejidos blandos ($p<0,001$) en el grupo pandémico. Comparados con los de otros estudios, nuestros resultados confirmaron una disminución en el número de pacientes con traumatismo maxilofacial, con variaciones en los datos personales por diferentes motivos. Conclusión: Hubo una disminución en la incidencia de fracturas maxilofaciales y traumatismos dentoalveolares y un aumento en la incidencia de lesiones de tejidos blandos, con variaciones en los tipos de estos traumatismos, lo que indica la posible influencia de diferencias en los factores causales durante la pandemia.

Descriptores: COVID-19; Traumatismos Maxilofaciales; Fracturas Maxilomandibulares; Estudios Epidemiológicos.

INTRODUCTION

In December 2019, COVID-19, caused by the SARS-CoV-2 virus, was first reported in China as a new coronavirus disease. This outbreak quickly reached pandemic status, affecting all continents[1]. The pandemic in Brazil grew quickly,

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with more than 5.4 million confirmed cases. The number of cases in Brazil was surpassed only by that in the United States and India[2].

The rapid increase in the number of cases led the World Health Organization to declare COVID-19 a global pandemic[3,4]. Worldwide, health services and health professionals started to follow specific protocols, mainly suspending elective procedures and using personal protective equipment[5-9].

Patient demand for health services also decreased, related to the reinforcement of restrictive measures and the fear of contracting the virus in the hospital environment[5]. In general, hospital oral and maxillofacial surgery services continued to treat patients, with restrictions on elective surgeries[1,6,8].

Studies on the occurrence of maxillofacial trauma during the pandemic have demonstrated a decrease in the number of cases in Europe, the USA, Asia, and Australia. Additionally, changes in personal data, etiologic factors, and fracture locations were described during the pandemic[3,4,9,10-15]. However, only a few studies have evaluated maxillofacial trauma and the COVID-19 pandemic in Brazil. A decrease in the number of maxillofacial trauma cases was reported, as well as a significant reduction in hospitalizations to hospital dentistry[16,17].

This study evaluated the effects of the COVID-19 pandemic on the presentation of patients with maxillofacial trauma in the emergency room of a level I trauma center hospital in São Paulo, Brazil.

MATERIAL AND METHOD

This study was conducted using the records of patients with maxillofacial trauma treated at the oral and maxillofacial surgery clinic of a level I trauma center hospital of São Paulo City, São Paulo State, Brazil. Patient data recorded between January and December 2019 (pre-pandemic group) and during the same period in 2020 (pandemic group) were included irrespective of age, sex, race, or socioeconomic status. Patients with incomplete medical records were excluded. This study was approved by the human research ethics committees of the institutions involved.

Data regarding variables such as age, sex, and etiology were collected. The types of sustained maxillofacial trauma were categorized as follows: maxillofacial fractures; soft tissue injuries; dentoalveolar trauma; temporomandibular joint (TMJ) trauma; and associated trauma, in which more than one type of trauma was reported[18].

Fractures were categorized based on location. The possibility of fracture in more than one location was considered. Soft tissue injuries were categorized as lacerations, gunshot wounds, or contusions. Dentoalveolar trauma was classified as concussion, tooth fracture, lateral, intrusive, and extrusive luxations, dental avulsion, or fracture of the dentoalveolar process[19]. Patients with TMJ trauma had clinical conditions similar to traumatic arthritis[20].

The collected data were tabulated. The Mann–Whitney test was used to identify differences in mean age between groups. The likelihood ratio test was used to identify differences in sex, age group, cause, and type of maxillofacial trauma between groups. The Fisher exact test was used to identify differences in fracture location, soft tissue trauma, and dentoalveolar trauma between groups. The Statistical Package for Social Sciences (SPSS) version 25.0 (IBM Software Group) was used for statistical analyses. The level of significance was set at $p \leq .050$.

RESULTS

A total of 1034 patients in the pre-pandemic group and 890 patients in the pandemic group who experienced maxillofacial trauma, were included in this study. The mean age was 30.3 years in the pre-pandemic group and 32.4 years in the pandemic group, and there was no significant difference between the groups (p=0.079). The most prevalent age group was children aged 9 years or younger, with 244 patients (23.6%) in the pre-pandemic group and 191 patients (21.5%) in the pandemic group, and there was no significant difference between the groups (p=0.338). There was a predominance of males in both groups, with 670 patients (64.8%) in the pre-pandemic group and 601 patients (67.5%) in the pandemic group, and there was no significant difference between the groups (p=0.207). There was a predominance of falls, with 516 cases (49.9%) in the pre-pandemic group and 474 cases (53.3%) in the pandemic group, followed by interpersonal violence with 292 cases (28.2%) in the pre-pandemic group and 213 cases (23.9%) in the pandemic group. An increase in motor vehicle accidents in the pandemic group, and a decrease in sports accidents in the pandemic group, were noted, and there was a significant difference between the groups (p <0.001). A description of the demographic data and causes is presented in Table 1.

The most common types of maxillofacial trauma were soft tissue injuries, with 580 patients (56.1%) in the pre-pandemic group and 681 patients (76.5%) in the pandemic group; maxillofacial fractures with 229 patients (22.2%) in the pre-pandemic group and 146 patients (16.4%) in the pandemic group; and dentoalveolar trauma, with 173 patients (16.7%) in the pre-pandemic group and 37 patients (4.2%) in the pandemic group. An increase in soft tissue injuries and a decrease in maxillofacial fractures and dentoalveolar trauma were noted in the pandemic

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group. There was a significant difference between the groups (p <0.001).

Table 1. Distribution of patients according to sex, cause, and age group in the pre-pandemic and pandemic groups, and the significance of the likelihood ratio test.

Variable	Category	Group				p value
		Pre-pandemic		Pandemic		
		n	%	n	%	
Sex	Female	364	35.2	289	32.5	0.207
	Male	670	64.8	601	67.5	
Cause	Bicycle accident	30	2.9	40	4.5	< 0.001
	Work accident	25	2.4	7	0.8	
	Motor vehicle accident	97	9.4	131	14.7	
	Sports accident	68	6.6	10	1.1	
	Attack by a domestic animal	6	0.6	13	1.5	
	Complications in oral surgery	0	0.0	2	0.2	
	Falls	516	49.9	474	53.3	
	Interpersonal violence	292	28.2	213	23.8	
Age Group	≤ 9	244	23.6	191	21.5	0.338
	10-19	116	11.2	80	9.0	
	20-29	207	20.0	174	19.6	
	30-39	153	14.8	142	16.0	
	40-49	111	10.7	96	10.6	
	50-59	68	6.6	80	9.0	
	60-69	62	6.0	57	6.4	
	≥ 70	73	7.1	70	7.9	

The distribution of the patients according to the type of maxillofacial trauma is presented in Table 2 and Figure 1.

Table 2. Distribution of patients according to the type of maxillofacial trauma in the pre-pandemic and pandemic groups and the significance of the likelihood ratio test.

Type of maxillofacial trauma	Group				p value
	Pre-pandemic		Pandemic		
	n	%	n	%	
Maxillofacial fracture	229	22.2	146	16.4	< 0.001
TMJ trauma	9	0.9	1	0.1	
Associated trauma	43	4.2	25	2.8	
Soft tissue injuries	580	56.1	681	76.5	
Dentoalveolar trauma	173	16.6	37	4.2	

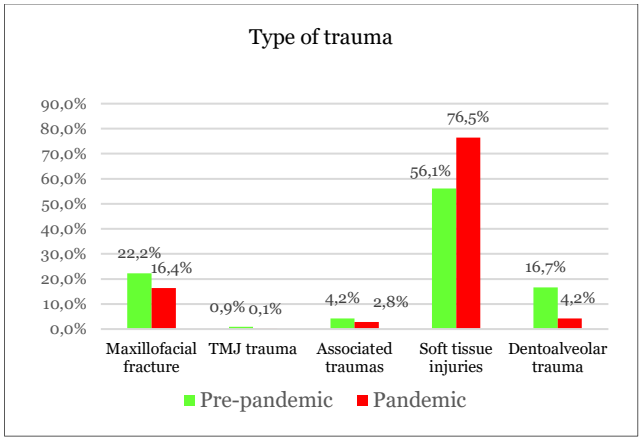

Figure 1: Distribution of patients according to the type of maxillofacial trauma.

The most common locations of maxillofacial fracture trauma were the nose, with 115 patients (11.1%) in the pre-pandemic group and 72 patients (8.1%) in the pandemic group; the zygomatic complex, with 80 patients (7.7%) in the pre-pandemic group and 49 patients (5.5%) in the pandemic group; and the mandible, with 70 patients (6.8%) in the pre-pandemic group and 41 patients (4.6%) in the pandemic group. There were significant differences between the groups for the mandible (p=0.042) and nose (p=0.025). The distribution of the patients according to the location of the maxillofacial fractures is presented in Table 3.

Table 3. Distribution of patients according to the maxillofacial fracture location in the pre-pandemic and pandemic groups and the significance of Fisher's exact test.

Fracture location	Category	Group				p value
		Pre-pandemic		Pandemic		
		n	%	n	%	
Mandible	Yes	70	6.8.	41	4.6	0.042
	No	964	93.2	849	95.4	
Maxilla	Yes	0	0.0	8	0.9	0.002
	No	1034	100	882	99.1	
Zygomatic Complex	Yes	80	7.7	49	5.5	0.051
	No	954	92.3	841	94.5	
Nose	Yes	115	11.1	72	8.1	0.025
	No	919	88.9	818	91.9	
Frontal sinus	Yes	5	0.5	3	0.3	0.619
	No	1029	99.5	887	99.7	
Orbit	Yes	10	1.0	7	0.8	0.673
	No	1024	99.0	883	99.2	

Regarding the type of soft tissue injury, there was a predominance of lacerations with 337 cases (32.6%) in the pre-pandemic group and 414 cases (46.5%) in the pandemic group, followed by contusions with 266 cases (25.7%) in the pre-pandemic group and 277 cases (31.1%) in the pandemic group. There were significant differences between the groups for lacerations (p<0.001) and contusions (p=0.009) (Table 4).

Table 4. Distribution of patients according to the type of soft tissue injury in the pre-pandemic and pandemic groups and the significance of the Fisher exact test.

Soft tissue injuries	Category	Group				Sig. (p)
		Pre-pandemic		Pandemic		
		n	%	n	%	
Laceration	Yes	339	32.8	416	46.7	< 0.001
	No	695	67.2	474	53.3	
Gunshot wound	Yes	4	0.4	0	0.00	0.063
	No	1030	99.6	890	100.0	
Contusion	Yes	266	25.7	277	31.1	0.009
	No	768	74.3	613	68.9	

Regarding the type of dentoalveolar trauma, in the pre-pandemic group, concussion was predominant, with 129 patients (12.5%), followed by 21 patients (2%) with dental fracture, 14 patients (1.4%) with avulsion, and 7 patients (0.7%) with lateral luxation. There was a substantial decrease in the number of cases of concussions in the pandemic group. There were significant differences for concussion (p<0.001), dental fracture (p=0.012), avulsion (p=0.040), and lateral luxation (p=0.014) between the groups (Table 5).

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Table 5. Distribution of patients according to the type of dentoalveolar trauma in the pre-pandemic and pandemic groups and the significance of Fisher's exact test.

Dentoalveolar trauma	Category	Group				p value
		Pre-pandemic		Pandemic		
		n	%	n	%	
Concussion	Yes	129	12.5	3	0.3	< 0.001
	No	905	87.5	887	99.7	
Dental fracture	Yes	21	2.0	6	0.7	0.012
	No	1013	98.0	884	99.3	
Lateral luxation	Yes	7	0.7	0	0.0	0.014
	No	1027	99.3	890	100.0	
Intrusive luxation	Yes	3	0.3	3	0.3	0.854
	No	1031	99.7	887	99.7	
Avulsion	Yes	14	1.4	4	0.5	0.040
	No	1020	98.6	886	99.5	
Extrusive luxation	Yes	6	0.6	12	1.4	0.081
	No	1028	99.4	878	98.6	
Fracture of the alveolar process	Yes	7	0.7	8	0.9	0.581
	No	1027	99.3	882	99.1	

DISCUSSION

Our study revealed a decrease in the number of patients with maxillofacial fractures and dentoalveolar trauma and an increase in the number of soft tissue injuries, with variations in the types of these traumas, indicating the possible influence of an increase in the number of motor vehicle accidents and a decrease in the number of sports accidents during the pandemic. One limitation of this study stems from the fact that no specific data was collected on the treatment of maxillofacial trauma, especially fractures, although we know of the predominance of surgical treatment.

This study showed a decrease in patients with maxillofacial trauma seen in the emergency room during the pandemic compared to the pre-pandemic period, confirming the findings of studies from many countries[4,11,15,21,22]. This decrease may have occurred due to restrictive measures to contain the advancement of the spread of SARS-CoV-2, including restrictions on outdoor activities, and elective care in health services; furthermore, people feared becoming infected with the virus and refused to undergo surgical procedures that required hospitalization[4,12,21]. The simultaneous occurrence of COVID-19 with maxillofacial trauma must be considered, which would lead professionals to reevaluate their care behavior[7,21].

Young male adult patients were predominant in the pandemic group with a significant difference compared to the other group, suggesting that this group remained more active during the pandemic[4,11,14]. There was a significant increase in the number of motor vehicle accidents and a decrease in the number of sports accidents in the pandemic group. The increase in traffic accidents may be related to the decreased use of public transport[3,14]. The decrease in the number of sporting accidents was likely related to restrictions on outdoor activities[11,13,15]. Falls predominated as the cause of trauma, which can be attributed to social distancing, and more domestic accidents[3,4,11].

There was a decrease in the number of patients with maxillofacial fractures and an increase in the number of soft tissue injuries in the pandemic group, significantly different from the pre-pandemic group, and a decrease in dentoalveolar trauma. A decrease in maxillofacial fracture cases has been reported by studies from many countries[9,13-15,22,23].

However, regarding the increase in soft tissue injury cases, only two studies have analyzed this aspect during the pandemic and reported an increase[10]. No reports were found in the literature regarding the cases of dentoalveolar trauma during the pandemic.

A significant decrease in mandibular and nasal fractures was observed in this study. This finding confirmed those of other studies of the pandemic, although mandibular fractures were predominant in many of those studies[3,11,13,14].

Regarding the type of soft tissue injury, there was a prevalence of lacerations and contusions in the pandemic group. Previous studies of maxillofacial trauma reported a high frequency of soft tissue trauma, with these injuries predominating[18,24].

There was a significant decrease in the incidence of dentoalveolar trauma in the pandemic group compared with the pre-pandemic group, which potentially included more complex cases. Although there are no studies related to dentoalveolar trauma during the pandemic, this decrease could be related to a decrease in sports or fear of seeking the hospital environment for a type of trauma that can be treated on an outpatient basis[4,11,25].

CONCLUSION

We must consider the possible influence of an increase in some causal factors and a decrease of other causal factors on the decrease in cases of maxillofacial fractures and dentoalveolar trauma, and an increase in soft tissue injuries, with variations in the types of these traumas, during the pandemic.

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CONFLICT OF INTERESTS

The authors declare no conflict of interest.

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