



Analysis of Maxillofacial Traumas at Thrace Region amid COVID-19 Pandemic

COVID-19 Pandemisinin Birinci Yılında Trakya Bölgesi'ndeki Maksillofasyal Travmaların Analizi

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ABSTRACT

Aim: Pandemic caused by Coronavirus disease-2019 has created an unpredicted situation. Due to governmental regulations, a significant amount of health provider task force was relocated for pandemic management. This restrictions put forth a need for pragmatic solutions to cope with the demand of non-pandemic health management. Remote counselling was among these solutions. In this study, we aimed to share our remote counselling approach, also to analyze the maxillofacial trauma (MFT) patients operated during the first year of pandemic, and to compare these results with the results of the previous year.

Materials and Methods: Beginning from May 11th, 2020 to May 11th, 2021, MFT patients were evaluated retrospectively. For comparison, patients referred within the same dates of the previous year were also evaluated. Two groups were constituted as pre-pandemic and pandemic. Groups were compared for demographics, affected facial region, operation performed as emergency or elective, time spanned from referral to surgery, and operative complications. Statistical significance was set as $p < 0.05$.

Results: The comparison for age, etiology, affected facial region, type of the operation and complication rates were insignificant among the groups ($p > 0.05$). Time spanned from referral to surgery was significantly shorter for the pandemic group in which the remote counselling approach was utilized ($p < 0.001$).

Conclusion: Remote counselling approach shortens the time spanned from referral to surgery among MFT patients referred during pandemic. Telemedicine may be used as a powerful tool for the management of MFT patients.

Keywords: Maxillofacial injuries, telemedicine, COVID-19

ÖZ

Amaç: Dünya Sağlık Örgütü tarafından 11 Mart 2020'de Koronavirüs hastalığı-2019 için pandemi ilan edilmesinin ardından, ülkemizde de sağlık hizmet sunumunda bazı değişiklikler yaşandı. Bu değişiklikler, mevcut sağlık çalışanı sayısının ve ortaya koydukları iş gücünün, sağlık otoritesi tarafından pandeminin yönetiminde kullanılmak üzere başka alanlara kaydırılmasını da kapsamaktaydı. Bu koşullar beraberinde pandemi harici sağlık hizmetlerinin sunumunda bazı ihtiyaçları da doğurdu. Bu ihtiyaçlar için pratik çözümler ortaya çıktı. Bunların arasında uzaktan konsültasyon da yer almaktadır. Çalışmamızda pandemi sürecinde oluşturduğumuz uzaktan konsültasyon yaklaşımını paylaşmayı, pandeminin birinci yılındaki maksillofasyal travma (MFT) olgularını analiz etmeyi ve 1 yıl önceki MFT olguları ile karşılaştırmayı amaçladık.

Gereç ve Yöntem: On bir Mart 2020 tarihinden 11 Mart 2021 tarihine kadar olan süreçte, yönetilen MFT olguları ve tedavileri geriye dönük olarak değerlendirildi. Bir önceki yılın aynı tarihler arasındaki verileri ile kıyaslandı. Pandemi ve pandemi öncesi olmak üzere iki grup oluşturuldu. Gruplar, demografik özellikleri, travmanın etkilediği yüz bölgesi, uygulanan onarımın acil veya elektif olarak gerçekleştirilmesi, başvuru anından ameliyata kadar geçen süre, operasyon sonrası komplikasyonlar yönünden karşılaştırıldı. İstatistiksel olarak $p < 0,05$ anlamlılık düzeyinde değerlendirildi.

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Presented in: This study was partially presented by the responsible author under the title of "Pandemi döneminde Maksillofasyal travmaların yönetiminde uzaktan konsültasyonun etkilerinin tek merkez kapsamında değerlendirilmesi" at the 10th International Trakya Aile Hekimleri Kongresi, in the oral presentations session on March 27, 2021 (09:00-10:30) presented as an oral report.

Bulgular: Gruplar arasında yaş, etiyoloji, etkilenen yüz bölgesi, onarımların acil-elektif dağılımı ve komplikasyonlar yönünden anlamlı fark saptanmadı ($p>0,05$). Uzaktan konsültasyon yaklaşımının kullanıldığı pandemi grubunda başvurudan ameliyata kadar geçen süre pandemi öncesi gruba göre kısaydı ($p<0,001$).

Sonuç: Uzaktan konsültasyon kapsamında yönetilen olgularda, hastanın başvuru anından ameliyata kadar geçen süresi anlamlı olarak kısalmıştır. Teletıp, MFT olgularını yönetiminde kolaylaştırıcı bir araç olarak kullanılabilir.

Anahtar Kelimeler: Maksillofasyal yaralanmalar, teletıp, COVID-19

INTRODUCTION

The disease caused by the new type of coronavirus, also known as Coronavirus disease-2019 (COVID-19), continues to be an important problem for public health. A pandemic was declared by the World Health Organization on March 11, 2020 for the new type of coronavirus¹. On the same date, the health authority in our country announced the first case of COVID-19. After this date, there have been some changes in our professional practice as well as in our daily life. One of the main factors underlying these changes was the number of existing health workers and the shift of their workforce to other areas by the health authority to be used in the management of the pandemic. As a result of this orientation, healthcare organizations had to manage a workload approaching the pre-pandemic period with fewer employees. Different pragmatic solutions emerged under these challenging conditions. One of these was remote consultation (RC) with technology support.

Maxillofacial traumas (MFT) and their treatment is one of the important topics of plastic surgery practice². It is a rule to use imaging methods in planning the treatment of MFT. Today, computed tomography is accepted as the gold standard in this planning process. Tomography series can be easily transferred to other computers or switchboards in digital environment with today's technology.

In this study, we wanted to evaluate the usability of these data in the management of emergency MFT within the scope of RC, based on the easy transfer of digital data. In this context, we aimed to share the RC approach that we created with the command and control center (CCC) of the health authority during the pandemic process in our clinic, which is the only center in the management of MFT in the Thrace region. As a primary inference, we determined to compare the patient data of the pre-pandemic period with the patient data of the pandemic period. As a secondary inference, we aimed to create an analysis of the MFT that occurred in our region in the specified time period.

MATERIALS AND METHODS

Selection and Definition of Cases

In the period from March 11, 2020, when the first COVID-19 case was diagnosed in our country, to March 11, 2021, MFT

cases and treatments were evaluated retrospectively. Data from the previous year between the same dates were used for comparison. The cases were divided into two groups as "pre-pandemic" and "pandemic". As inclusion criteria for the study, cases in the adult age group consulted by CCC for patient referral or consultation were determined. Patients who applied to our hospital with their own means, patients with additional pathology other than MFT, and patients who were admitted to the hospital after 24 hours following trauma were not included in the study. The pediatric age group was not included in the study.

Technical Information

In order to facilitate communication with CCC, we were asked to send a video containing the patient's tomography, as well as verbally consulting the patient. The minimum features of the tomography standard were determined as follows: the tomographies taken should include the entire facial base starting from the frontal bone and including the lower border of the mandible, with 5 mm or thinner sections, and including at least one of the sections in the coronal or axial plane. It was requested to renew the tomographies that did not meet these technical specifications.

Within the scope of RC, videos containing maxillofacial tomographies of patients who applied during the pandemic period were sent to us using a cellular network (4G).

The included cases were evaluated in terms of demographic characteristics, facial area affected by trauma, emergency or elective repair, time from admission to surgery, and postoperative complications. These results were compared with the previous year's data.

Statistical Analysis

Within the scope of the study, demographic data of the cases were calculated using percentage and frequency from descriptive statistics. Relevant tests were performed using the mean and standard deviation for patient age and postoperative time. Before using the hypothesis tests, the Shapiro-Wilk test was used to examine whether the data showed normal distribution. Logarithmic variation was applied to the categories that did not show normal distribution. Parametric hypothesis tests were applied to the data after the variation. The Student's

t-test was used to compare two groups of quantitative data, and the chi-square test was used to compare qualitative data. IBM Statistical Package for the Social Sciences (SPSS) 19.0 package program (SPSS Inc., Chicago, IL, USA) was used in the analyses and $p < 0.05$ was accepted as significance level.

RESULTS

Fifty-four cases were included in the study. Of the cases, 21 (38.8%) were in the pandemic group, and 33 (61.2%) were in the pre-pandemic group. The mean age was 39.9 ± 8.4 years for the pandemic group and 40.9 ± 11.5 years for the pre-pandemic group. There was a normal age distribution in both groups ($p > 0.05$). The number of female patients was three (14.2%) in the pandemic group and five (15.1%) in the pre-pandemic group.

In the pandemic group, the most common etiology was in-vehicle traffic accidents (IVTA) with 10 (47.6%) cases. In the pre-pandemic group, the most common cause was IVTA with 18 (54.5%) cases. During the pandemic period, the rate of maxillofacial fracture cases developing after beating was 38.1%, and this rate was 30.3% in the pre-pandemic period.

Percentage changes in the frequencies of IVTA and beating were not statistically significant ($p > 0.05$). Detailed data and comparison are given in Table 1.

The most frequently affected facial bone was the mandible in both groups. While this was 14 cases (66.6%) during the pandemic period, it was 19 (57.7%) cases before the pandemic. This percentage difference was not statistically significant ($p > 0.05$). The affected facial region distributions are given in Figure 1.

Four (19%) cases were operated urgently in the pandemic group. In the pre-pandemic group, the number of patients who were operated urgently was three (9.1%). This increase during the pandemic period was not statistically significant ($p > 0.05$). Cases that were operated urgently consisted of those whose tongue could cause airway obstruction due to mandibular fracture and cases that caused limitation of gaze in the orbita.

The mean time between admission and operation was 2.05 ± 1.49 days for the pandemic group and 6.94 ± 4.01 days for the pre-pandemic group. The time from admission to surgery was significantly shortened during the pandemic period ($p < 0.001$).

Etiology	Pre-pandemic	Pandemic
IVTA	18 (54.5%)	10 (47.6%)
Beating	10 (30.3%)	8 (38.1%)
Work accident	5 (15.2%)	3 (14.3%)
Total	33 (100%)	21 (100%)

IVTA: In-vehicle traffic accident

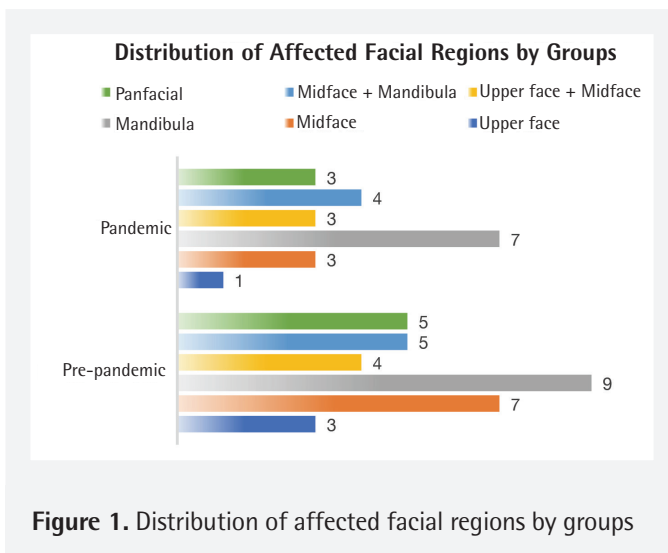


Figure 1. Distribution of affected facial regions by groups

Surgical site infection developed in two (9.5%) cases in the pandemic group, and in four (12%) cases in the pre-pandemic group. Surgical site infections were managed with local wound care and antibiotic therapy. No surgical procedure was performed.

DISCUSSION

With the beginning of the COVID-19 pandemic, certain order changes have occurred in both our social and professional lives. As a significant part of the healthcare staff's workforce was directed to combat the pandemic, there were some regressions in the healthcare services that healthcare institutions could offer to non-COVID patients. Different solutions emerged to compensate for these regressions. These include RC and rapid-transition protocols for surgical units³⁻⁶.

Considering the results of the study, it is remarkable that the mean time from admission to surgery (2.05 ± 1.49) of the patients who were evaluated with RC and admitted during the pandemic process was shorter than the mean time (6.94 ± 4.01) in referrals without the use of RC ($p < 0.001$). Maxillofacial tomographies of the patient are evaluated with RC before the patient is admitted by the team that will perform the possible surgery. Thus, whether the patient needs surgery or not is determined more clearly by evaluating the tomography as well as verbal data. For the same reason, the RC allows the doctor who will perform the surgery to create the surgery plan (like the possible duration of the surgery, the supply of internal fixation systems to be used) before the patient arrives. We think that this preparation process, which is carried out before the patient's admission, plays a major role in shortening the time from admission to surgery.

In addition, since only the patients who are accepted as candidates for surgery are hospitalized within the scope of the RC, the surgical preparation of the patients in the

pandemic group (such as taking a polymerase chain reaction test, preparations for general anesthesia) begins as soon as the patient is admitted to the service and hospitalized in the clinic.

In the pre-pandemic period, since patients were only consulted verbally, although there is the process of taking a tomography, the process of reporting this tomography and the process of consulting in the framework of emergency trauma behind the referral of the patient to us, additional processes such as evaluating the patient as a candidate for elective surgery and referring the patient to the outpatient clinic for surgical preparations are involved in the management of MFT patient.

We believe that elimination of these additional processes within the scope of RC also explains the shortness of the time from admission to surgery during the pandemic period.

During the pandemic process, our hospital served as the only reference center in the region for MFT. When the applications before and during the pandemic are examined in terms of etiology, IVTA is the most common cause of MFT in both groups, followed by beating. This situation is also compatible with the current literature^{7,8}. When the distribution of these two etiology titles according to the groups is examined, it is seen that the rate of MFT due to physical attacks increased during the pandemic period (38.1% during the pandemic period and 30.3% during the pre-pandemic period) and the ratio of IVTA decreased (54.5% before the pandemic and 47.6% during the pandemic period). We could not show the statistical significance of this proportional change. We explain this by the small sample size of our sample. With the lockdowns during the pandemic process, the rates of major depression and domestic violence have increased in the society. We explain the proportional increase in MFT cases due to physical attack in our study with the secondary effects of restrictions in this pandemic period. Studies from different countries have also underlined this finding^{9,10}. For the same reason, we explain the proportional decrease in MFT cases due to traffic accidents with the lockdowns in the pandemic process. The decrease in the number of vehicles in the traffic and the number of people on the street in a unit of time also reduced the number of accidents.

Compared to the pre-pandemic period, we explain the decrease in the total number of patients referred by CCC during the pandemic, with the restrictions imposed by the state authority (such as lockdowns at certain hours). In addition, as we mentioned, besides verbal consultation of the patients, the patient's tomographies were also directed to us during the pandemic process, and in the light of these data, only the patients who were accepted as candidates for surgery were included in this study. We believe that these two reasons explain the decrease in the number of cases despite our role as a single center during the pandemic process.

Remarkably, four patients underwent emergency surgery during the pandemic. Compared to the previous year, this number has increased proportionally. We explain this increase with the fact that we are the only center where these patients are referred during the pandemic process.

In accordance with the current literature, local infection was encountered most commonly in the early period in the postoperative follow-up of the patients.

Increasing local wound care and oral hygiene is the first step in the treatment of wound infections, which are especially common in segmental fractures of the midface and mandible². With this treatment approach, all cases in our patient cohort who developed complications were treated with local wound care and complete healing was achieved.

Telemedicine and virtual consultation methods are also used successfully in orthopedics, which is a branch that frequently uses imaging methods in patient treatment^{3,11}. In randomized controlled studies conducted within the scope of this branch, it has been shown that these methods can be used safely in selected patients^{4,12}. In order to be used in a wider context, the success of this approach should also be demonstrated by economic and patient satisfaction-based studies.

These findings, which we shared, revealed the necessity of a more comprehensive study. However, in the light of these data involving the borders of the Thrace region, it can be supported that sharing patient images with the physician who will perform the surgery during the consultation is a facilitating factor in the decision of surgery and patient triage.

On the other hand, it is also important to examine patient data within the scope of the Law on the Protection of Personal Data (KVKK)¹³. Tomographs are considered as the patient's personal health data. All of the patients included in the study were patients consulted by us from external centers. As required by good medical practices, the necessity of informing and obtaining verbal consent before all procedures performed on the patient is also essential for obtaining patient photographs and other health data. However, in addition to patient consent in sending tomography videos, it does not create a conflict with the scope of KVKK, since the purpose is legitimate and the existing images are not stored and processed in a data recording system.

A non-cloud-based messaging program running on 4G infrastructure is used to transfer tomography data. This program has an end-to-end encipherment feature, and during the transmission of the message, no third party other than the receiving and transmitting party can access the content.

There is a digital system established by the Ministry of Health, called the Telemedicine System. The purpose of this system is

to report the images taken by different radiologists in order to balance the workload of radiologists between hospitals¹⁴.

In this system, loading the tomographies into the system after they are taken can cause a certain delay, especially during non-working hours. If the center where the tomography has been taken does not have an agreement with the Ministry of Health, or if it is not integrated into this system, then the data will not be uploaded to the system. There is a need for arrangements to be made in this system, which is intellectually innovative.

Study Limitations

The fact that this study shares the results of a single center and its retrospective design are the limitations of this study. We could not find any similar study within the scope of the national literature that we could search. From this point of view, we believe that this descriptive study will have a high contribution to the literature.

CONCLUSION

The COVID-19 pandemic and state authority restrictions in this period have led to a decrease in MFT cases referred to our clinic. Although there is a difference in the etiology of the cases admitted during the pandemic, this could not be supported statistically. In the management of MFT patients in this period, sharing the tomography images of the cases within the scope of UK significantly shortened the patient's time from admission to the surgery. Telemedicine can be used as a facilitating tool in the management of MFT cases.

Ethics

Ethics Committee Approval: The study were approved by the Local Ethics Committee of the Trakya University (protocol number: 2021/267-12/23, date: 31.05.2021).

Informed Consent: Retrospective study.

Peer-review: Externally peer-reviewed.

Authorship Contributions

Surgical and Medical Practices: D.D., E.B., Concept: D.D., Design: D.D., E.B., Data Collection or Processing: D.D., Analysis or Interpretation: D.D., E.B., Literature Search: D.D., Writing: D.D., E.B.

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References

- Huang C, Wang Y, Li X, Ren L, Zhao J, Hu Y, et al. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. *Lancet*. 2020;395:497-506.
- Ozkaya O, Turgut G, Kayali MU, Uğurlu K, Kuran I, Baş L. A retrospective study on the epidemiology and treatment of maxillofacial fractures. *Ulus Travma Acil Cerrahi Derg*. 2009;15:262-6.
- Gilbert AW, Booth G, Betts T, Goldberg A. A mixed-methods survey to explore issues with virtual consultations for musculoskeletal care during the COVID-19 pandemic. *BMC Musculoskelet Disord*. 2021;22:245.
- Buvik A, Bugge E, Knutsen G, Småbrekke A, Wilsgaard T. Quality of care for remote orthopaedic consultations using telemedicine: a randomised controlled trial. *BMC Health Serv Res*. 2016;16:483.
- Kehlet H, Wilmore DW. Evidence-based surgical care and the evolution of fast-track surgery. *Ann Surg*. 2008;248:189-98.
- Chen QZ, Sun YC, Chen J, Kong J, Gong YP, Mao T. Comparative study of functional and aesthetically outcomes of reverse digital artery and reverse dorsal homodigital island flaps for fingertip repair. *J Hand Surg Eur Vol*. 2015;40:935-43.
- Bocchialini G, Castellani A. Facial Trauma: A Retrospective Study of 1262 Patients. *Ann Maxillofac Surg*. 2019;9:135-9.
- Kostakis G, Stathopoulos P, Dais P, Gkinis G, Igoumenakis D, Mezitis M, et al. An epidemiologic analysis of 1,142 maxillofacial fractures and concomitant injuries. *Oral Surg Oral Med Oral Pathol Oral Radiol*. 2012;114(5 Suppl):S69-73.
- Vishal, Prakash O, Rohit, Prajapati VK, Shahi AK, Khaitan T. Incidence of Maxillofacial Trauma Amid COVID-19: A Comparative Study. *J Maxillofac Oral Surg*. 2020:1-6.
- Shokri T, Saadi RA, Liaw J, Bann DV, Patel VA, Goyal N, et al. Facial Plastic and Reconstructive Surgery During the COVID-19 Pandemic: Implications in Craniomaxillofacial Trauma and Head and Neck Reconstruction. *Ann Plast Surg*. 2020;85(2S Suppl 2):S166-70.
- Sathiyakumar V, Apfeld JC, Obremskey WT, Thakore RV, Sethi MK. Prospective randomized controlled trial using telemedicine for follow-ups in an orthopedic trauma population: a pilot study. *J Orthop Trauma*. 2015;29:e139-45.
- Manz WJ, Goel R, Fakunle OP, Labib SA, Bariteau JT. Feasibility of Rapid Development and Deployment of a Telemedicine Program in a Foot and Ankle Orthopedic Practice. *Foot Ankle Int*. 2021;42:320-8.
- Kişisel Verilerin Korunması Kanunu. Erişim tarihi: 02.11.2021. Erişim adresi: <https://www.mevzuat.gov.tr/MevzuatMetin/1.5.6698.pdf>
- T.C. Sağlık Bakanlığı. Teletıp Sistemi. Erişim tarihi: 02.11.2021. Erişim adresi: <https://teletip.saglik.gov.tr>