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Effects of the COVID-19 Outbreak on Emergent and Urgent Dental Applications

COVID-19 Salgınının Acil ve Kaçınılmaz Dental Başvurular Üzerindeki Etkileri

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ABSTRACT Objective: To compare patients' demographic characteristics and their reasons for visiting 2 months prior to and after the coronavirus disease-2019 (COVID-19) outbreak. **Material and Methods:** An electronic search of the Hacettepe University Faculty of Dentistry was undertaken to identify patients treated at Department of Oral and Maxillofacial Surgery between 16 January 2020 and 16 May 2020. The patients' ages and genders, the procedures performed, the number of procedures performed, and their days of application were recorded. **Results:** In total, 3,384 patients were evaluated. The mean age was 35.6 years, and the female male ratio was 1.27. Of the 3,384 patients, 86.3% were treated 2 months prior to the COVID-19 outbreak, while 13.7% were treated 2 months after the COVID-19 outbreak. Consultations (55.8%) were the most common reason for visiting, followed by tooth extraction (40.1%) and impacted tooth extraction (1.5%) after the COVID-19 outbreak. The frequency of dentoalveolar surgical procedures decreased after the COVID-19 outbreak, but the rate of maxillofacial infection significantly increased (p=0.011). The number of tooth extractions per patient increased daily in the 2 months after the COVID-19 outbreak, with the difference within days found to be statistically significant (p=0.000). The rate of multiple procedures performed on a patient decreased to 9.5% during the COVID-19 outbreak. **Conclusion:** The results of the present study show that even if the number of patients treated after the COVID-19 outbreak decreased, there was an increase in the number and disease severity of patients presenting with maxillofacial infection.

Keywords: Coronavirus; disease transmission; dental infection control; oral medicine

ÖZET Amaç: Hastaların, koronavirüs hastalığı-2019 [coronavirus disease-2019 (COVID-19)] salgını başlamadan 2 ay önceki ve sonraki dönemde başvurma nedenlerini ve demografik özelliklerini karşılaştırmaktır. **Gereç ve Yöntemler:** Hacettepe Üniversitesi Diş Hekimliği Fakültesinde, 16 Ocak 2020 ve 16 Mayıs 2020 tarihleri arasında Ağız, Diş ve Çene Cerrahisi Ana Bilim Dalında tedavi gören hastaların belirlenmesi için elektronik bir arama yapıldı. Hastaların yaşları ve cinsiyetleri, gerçekleştirilen işlem, gerçekleştirilen işlem sayısı ve başvuru tarihleri kayıt altına alındı. **Bulgular:** Toplamda 3.384 hasta değerlendirildi. Ortalama yaş 35,6 yıl ve kadın/erkek oranı 1,27'dir. Üç bin üç yüz seksen dört hastanın %86,3'ü COVID-19 salgınından önceki 2 ayda, %13,7'si COVID-19 salgınından sonraki 2 ayda tedavi edilmiştir. COVID-19 salgınından sonra konsültasyonlar (%55,8), en sık başvuru nedeni olmuştur, bunu diş çekimi (%40,1) ve gömülü diş çekimi (%1,5) takip etmiştir. COVID-19 salgınından sonra yapılan dentoalveoler cerrahi işlemlerin sıklığı azalmıştır, fakat maksillofasiyal enfeksiyon oranı belirgin bir şekilde artmıştır (p=0,011). COVID-19 salgınından sonraki 2 ay içinde hasta başına diş çekimi sayısı günlük olarak artarken, günler içindeki fark istatistiksel olarak anlamlı bulunmuştur (p=0,000). COVID-19 salgını sırasında hasta başına gerçekleştirilen çoklu işlem oranı %9,5 oranına düşmüştür. **Sonuç:** Bu çalışmanın sonuçları, COVID-19 salgını sonrası tedavi edilen hasta sayısı azalsa bile, maksillofasiyal enfeksiyon ile başvuran hastaların sayısı ve hastalık şiddetinde artış olduğunu göstermektedir.

Anahtar Kelimeler: Koronavirüs; hastalık geçişi; dental enfeksiyon kontrolü; ağız hastalıkları

The worldwide spread of the coronavirus disease-2019 (COVID-19) has caused difficulties in both medical and dental practice in all affected countries. The pathways of transmission of COVID-19 from person to person include direct transmission, such as sneezing, coughing and inhalation of virus particles; as well as contact transmission, which can be through touching the eyes, mouth, and nasal mu-

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cous membranes.[1] Therefore, dentists and dental assistants are considered to be in the high risk group for COVID-19 infection due to face-to-face communication with the patients, exposure to patients' blood, saliva and other body fluids, as well as performing aerosol-forming processes in dental clinics.[2] At the beginning of the COVID-19 pandemic, dental clinics evaluated only emergency patients and all elective dental procedures were delayed for a certain period. At first, cellulite, uncontrolled bleeding, and trauma were accepted as emergent clinical conditions, but dental treatments including severe dental pain; infections such as pericoronitis, dental abscess or cellulitis, postoperative osteoitis, and dry socket; as well as traumatic injures such as tooth fractures, avulsion or luxation, and emergency restorative procedures have been considered urgent as well.[3,4]

During the COVID-19 outbreak, multi-layered triage areas have been created in many dental hospitals. In these areas, the urgency of the patient's reason for dental consult is determined, with a decision made to modify treatment procedures or defer treatment depending on the clinical situation in efforts to reduce risk of viral transmission.[4] Implementation of quarantine measures in order to reduce risk of viral transmission has led to an increase in the number of patients developing serious dental infections. In a study conducted in Beijing, dental and oral infections increased from a prevalence of 51% pre-COVID-19 to 71.9% during COVID-19. Pulpal or periapical lesions were found to be the main reason for emergency visits, followed by cellulitis or abscess and trauma.[5] In a different study, a significant decrease in the number of patients admitted to the oral and maxillofacial surgery departments of universities was reported, but the severity of the infection increased in patients admitted with odontogenic infection.[6]

The hypothesis of this clinical study is that the severity and amount of cases having acute abscesses or cellulitis increased during the COVID-19 outbreak. Therefore, this study aimed to compare patients' demographic characteristics and their reasons for visiting 2 months prior to and after the COVID-19 outbreak.

MATERIAL AND METHODS

This retrospective clinical study was performed in the Department of Oral and Maxillofacial Surgery at Hacettepe University and followed the Declaration of Helsinki on medical protocol and ethics. The study protocol was approved by Hacettepe University Non-interventional Clinical Research Ethics Board (Protocol number: GO 20/720 and approval date: 25.8.2020).

An electronic search of database of the Hacettepe University to analyze the patients treated at the Department of Oral and Maxillofacial Surgery was undertaken between 16 January 2020 and 16 May 2020. The search was performed in the time frame encompassing two months prior to and following the Turkish Ministry of Health guidance for dental practitioners to cease routine dental treatment due to the COVID-19 outbreak. The patients' ages and genders, procedures performed, the number of procedures performed, and the days of application were recorded. Surgical procedures performed under local anesthesia were included in this study, which included tooth extraction, impacted tooth extraction, maxillofacial pathology, maxillofacial infection, preprosthetic surgical procedures such as vestibuloplasty, hard and soft tissue augmentation, sinus lifting, dental implant surgery, as well as simple procedures related to temporomandibular disease and orthodontic approaches. Patients who visited for consultation, such as oncologic patients, cardiac patients who need antibiotic prophylaxis, and patients with acute apical periodontitis who need antibiotic therapy before the surgical procedures, were also included in the study. If more than one surgical procedure was performed in a patient, the main procedure was recorded as the surgical procedure performed, and the number of surgical procedures performed was recorded as multiple for the same patient.

STATISTICAL ANALYSIS

The data collected were evaluated using IBM SPSS statistics software to calculate mean and median values, percentages, and correlations. A Fisher's exact test was used to analyze the difference in the rate of maxillofacial infection prior to and during the COVID-19 outbreak. Different variables were com-

pared using a chi-square test. Differences in the rate of tooth extraction within the days after the COVID-19 outbreak were analyzed using a chi-square test and Spearman's rho correlation. A p value of ≤0.05 was considered statistically significant.

RESULTS

Three thousand three hundred and eighty-four patients (56.1% female, 43.9% male) who ranged in age from 1 to 91 years (mean 35.68 years, standard deviation 20.759 years) were treated in the Department of Oral and Maxillofacial Surgery at Hacettepe University between 16 Jan 2020 and 16 May 2020. The adults (older than or equal to 18 years old) comprised 76.4% of all patients, while 23.6% of patients were children (younger than 18 years old).

Tooth extraction (49.8%) was the most common procedure, followed by consultations (32.5%) and impacted tooth extraction (9.2%). However, when analyzing procedures within 2 months after the COVID-19 outbreak, consultations (55.8%) were the most common procedure, followed by tooth extraction (40.1%) and impacted tooth extraction (1.5%). The procedures performed prior to and after the COVID-19 outbreak are shown in Figure 1. Multiple surgical procedures were performed in 25.7% of all patients, whereas 74.3% of patients only underwent a single procedure.

Patients' applications decreased by 84.1% after the Turkish Republic of Health Minister declared cessation of routine dental treatment due to the COVID-19 outbreak (Table 1). Although the application rate of the patients <18 years old decreased from 24.6% to 17.2%, the application rate of patients ≥18 increased from 75.4% to 82.8%. This difference between application time and the age of patients was found to be statistically significant (p=0.001).

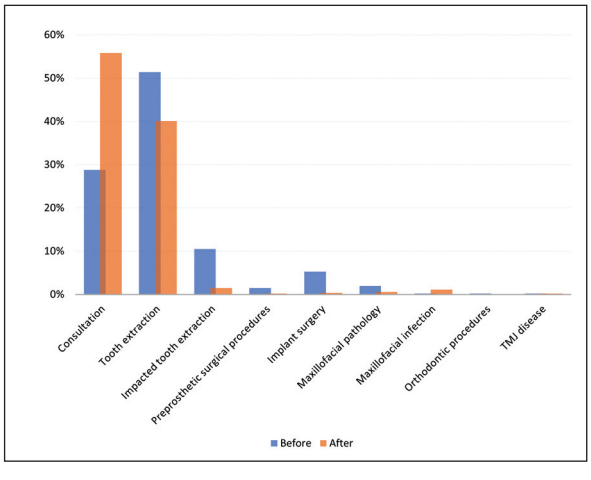

FIGURE 1: The distribution of procedures performed 2 months before the COVID-19 outbreak (blue column) and 2 months after the COVID-19 outbreak (orange column) for 3,384 patients. Consultation and maxillofacial infection significantly increased after the COVID-19 outbreak.

TABLE 1: The negative correlation between the number of patients and the days of application. The dramatic fall in the number of patients was detected 2 months after the COVID-19 outbreak.

The day of application	The number of patients
2 months before the COVID-19 outbreak	2,920 patients (86.3%)
2 months after the COVID-19 outbreak	464 patients (13.7%)

Dentoalveolar surgical procedures, such as tooth extraction, impacted tooth extraction, preprosthetic surgical approaches, implant surgery, and orthodontic approaches were the most common procedures performed at the department of oral and maxillofacial surgery under local anesthesia. All dentoalveolar surgical procedures decreased after the COVID-19 outbreak, but the rate of maxillofacial infection increased. The difference between these two time intervals was found to be statistically significant (p=0.011). At the same time, results show that dentoalveolar surgical procedures decreased, while other procedures such as consultations, maxillofacial pathology, maxillofacial infection, and approaches related to temporomandibular joint diseases increased 2 months after the cessation of the COVID-19 outbreak (p=0.000) (Figure 2). However, the number of tooth extractions per patient increased daily in the 2 months after the COVID-19 outbreak, with the difference within the days found to be statistically significant (p=0.000). Figure 3 shows a scatter plot between the number of days after the COVID-19 outbreak and the rate of tooth extraction per patient.

The rate of multiple procedures performed in a patient was 28.3% before the cessation in COVID-19 outbreak, but this rate decreased to 9.5% during the

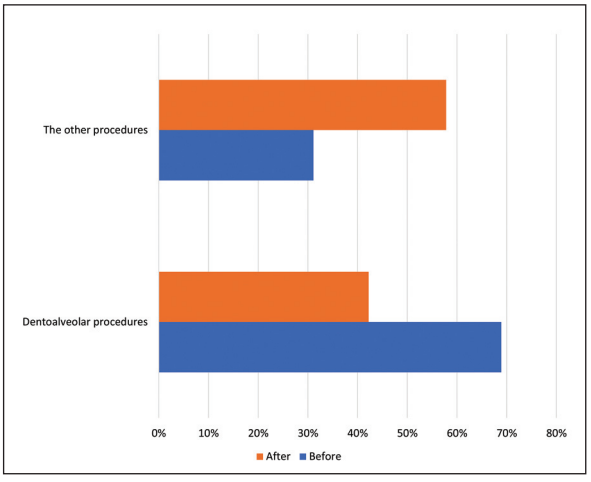

FIGURE 2: Dentoalveolar procedures (tooth extraction, impacted tooth extraction, preprosthetic surgical procedures, implant surgery, orthodontic approaches) decreased while other procedures (consultations, maxillofacial pathology, maxillofacial infection, and approaches related to temporomandibular joint diseases) significantly increased after the COVID-19 outbreak (orange column).

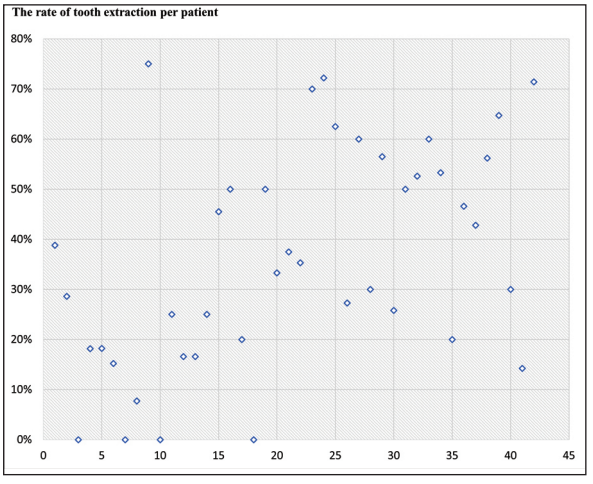

FIGURE 3: A scatter plot shows that the number of tooth extractions per patient increased daily in the 2 months after the COVID-19 outbreak.

COVID-19 outbreak. There was a statistically significant difference between the application time and the number of procedures performed (p=0.000).

DISCUSSION

COVID-19 infection was initially defined as a respiratory tract infection localized to China, but it is now currently considered an inflammatory disease that affects many systems in the body, with both contamination routes and the protective measures against the disease being well-defined in literature.[1,7,8] After the World Health Organization declared the COVID-19 outbreak a pandemic, many quarantine measures have already been implemented worldwide. One of these measures was the cessation of routine dental practices until further notice, depending on the situation of the pandemic in the country. After the first COVID-19 patient was diagnosed in Turkey, the Turkish Ministry of Health declared that routine dental procedures from 16 March 2020 and 01 June 2020 be rescheduled until the pandemic ceased. In this study, patients treated at Hacettepe University Faculty of Dentistry, Department of Oral and Maxillofacial Surgery between 16 Jan 2020 and 16 May 2020 were investigated. The aim of this study was to compare the patients' demographic characteristics and their reasons for visiting 2 months prior to and after the COVID-19 outbreak.

According to the guidelines developed during COVID-19 outbreak, only emergent and urgent dental procedures were allowed during the epidemic's cessation period. In this study, emergent and urgent dental visits dropped to 13.7% within 2 months after the cessation of routine dental procedures due to the COVID-19 outbreak. The most common urgent dental complaint encountered in the oral and maxillofacial clinic was severe dental pain due to pulpal, periapical, oral and maxillofacial infections. Similarly, Yu et al. reported that patients with symptomatic irreversible pulpitis, symptomatic apical periodontitis, and acute apical abscess had high pain levels during the early periods of COVID-19 outbreak in Wuhan, with interventions using rubberdam as well as the use of personal protective equipment recommended.[9] The cessation of routine dental procedures during the pandemic was done to reduce the number of patients and lessen duration of contact spent with each patient, in the hopes of decreasing the risk of COVID-19 transmission. In our study, patients were also treated for their main complaints. As a result of this approach, the number of single procedures rose from 71.7% to 90.5% between the periods of 2 months prior to and after the COVID-19 outbreak.

Patients' dental application significantly decreased during COVID-19 outbreak in the present study, but there was an observed increase in the number of patients with maxillofacial infection compared to before the

pandemic. This means that the patients followed precautions to prevent the spread of COVID-19 pandemic, but then developed advanced odontogenic infections due to deferment of their dental treatments. Yakubov et al. also emphasized this finding in their letter. They indicated that they begun to see increasing numbers of late dental complications that often resulted from untreated mandibular infections or trauma. Therefore, they pointed out that routine dental conditions could rapidly evolve into emergencies if not promptly treated.[10] The basic principle in the treatment of odontogenic infections is to determine the source of infection and eliminate the inciting factor by extirpation of the necrotic pulp, tooth extraction, or incision and drainage. Antibiotic therapy can only be used to manage the infection rather than actually treating the cause. However, during the COVID-19 pandemic, patients stayed at home for fear of COVID-19 contamination, thus prompting them to use antibiotics and analgesics for their infections. This situation caused the patients to take unnecessary antibiotics, which could have led to development of resistant and advanced infections during the COVID-19 pandemic. Long and Corsar performed a study on patients for a short time period and reported that severity of odontogenic infections rose from 35% to 80% 2 weeks after the cessation of routine dental procedures, which is similar to the results of the present study.[6]

In the present study, tooth extraction was the most common surgical procedure done between 16 Jan and 16 May 2020. However, after the cessation of routine dental procedures, consultations became the most common procedure, followed by tooth extraction. These consultations involved mostly cardiac and oncologic patients, as well as patients with severe dental pain due to acute periapical abscesses. These patients were treated in a few days under antibiotic administration. Therefore, the number of tooth extractions per patient increased daily in the 2 months after the COVID-19 outbreak in the present study.

CONCLUSION

The results of this study were garnered from a study population of large sample size and observed over wide time interval. The hypothesis of this clinical study, namely that the occurrence of acute abscesses or cellulitis increased during COVID-19 outbreak, was accepted based on statistical analysis. The risk of COVID-19 transmission and cross-contamination are known to be high in dental practice. However, guidelines were developed to lessen the transmission of the virus. Therefore, if COVID-19 infection peaks again in the future, routine dental procedures should be performed under asepsis and antisepsis rules with the use of personal protective equipments within safety limits. In this way, the risk of morbidity caused by advanced and resistant odontogenic infections and the complications caused by using long-term antibiotics could be reduced during the COVID-19 pandemic.

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Conflict of Interest

No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.

Authorship Contributions

Idea/Concept: *Hakan Hıfzı Tüz, Alper Aktaş;* ***Design:*** *Hakan Hıfzı Tüz, Alper Aktaş, Çiğdem Karaca;* ***Control/Supervision:*** *Osman Taha Köseoğlu, Hakan Hıfzı Tüz, Mustafa Yiğit Saysel;* ***Data Collection and/or Processing:*** *Çiğdem Karaca;* ***Analysis and/or Interpretation:*** *Nuray Er, Alper Aktaş, Çiğdem Karaca;* ***Literature Review:*** *Çiğdem Karaca;* ***Writing the Article:*** *Alper Aktaş, Çiğdem Karaca;* ***Critical Review:*** *Nuray Er, Hakan Hıfzı Tüz, Alper Aktaş.*

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