Orofacial Infection Number Decrease during COVID-19 Pandemic

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Abstract: This study analyses trends in orofacial infection hospital admissions at a single department, focusing on the impact of the COVID-19 pandemic. Admission counts fluctuated over the study period, but 2020 (n=65) and 2021 (n=56) showed a statistically significant decrease, falling slightly outside the 95% confidence interval of a linear trend established for 2014–2019. In 2022, the number of admitted patients (n=63) remained below average but within the confidence interval, while 2023 saw an increase to 97 patients. A notable shift in treatment methods was observed during the pandemic years. The proportion of patients treated with extraoral revision increased, with the most pronounced disparity in 2020 (n=40:10, 80%:20% extraoral revision-to-local treatment ratio). Statistical analysis (chi-square test, $p<0.001$) confirmed significant differences across the years. Comparing COVID-19-affected years (2020–2022) with non-COVID years (2014–2019 and 2023), 73% of patients were treated with extraoral revision during the pandemic, compared to 49% in non-COVID years ($p<0.001$). Additionally, only 44 patients were treated with antibiotics alone, whereas 75 would have been expected in the absence of COVID-19-related disruptions. These findings suggest that the pandemic influenced both the number of orofacial infection admissions and the treatment approach.

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Introduction

Infectious disease refers to a clinically evident illness caused by pathogenic microorganisms such as bacteria, viruses, fungi, or parasites (Morens et al., 2004). The aetiology of orofacial infection can be divided into odontogenic and non-odontogenic origin (salivary glands, facial skeleton fracture, osteonecrosis, osteomyelitis).

Odontogenic orofacial infections are most caused by anaerobic bacteria originating from a gangrenous tooth. If left untreated, the infection can spread from the periodontium of the tooth into adjacent subperiosteal and subsequently submucosal area spreading on into deep neck spaces and turning the state of the patient into a life-threatening condition (Figures 1 and 2).

The COVID-19 pandemic, caused by the SARS-CoV-2 virus, was a global health crisis that began in late 2019 and was officially declared a pandemic by the World Health Organization (WHO) on March 11, 2020. Its impact on healthcare systems worldwide was profound, leading to significant restrictions in both outpatient and inpatient care. In Slovakia, as in many other countries, healthcare facilities faced strict infection control measures, which limited access to routine and elective treatments. This disruption affected the management of various medical conditions, including dental care, potentially leading to delayed diagnoses and complications. In response, the Slovak Chamber of Dentists issued recommendations for dental practitioners, emphasizing the prioritization of emergency and urgent care while postponing non-essential procedures – especially any treatment involving spreading of aerosol, e.g. caries preparation. These guidelines aimed to minimize the risk of viral transmission while ensuring that patients with acute dental infections received necessary treatment. All these preventive measures might have potentially resulted in acute exacerbation of many chronic difficulties, e.g. dental caries and pulpitis.

Postponing planned dental care during the COVID-19 pandemic in general resulted in a higher number of odontogenic orofacial infections according to several studies (Long and Corsar, 2020; Visholm et al., 2021; Çelik and Karaaslan, 2023; Louizakis et al., 2024).

At the authors' workplace, Department of Oral and Maxillofacial Surgery, there was a statistically significant decrease of the number of these admissions in the pandemic years (2020–2022).

Aim of this study was to analyse the differences between the years and find a possible explanation for this phenomenon in previously published literature.

Material and Methods

A retrospective study was conducted to analyse patients with orofacial infections admitted to the Department of Oral and Maxillofacial Surgery between 2014 and 2023. The inclusion criterion was a primary admission diagnosis of an orofacial infection. Patients were categorized based on the treatment received: either surgical management involving extraoral revision under general anesthesia with pus evacuation and drainage or conservative treatment, including the removal of the inflammatory cause. Antibiotic therapy was administered to all patients. Statistical analyses were performed using RStudio, with the specific tests used to evaluate statistical significance indicated alongside p-values in the results section.

Figure 1: Pus evacuation during extraoral revision of a submandibular odontogenic abscess.

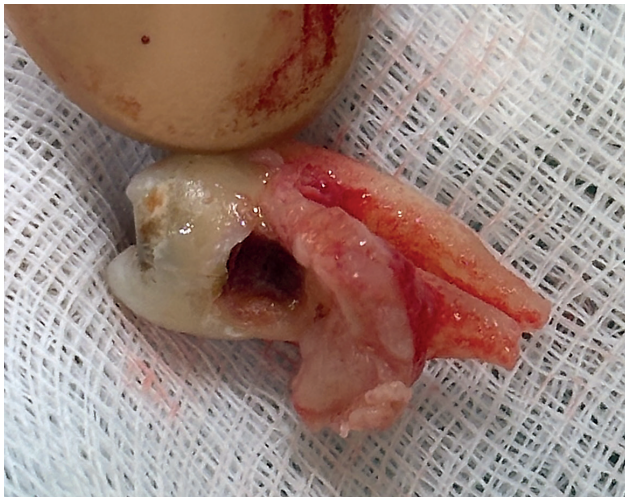

Figure 2: Extracted causal tooth of an orofacial infection.

Results

Total number of patients was n=744, 303 women and 441 men. The mean age was 43.1 years. Average length of hospital stay was 6.81 days. The highest admission count n=101 was noted in 2018. The admission count was quite variable during the study period, however if we assume linear trend for years 2014–2019, then number of patients in 2020 (n=65) and 2021 (n=56) is slightly outside the 95% confidence interval (CI), indicating a drop in patient counts. 63 patients in 2022 are still below average, although within the 95% CI for linear trend. In 2023, the number increased again to 97 admitted orofacial infection patients (Figures 3 and 4).

Regarding treatment method, the share of patients treated by extraoral revision is slightly increasing over the analysed years, with the extraoral revision-local treatment ratio being most uneven in 2020 – n=40:10 (80%:20%). This trend was particularly imminent during the COVID-19 pandemic. Differences between the years are statistically significant (chi-square test, $p<0.001$) (Figure 5). When comparing COVID-19 impacted year (2020–2022) with non-COVID years (2014–2019 and 2023), there is statistically significant difference in the number of patients treated with extraoral revision – 49% of patients were treated in non-COVID years, while in COVID years, 73% of patients were treated by extraoral revision (chi-square test, $p<0.001$). Only 44 patients were treated with

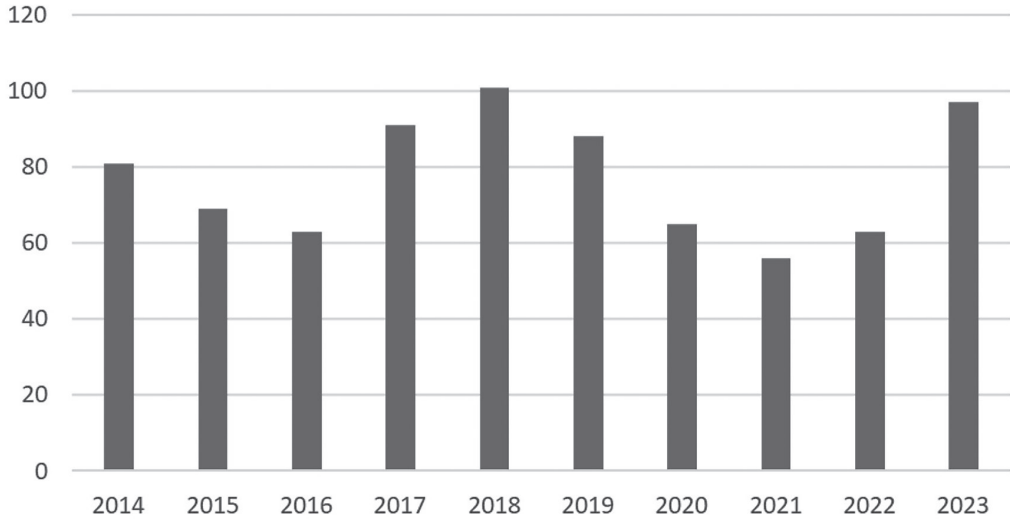

Figure 3: Orofacial infection number over analysed years 2014–2023.

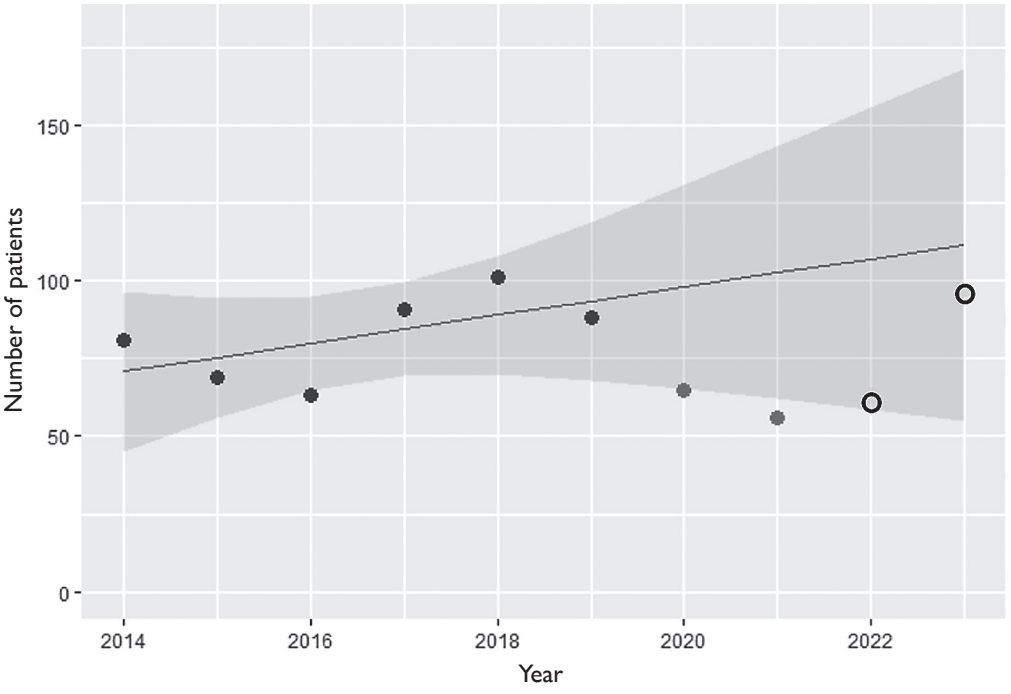

Figure 4: Linear regression of number of patients in years 2014–2023.

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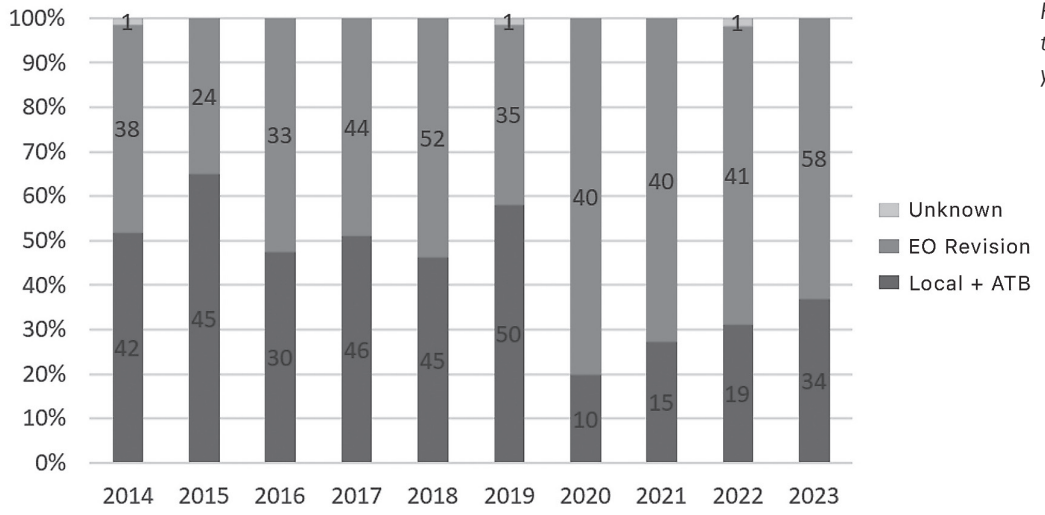

Figure 5: Orofacial infection treatment over analysed years 2014–2023.

antibiotics only, while 75 would be the expected number assuming no difference between COVID and non-COVID years.

Discussion

Deep space orofacial infections represent a potential life-threatening condition in oral and maxillofacial surgery. Epidemiological information about orofacial infection patient count during different world situations help the clinicians to prepare guidelines and educate the public.

Results of this study showed the patient counts in COVID-19 pandemic years 2020 (n=65) and 2021 (n=56) fell slightly outside the 95% confidence interval, indicating a notable decrease. The proportion of patients treated with extraoral revision has shown a slight increase over the analysed years, with the most pronounced disparity in the extraoral revision-to-local treatment ratio observed in 2020 (n=40:10, 80%:20%).

Explanation of this phenomenon is not entirely certain. As previously stated, number of deep space orofacial infection patients requiring hospital admission during the COVID-19 pandemic years increased in many regions (Long and Corsar, 2020; Visholm et al., 2021; Çelik and Karaaslan, 2023; Louizakis et al., 2024).

During the COVID-19 pandemic, treatment management of odontogenic infections varied across countries due to differing healthcare capacities and guidelines. In the United Kingdom (UK), oral and maxillofacial units adopted a more radical approach to managing odontogenic cervicofacial infections. During the first wave of the pandemic in the UK, dental practitioners increasingly opted for early and definitive interventions, such as tooth extractions, to reduce the risk of complications requiring hospital admission. This approach aimed to limit patient exposure to hospital environments and alleviate the burden on healthcare facilities already overwhelmed by COVID-19 cases (Puglia et al., 2021). In contrast, the recommendations issued by the Slovak Chamber of Dentists prioritized emergency and urgent care while deferring non-essential procedures.

In particular, in the United Kingdom, on the 25th March 2020, the Chief Dental Officer (CDO) for England released a statement calling for primary dental care services to cease all routine dental care, as a result the number of dental abscesses presenting to the emergency department decreased, but the number of patients with abscesses requiring admission increased significantly from 35 to 80% (Long and Corsar, 2020).

In Oxford, in the so called "Central Hub", outpatient reviews on the general practitioner referral unit saw an increased number of dental abscesses reviewed ($p=0.0067$). However, there was no statistical significance between the number of dental abscesses admitted between the COVID and non-COVID period (Visholm et al., 2021).

In Turkey, in a paediatric study, the rates of odontogenic cervicofacial infections requiring intravenous antibiotics and abscess drainage in children increased significantly in the second year of the COVID-19 pandemic (Çelik and Karaaslan, 2023).

In a study from Germany, there was an interesting shift in the orofacial infection patient portfolio: despite an overall reduction in the number of patients treated for odontogenic and intraoral abscesses in the first year of the pandemic (298 cases) compared to the two preceding years (663 cases), the severity of infections increased. Specifically, there was a significant rise in the number of advanced cases requiring general anaesthesia ($p<0.001$) (Grill et al., 2023).

A study conducted at Helsinki University Hospital evaluated the effects of the COVID-19 pandemic on the rate of orofacial and respiratory infections in emergency departments. The results showed a significant 37% reduction in patient visits for these infections in 2020 compared to 2018 and 2019 (1,894 cases in 2020 vs. 3,077 and 2,929 in previous years, respectively) (Haapanen et al., 2021).

Most hospitals have reported an increase in orofacial infection patients during the COVID-19 pandemic years (Long and Corsar, 2020; Haapanen et al., 2021; Visholm et al., 2021; Çelik and Karaaslan, 2023; Grill et al., 2023; Louizakis et al., 2024), yet the reasons for the decrease in such patients in Bratislava remain unclear. Several possibilities come into consideration. First, the overall number of patients seeking hospital care declined significantly during the pandemic, which might explain why many infection cases that would typically be referred to specialized departments were treated in outpatient settings, such as emergency dental practices. Another possible explanation for the patient count decrease is the possibility that fear of contracting COVID-19 may have kept people from seeking hospital care until necessary. However, this remains speculative.

In Slovakia, the Slovak Chamber of Dentists issued a statement advising practitioners to minimize aerosol producing treatment to reduce the risk of COVID-19 transmission (https://www.skzl.sk/wp-content/uploads/2021/11/ZUBNE_OSETRENIE_POKYNY_ZL-1.pdf). This directive likely changed the treatment approach for many patients. Traditionally, most dentists favour conservative methods, such as endodontic treatment or trepanation, which allows the problematic tooth to remain in the socket. Due to the issued guidance, dentists might have decided to extract the affected teeth instead. Previous findings (Vavro et al., 2024) indicated that orofacial infection patients admitted with the causal tooth still in the socket represented the largest aetiological group and exhibited the highest levels of inflammation markers, such as C-reactive protein and leukocyte counts.

Conclusion

Less hospital admissions for orofacial infections during the COVID-19 pandemic than in non-pandemic years was reported at the monitored department. However, the number of patients requiring extraoral revision of orofacial infection was significantly higher.

To optimize orofacial infection management during pandemics, early patient presentation and education should be prioritized to prevent complications. A more radical approach, such as immediate tooth extraction in severe cases, can reduce hospitalizations. Strengthening collaboration between dental and medical professionals and ensuring access to essential treatments in outpatient settings can further improve patient outcomes.

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