Original Research Article

Influence of the COVID-19 pandemic on oral and maxillofacial care in health units in Belém/Brazil

ABSTRACT

Aims: This study aims to assess the influence of the pandemic on oral and maxillofacial surgical procedures in Dental Specialty Centers (CEOs) within the Metropolitan Region of Belém, Pará, Brazil.
Study design:A retrospective cross-sectional epidemiological investigation was conducted using a comparative statistical approach.
Place and Duration of Study: Data from 2019 to 2020 on non-urgent surgical procedures in selected CEOs were collected from the DATASUS platform and compared to the number of confirmed COVID-19 cases in Belém, Pará
Methodology: Descriptive statistics and inferential analyses, including ANOVA and t-tests, were used to evaluate the impact of the pandemic on the number of surgical procedures conducted.
Results: The total number of patients treated at the CEOs in 2019 was 30,013, which decreased to 15,952 in 2020, resulting in a 46.8% reduction. The analysis showed that different CEOs exhibited varying trends in the number of procedures performed, with a significant association between the pandemic and procedure numbers. Most surgical procedures experienced a decline from 2019 to 2020. Still, specific procedures showed substantial increases, such as excision of skin and mucosal lesions, treatment of facial neuralgia, and drainage of abscesses in the mouth and appendages.
Conclusion: The COVID-19 pandemic significantly impacted the oral and maxillofacial surgical procedures rate at Dental Specialty Centers in the Metropolitan Region of Belém, Pará, Brazil. While overall procedures decreased, specific non-urgent procedures demonstrated variations, influenced by the evolving pandemic and public health measures.

Keywords: COVID-19. Epidemiology. Maxillofacial Surgery. Oral surgery.

1. INTRODUCTION

The COVID-19 pandemic, caused by the severe acute respiratory syndrome coronavirus 2 (sars-cov-2), profoundly reshaped our daily lives and habits. Recognizing that this virus primarily spreads through contaminated environments via saliva droplets, sneezes, and coughs is crucial. Consequently, stringent measures, such as quarantine and social distancing, were imperative to curb its transmission [1]. Elective procedures to prevent overwhelming healthcare facilities had to be put on hold, with a focus on prioritizing urgent dental services, as recommended by the World Health Organization (WHO) in 2020.

The global landscape of oral and maxillofacial surgical practices faced the challenge of adapting to these new guidelines provided by WHO, emphasizing personal protective equipment (PPE), including facial shields [2]. Furthermore, the risk of disease transmission via aerosols generated during high-speed oral surgeries significantly reduced the number of professionals operating on the front lines [3,4]. These reductions were also observed in Brazil, with varying trends in oral surgeries across different regions, influenced by factors such as the availability of adequate PPE and its heightened demand [5].

Considering these unprecedented circumstances, the aim of this study was to assess the impact of the COVID-19 pandemic on the rate of oral and maxillofacial surgeries at dental specialty centers (CEOs) in the metropolitan region of Belem (MRB), Pará, Brazil.

2. MATERIAL andMETHODS

This study entails a retrospective cross-sectional epidemiological investigation using an inductive approach, employing a comparative statistical procedure and a research technique involving the documentation available on public government information websites provided by the Ministry of Health (CEP protocol number, Faculdade São Leopoldo Mandic: 2022-0867).

We assessed data from 2019 to 2020 of patients treated at the CEOs in the city of Belém, in the state of Pará, specifically Medical-Dental Specialties Center (CEMO), Barros Barreto, Guamá, Marambaia, Pedreira, President Vargas, Federal University of Pará (UFPA) and Uremia. The surgical procedures evaluated were categorized as non-urgent.

Data collection regarding the procedures performed was conducted through the DATASUS platform, which is responsible for collecting, processing, and disseminating health information on behalf of the Ministry of Health. This process was carried out by a previously calibrated examiner who organized the information into Excel tables (Redmond, Washington, USA). The collected data included details about the procedures conducted by each of the selected CEOs and the number of confirmed COVID-19 cases in the city of Belém, Pará. Information regarding COVID-19 was sourced from the website https://infoms.saude.gov.br/extensions/covid-19_html/covid-19_html.html.

The data underwent descriptive analysis, employing absolute and percentage frequencies and mean and standard deviation (mean ± SD) for numerical variables. Inferential analysis was performed using ANOVA and independent samples t-tests to assess the association between the pandemic caused by the Sars-Cov-2 virus, the etiological agent of COVID-19, in the years 2019 and 2020, and the quantity of maxillofacial procedures conducted at the CEO's in Belém, PA, Brazil.

The null hypothesis (h0) was that there was no association between the occurrence of the pandemic and the number of maxillofacial procedures conducted at the CEO. The margin of error used in the decision for statistical tests was 5%. Data was entered in Microsoft Excel (Redmond, Washington, USA), and the Biostat software (Instituto Mamirauá – conservation in the Amazon, Brazil) was used for statistical calculations.

3. RESULTS

In 2019, 30.013 patients were treated; in 2020, the number was 15,952. The difference in attendance over a year resulted in a 46.8% drop overall.

The analysis of the collected data revealed that the CEO of Belém do Pará with the highest number of appointments was the one from UFPA. At the same time, the CEO of Pedreira recorded the lowest number of appointments, both in 2019 and 2020. The total number of appointments made by the analyzed CEOs during the specified period is presented in Table 1.

Medical procedures were analyzed over the months, from January to December, in 2019 and 2020. The annual average of the procedures was compared in each evaluated CEO using the ANOVA test, with a p-value of <0.05. The results showed a statistically significant difference between the analyzed variables (p=0.01). In other words, overall, the procedures performed by the CEOs were influenced by the pandemic during the considered period, and the null hypothesis was discarded.

When examining specific scenarios for each CEO, a distinct behavior was observed in the same variables when comparing 2019 and 2020. A significant association (p<0.05) between the number of appointments and the pandemic, using inferential statistics and a t-test with a fixed margin of error of 5%, was observed in all CEOs, except for President Vargas and Uremia CEOs (Table 1). Therefore, the null hypothesis was rejected for all CEOs, except President Vargas and Uremia, indicating a significant association between the analyzed variables.

Table 1. Comparative Analysis of Procedures Conducted by CEOs in the years 2019 and 2020.

CEO	2019	2020	Difference between the

									periods analyzed			
	n	%	Mean	SD	n	%	Mean	SD	n	%	t	p-value
Barros	6,182	20.6	515.17	74.95	4,700	29.5	391.67	212.02	(-) 1.482	(-) 24.0%	1.75	0.0232662
CEMO	7,174	23.9	597.83	116.49	2,187	13.7	182.25	146.13	(-) 4.987	(-) 69.5%	1.72	0.0000000
Guamá	1,557	5.2	129.75	64.06	279	1.7	23.25	42.13	(-) 1.278	(-) 82.1%	1.72	0.0000606
Marambaia	2,436	8.1	203.00	118.65	508	3.2	42.17	90.75	(-) 1.928	(-) 79.1%	1.72	0.0006187
Pedreira	753	2.5	62.75	26.81	204	1.3	17.00	22.13	(-) 549	(-) 72.9%	1.72	0.0000854
Presidente Vargas	3,399	11.3	283.25	89.44	2,472	15.5	206.00	195.96	(-) 927	(-) 27.3%	1.75	0.1165989
UFPA	7,974	26.6	664.50	130.48	5,174	32.4	431.17	222.00	(-) 2.800	(-) 35.1%	1.73	0.0028369
Uremia	538	1.8	44.83	-33.68	428	2.7	35.67	42.97	(-) 110	(-) 20.4%	1.72	0.2835191
Total	**30,013**				**15,952**				**(-) 14,061**	**(-) 46.8%**		

The difference in procedures performed between 2019 and 2020 was also evaluated (Table 2). Out of the 50 assessed procedures, most showed a reduction between the two compared years. However, there were significant increases in the procedures for excision of skin and mucosal lesions (+44.6%), treatment of facial neuralgia (+29.4%), drainage of abscesses in the mouth and appendages (+11.7%), wedge excision of the lip (+20.8%), apicoectomy with or without retrograde filling (+7.2%), deepening of the oral vestibule (by sextant) (+2.6%), removal of tori and exostoses (+3.2%), frenectomy/frenotomy (+257.1%), and partial reconstruction of traumatized lips (+400.0%).

Table 2. Comparison of Surgical Procedures between 2019 and 2020.

Procedures	2019		2020		Difference between the periods analyzed		
	N	%	N	%	N	%	P-value
Salivary gland biopsy	586	1.3	413	1.4	(-) 173	(-) 29.5	0.0000000009
Cranial and facial bone biopsy	728	1.6	488	1.7	(-) 240	(-) 33.0	0.0000000055
Oral soft tissue biopsy	907	2.0	547	1.9	(-) 360	(-) 39.7	0.0000003799
Anatomopathological examination for freezing/paraffin embedding for surgical specimen or biopsy (excluding cervix and breast)	852	1.9	538	1.9	(-) 314	(-) 36.9	0.0000000723
Lesion excision and/or skin, appendages, and mucous membrane suture	166	0.4	240	0.8	(+)74	(+) 44.6	0.0000000000
Mouth lesion excision and suture	1,150	2.6	631	2.2	(-) 519	(-) 45.1	0.0000015357
Removal of bone/dental synthesis material	176	0.4	145	0.5	(-) 31	(-) 17.6	0.0000000017
Removal of maxillomandibular fixation devices	152	0.3	126	0.4	(-) 26	(-) 17.1	0.0000000033
Treatment of facial neuralgia	252	0.6	326	1.1	(+) 74	(+) 29.4	0.0000000000
Orthodontic/orthopedic appliance maintenance/repair	4,029	9.0	959	3.4	(-) 3,070	(-) 76.2	0.0000000000
Surgical correction of oro-nasal/oro-sinusal fistula	178	0.4	164	0.6	(-) 14	(-) 7.9	0.0000000000

Oral and appendage abscess drainage	266	0.6	297	1.0	(+) 31	(+) 11.7	0.0000000000
Ranula or salivary retention phenomenon excision	194	0.4	186	0.7	(-) 8	(-) 4.1	0.0000000000
Wedge lip excision	144	0.3	174	0.6	(+) 30	(+) 20.8	0.0000000000
Foreign body removal from facial bones	138	0.3	110	0.4	(-) 28	(-) 20.3	0.0000000164
Tooth stabilization through splinting	168	0.4	140	0.5	(-) 28	(-) 16.7	0.0000000015
Alveolo-dental fracture osteotomy	271	0.6	167	0.6	(-) 104	(-) 38.4	0.0000006330
Alveolo-dental fracture reduction without osteosynthesis	166	0.4	134	0.5	(-) 32	(-) 19.3	0.0000000047
Temporomandibular dislocation reduction	168	0.4	126	0.4	(-) 42	(-) 25.0	0.0000000363
Odontogenic and non-odontogenic cyst excision	207	0.5	183	0.6	(-) 24	(-) 11.6	0.0000000000
Apicectomy with or without retrograde filling	166	0.4	178	0.6	(+) 12	(+) 7.2	0.0000000000
Oral vestibule deepening (per sextant)	232	0.5	238	0.8	(+) 6	(+) 2.6	0.0000000000
Muscle frenulum correction	421	0.9	236	0.8	(-) 185	(-) 43.9	0.0000012289
Alveolar ridge irregularities correction	1,347	3.0	435	1.5	(-) 912	(-) 67.7	0.0000000000
Maxillary tuberosity correction	228	0.5	153	0.5	(-) 75	(-) 32.9	0.0000001991
Periapical curettage	2,950	6.6	1,337	4.7	(-) 1,613	(-) 54.7	0.0000000000
Bone grafting of intraoral donor site	190	0.4	146	0.5	(-) 44	(-) 23.2	0.0000000115
Multiple tooth extraction with alveoloplastyby sextant	931	2.1	829	2.9	(-) 102	(-) 11.0	0.0000000001
Cyst and pseudocyst marsupialization	195	0.4	170	0.6	(-) 25	(-) 12.8	0.0000000001
Odontosection / tunneling procedure.	864	1.9	460	1.6	(-) 404	(-) 46.8	0.0000011691
Dental reimplantation and transplantation (per tooth)	159	0.4	136	0.5	(-) 23	(-) 14.5	0.0000000008
Removal of retained tooth (included / impacted)	3,665	8.2	2,367	8.3	(-) 1,298	(-) 35.4	0.0000000000
Tori and exostoses removal	186	0.4	192	0.7	(+) 6	(+) 3.2	0.0000000000
Surgical treatment for dental traction	196	0.4	158	0.6	(-) 38	(-) 19.4	0.0000000019
Surgical suture removal (per patient)	1,289	2.9	551	1.9	(-) 738	(-) 57.3	0.0000000000
Frenectomy / frenotomy	14	0.0	50	0.2	(+) 36	(+) 257.1	0.0000000000
Partial reconstruction of traumatized lip	0	0.0	4	0.0	(+) 4	(+) 400.0	0.0000000271
Primary tooth extraction	1,796	4.0	847	3.0	(-) 949	(-) 52.8	0.0000000017
Permanent tooth extraction	2,751	6.1	885	3.1	(-) 1,866	(-) 67.8	0.0000000000

Surgical treatment of oral and dental hemorrhage	577	1.3	68	0.2	(-) 509	(-) 88.2	0.0000000000
Alveolitis treatment	61	0.1	20	0.1	(-) 41	(-) 67.2	0.0000001321
Ulotomy / ulectomy	71	0.2	28	0.1	(-) 43	(-) 60.6	0.0000003480
Removable orthopedic and orthodontic appliance	392	0.9	254	0.9	(-) 138	(-) 35.2	0.0000001668
Abscess drainage.	14	0.0	0	0.0	(-) 14	(-) 100.0	0.0000000213
Simple excision and/or suture of small skin, appendage, and mucous membrane lesions / wounds	195	0.4	63	0.2	(-) 132	(-) 67.7	0.0000000010
Surgical treatment of intra/extraoral fistula	225	0.5	53	0.2	(-) 172	(-) 76.4	0.0000000000
Total	**30,013**	**64.6**	**15,952**	**55.7**	**(-) 14,061**	**(-) 46.8**	

4. DISCUSSION

Our comparative study unearthed statistically significant variations in the number of consultations and surgical procedures in secondary healthcare, juxtaposed with the pre-pandemic era. Astonishingly, only nine procedures exhibited no decline in this regard. While the exact reasons for this upswing remain elusive, it is conjectured that the presence of severe pain, potentially coupled with an imminent risk of evolving into a medical emergency, plays a pivotal role. It is also pertinent to highlight that the performance of specific surgical procedures is advised in hospital or outpatient settings affiliated with tertiary services, contingent upon the degree of surgical invasiveness.

The American Dental Associationunveiled guidelines meticulously outlining a prioritization protocol for procedures [6]. These guidelines focus on emergency cases that pose vital risks requiring immediate intervention. Notably, this encompassed cases of cellulitis, facial trauma, and uncontrolled bleeding. The dental emergency guidelines revolved around the urgent management of conditions demanding immediate attention to alleviate acute pain and mitigate the risk of infection progressing to a critical stage. Consequently, dental procedures within the Unified Health System (SUS - Brazil) adhered to these regulations, spanning primary, secondary, and tertiary care. The overarching objective was to alleviate the burden on emergency departments within hospitals by strongly discouraging elective procedures during the pandemic [7,8].

Given the elevated risk of coronavirus transmission during oral surgeries, we need to consider the heightened probability of contamination when instruments with high rotation and longer surgical durations are employed [9]. Drawing from the insights of Luizeti and their collaborators [10] it is evident that the specialty of oral and maxillofacial surgery falls within the health subgroups recording the most substantial decline rates, at 37.3%. This decline can be primarily attributed to the heightened risk of aerosol generation. Furthermore, the absence of personal protective equipment on a global scale (i), the high prevalence of pandemic-induced anxiety (ii), and the pre-existing health conditions of these professionals (iii), necessitating time off work, serve as critical factors elucidating the overall decrease in surgical procedures [5, 11].

In a global context, oral and maxillofacial traumatology services demonstrated notable resilience during the pandemic's peak. Initially, 90.4% of centers conducted oral surgeries, but this percentage dipped to 34.6%, indicating a considerable 55.8% reduction in surgical procedures. It is crucial to emphasize that the varying stringency of pandemic-related restrictions across different countries, considering territorial factors, regional administrative disparities, and specific local nuances in virus control measures, directly influenced the reduction in cases of facial trauma stemming from personal assaults and vehicular accidents in Brazil [12]. An extensive study undertaken by Dos Santos and their team [13] unveiled a significant decline of over 66% in dental interventions, including surgical procedures, between 2019 and 2020 in Brazil. However, in stark contrast to this overall trend, the state of Pará recorded an increase in dental procedures in 2020, deviating from most other Brazilian states [14].

In total, nine surgical procedures recorded in this study showed increases, namely: Lesion excision and/or skin, appendages, and mucous membrane suture (+44,6%), treatment of facial neuralgia (+29,4%), oral and appendage abscess drainage (+11,7%), wedge lip excision (20.8%), apicectomy with or without retrograde filling (7.2%), oral vestibule deepening (per sextant) (2,6%), tori and exostoses removal (3,2%), frenectomy/frenotomy (257,1%) and partial

reconstruction of traumatized lip (400,0%). According to Shao and collaborators [15], this situation resulted from circumstances arising from the readjustment of elective care, in which it was concluded that surgeries became increasingly outpatient and elective in hospitals and dental specialty centers to the detriment of the lack of available PPE and facilities appropriate. Regional differences were also scrutinized. Urgent dental care in the North region was notably lower than in other macro-regions of Brazil (66.07%), partly attributed to the more rigorous practice of social isolation among dental professionals (44.05%). Interestingly, the North region registered more elective interventions (10.71%) [16].

5. CONCLUSION

In conclusion, this study highlights the substantial reduction in surgeries in all dental specialty centers in the metropolitan region of Belem, Pará, Brazil. Although an increase was observed in some procedures when comparing the pre-pandemic and trans-pandemic periods, the main factor for this reduction was the strategic cancellation of elective care and the prioritization of clinical cases with potential risks ranging from moderate to severe. These measures were implemented to contain the spread of COVID-19 cases and mitigate pressure on healthcare resources during the pandemic. At the same time, intrinsically, the pandemic highlighted chronic problems faced in the metropolitan region of Belém, requiring investments in infrastructure and trained health teams. To meet any epidemiological nature, be it an outbreak, epidemic, endemic, or pandemic.

ETHICAL APPROVAL

This study involved documentation available on public government information websites made available by the Ministry of Health (Protocol number of the Ethics Committee, Faculdade São Leopoldo Mandic: 2022-0867).

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