

ORIGINAL ARTICLE

Use of Tele Dentistry in Orthodontic Patients During the Covid Pandemic

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ABSTRACT

Objective: This study was aimed to assess the impact of tele dentistry on bracket breakage and orthodontic plaque index during the covid pandemic.

Study Design: An experimental study.

Place and Duration of Study : The study was conducted from 1st April 2020 to 1st March 2021 in the orthodontic department of Rawal Institute of Health Sciences Islamabad.

Materials and Methods: Seventy-six orthodontic patients were selected from the orthodontic department of Rawal institute of Health Sciences. Each patient had a minimum orthodontic plaque index of 1 and experienced at least four bracket breakages. The treating doctor provided counseling and communicated with the patients via WhatsApp messages, offering them the opportunity to reach out at any time with questions. After a period of three months, the patients were reassessed clinically. A paired sample t-test was applied to evaluate the pre and post counseling values pertaining to bracket breakage and the orthodontic plaque index.

Results: The findings revealed that by using tele dentistry incidence of bracket breakage reduced from 20% to 5% in most of the study participants. Similarly mean plaque index was reduced from 1.78 to 0.53 after online counselling session and WhatsApp messages over a period of three months.

Conclusion: This study highlights the potential of tele dentistry not only to enhance access to oral healthcare and its delivery but also to reduce bracket breakage incidents and promote superior oral hygiene in orthodontic patients.

Key Words: Bracket, Covid 19, Plaque Index, Tele Dentistry.

Introduction

In the light of the challenges posed by the COVID-19 pandemic on global healthcare access, healthcare providers and their teams are grappling with the need to adapt their practices accordingly.¹ Dental professional bodies and decision-makers are tasked with offering The SARS-CoV-2 virus, which causes COVID-19, is abundantly found in the nasopharyngeal and salivary secretions of infected patients.² It is believed to spread mainly through respiratory droplets, as well as via aerosols and contaminated surfaces (fomites) guidance in an ever-changing landscape, drawing from current data, research, and established knowledge.³

Continuous advancements in information communication technology and the widespread availability of social media platforms have guided clinicians to creatively overcome traditional barriers in both clinical and technological workflows.⁴

Telemedicine has emerged as a recognized and regulated tool to address the COVID-19 pandemic, aiming to narrow the gap between healthcare services and the population. By minimizing physical contact between healthcare professionals and patients, tele medicine contributes to the containment of the virus.⁵ Amidst shutdowns, certain dentists have implemented tele health services to offer virtual care to their patients.⁶ This approach involves utilizing various mediums such as phone calls, photographs, and videos to facilitate the delivery of oral healthcare and oral health education services.⁷

For patients undergoing orthodontic treatment, daily oral hygiene presents a particular challenge. To mitigate the heightened risk of caries and gingivitis, it is imperative for patients to undergo intensified individual prophylaxis throughout the entirety of their orthodontic treatment. This involves regular

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Received: March 28, 2024; Revised: August 26, 2024

Accepted: August 27, 2024

oral hygiene check-ups coupled with motivation and instruction on oral hygiene practices.⁸

The landscape of orthodontic practice has been significantly altered by the COVID-19 pandemic. Stringent infection control measures, minimal aerosol generation, and a focus on minimal-touch dentistry are crucial in preventing contamination within the orthodontic operator. During this period, only emergency orthodontic procedures should be administered to patients, while strictly adhering to regulatory guidelines.⁹ The concept of Dentistry 4.0 represents the fourth revolution in dentistry, leveraging modern technologies to enhance patient care.¹⁰ Numerous messenger and video-calling applications are currently available, offering opportunities for hospitals and dental clinics to engage with their patients.¹¹

Implementing virtual triage through the utilization of photos, videos, and video-calling capabilities can prove invaluable in distinguishing and prioritizing genuine orthodontic emergencies requiring immediate attention in clinics from issues that can be managed with home remedies and deferred without clinic visits.¹² As we navigate the current landscape, it's imperative to shift focus from solely addressing urgent dental needs towards strategizing the resumption of routine dental care. This entails devising innovative approaches to cater to patients who may be hesitant to visit dental offices in the foreseeable future, amidst the ongoing uncertainty surrounding the pandemic timeline.

The objective of this research was to advocate for the effective utilization of tele dentistry in orthodontic care during crisis scenarios like the COVID-19 pandemic, as well as its ongoing integration into non-crisis situations. This paper was planned to provide insights supporting the adoption of tele dentistry as a promising avenue for orthodontists, in reducing bracket breakage and improving oral hygiene.

Materials and Methods

This experimental study was conducted during the peak time of Covid pandemic from 1st April 2020 to 1st March 2021 in the orthodontic department of Rawal Institute of Health Sciences RIHS Islamabad. Permission was taken from the ethical review Board of RIHS on 03/02/2020 under letter number RIHS/IRB/D/23/003. Purposive sampling was done, and 80 patients were selected who fulfilled the

inclusion criteria of minimum four bracket breakages with orthodontic plaque index value of 1. Informed consent was taken from every patient. Patients above 12 years of age were included in the study. Syndromic and highly non-compliant patients were excluded. The researchers along with four house officers collected the data. Confidentiality and the privacy of patients were diligently upheld throughout the course of the study, employing measures that encompassed the destruction of any potentially identifying data gathered during the tele dentistry session, including mobile phone numbers and photographs, after the assessment's conclusion. Prior to the study's initiation, all participants were dispatched an informed consent form via WhatsApp, wherein they were required to respond with the term 'accept' accompanied by their name, thereby granting informed consent. These records were retained as substantiation of their willingness to take part in the study. Four patients failed to respond to the consent request, resulting in their exclusion from the study, thus yielding a sample size of 76 patients. The patients were given appointments after every twelve weeks instead of routine four weeks to reduce the number of patients, thus reducing workload as a measure of precaution during the pandemic. It was found that most of the patients reporting for routine adjustment during pandemic had an increased number of bracket breakages along with poor oral hygiene because of the longer gap in appointments. So, a study was designed to know the impact of tele dentistry counselling on bracket breakage and plaque index during this span of time. Inclusion criteria was set as adolescent patients undergoing orthodontic treatment from last twelve months and reporting with minimum number of at least three bracket breakage. Orthodontic Plaque index (OPI) score was also assessed in the same patient with a minimum OPI score of 1. Every patient was reappointed after three months. During this time a video call once a month and What's app message related to oral hygiene instructions twice a month was scheduled as a reminder to improve oral hygiene leading to lesser number of bracket breakage. Thus, a total of three video calls by the treating doctor and six What's app messages on oral hygiene and eating habits were scheduled as a reminder for the patient. During the video call

patients were examined and instructed and motivated about eating habits, brushing timing and techniques. Furthermore, patients were authorized to submit intraoral photographs through WhatsApp, and seek advice from the treating orthodontist promptly, in the event of any emergencies. When the patient reported after three months for routine adjustment, the number of bracket breakage and plaque index score was again recorded to assess the change. The Orthodontic Plaque Index (OPI) constitutes a specialized metric tailored for patients undergoing treatment with fixed orthodontic appliances. The dental arch is subdivided into sextants, and the OPI primarily targets the region proximal to the bracket. Plaque accumulation is assessed on a scale ranging from 0 to 4, with consideration given to various tooth surfaces adjoining the bracket base, including the mesial, distal, occlusal/incisal, and cervical aspects.

In our study OPI was recorded in upper anterior sextant only. The OPI scoring criteria was as follows: 0: No plaque deposits on the tooth surfaces surrounding the bracket base 1: Plaque deposits on one tooth surface at the bracket base 2: Plaque deposits on two tooth surfaces at the bracket base 3: Plaque deposits on three tooth surfaces at the bracket base 4: Plaque deposits on four tooth surfaces at the bracket base and/or gingival inflammation indicators (plaque deposits near the gingiva do not necessarily have to be present).⁸

The initial measurements, termed BR1 for bracket breakage and PI1 for the orthodontic plaque index, were recorded prior to counseling. Subsequent measurements, labeled BR2 for bracket breakage and PI2 for the orthodontic plaque index, were taken following counseling sessions. Statistical analysis was conducted utilizing SPSS 21 software. Frequency of bracket breakage (BR1, BR2) was assessed in pre and post-counseling sessions. A paired sample *t*-test was used to assess the disparity between the pre and post-counseling values for orthodontic plaque index (PI1, PI2).

Results

In our study, we analyzed a sample size of 76 participants, comprising of 51 females (67.1%) and 25 males (32.89%). The mean age of the sample was 16.7 years. The frequency of bracket breakage is detailed in Table 1. Notably, in 26 cases (30%) of

bracket breakage (6 brackets) were reported during the pre-counseling period. However, this frequency decreased significantly to 1 bracket (5%) in 28 cases following counseling via tele-dentistry. The mean plaque index in our sample was initially recorded at 1.78 before the administration of oral hygiene instructions through tele dentistry. This value decreased to 0.53 after a three-month counseling period, which included guidance sessions and WhatsApp messages (Table II). A paired sample *t*-test (Table III) was conducted to compare pre- and post-counseling values for orthodontic plaque index. The results were statistically significant, with a *p*-value of 0.001. The confidence interval for bracket plaque index ranged from 1.011 to 1.489.

Only two patients reported with wire poking and were seen in an emergency setting to have the wire cut. The most common issue reported by patients, accompanied by pictures, was bracket breakage, accounting for 55 cases (73%) of complaints, followed by ligature decay 15 cases (20%). Additionally, nearly 49 patients (65%) expressed concerns about treatment delays.

Table I: Frequency of Bracket Breakage in Pre and Post Counselling Session with Tele Dentistry

Pre-Counselling Session		Post Counselling Session with Tele Dentistry	
Number of cases assessed n=76	Frequency of bracket breakage Br1 in each case	Number of cases assessed n=76	Frequency of bracket breakage Br 2 in each case
15	4 (20%)	14	0 (0%)
12	5 (25%)	28	1 (5%)
26	6 (30%)	20	2 (10%)
10	7 (35%)	8	3 (15%)
8	8 (40%)	6	4 (20%)
5	9 (45%)	nil	nil

Table II: Descriptive Statistics for Age, Bracket Breakage and Plaque Index (N= 76)

	Minimum	Maximum	Mean	St. Deviation
Age (Years)	12	43	16.71	6.224
Br1	4(20%)	9 (45%)	_____	_____
Br2	0 (0%)	4 (20%)	_____	_____
PI1	0	3	1.78	.932
PI2	0	2	.53	.599

Br1: Pretreatment bracket breakage

Br2: Post treatment bracket breakage

PI1: Pretreatment plaque index

PI2: Posttreatment plaque index

Table III: Paired sample T test for Plaque Index

		Mean	Std Deviation	Std Error Mean	Confidence Interval		T	Df	Significance	
					Upper	Lower			One Sided P	Two sided P
Pair	pl1-pl2	1.250	1.047	.120	1.011	1.489	10.406	75	<.001	<.001

Discussion

Our research highlights that delays in orthodontic appointments, as seen during the COVID-19 pandemic, are related to an increased frequency of bracket breakage and higher plaque indices. It is important to note that the implementation of WhatsApp and tele dentistry counselling methods significantly reduced these issues, lowering bracket breakage from 30% to 5% and the plaque index from 1.78 to 0.53. The average age of our sample population was 16.8 years. Consistent with the findings of Ammar et al.¹³, we observed a higher incidence of bracket breakage among teenagers compared to adults. Adolescents are more likely to have elevated levels of supragingival plaque and a higher prevalence of gingivitis than adults, which supports the selection of the 12-18 years age range for our study.

Teleconsultation, telediagnosis, and telemonitoring are elements of tele dentistry that have the potential to engage patients undergoing orthodontic treatment, which often requires cooperation from the patient.¹⁴ Similar to this, our study revealed that using WhatsApp messages and videos strategically can motivate patients to alter their eating habits and improve their oral hygiene, resulting in a significant decrease in broken brackets and an improvement in the orthodontic plaque index.

In a study conducted in Genova, it was determined that participants who received post-treatment reassurance through communication (text message and calls) exhibited greater compliance in oral hygiene than the control group patients.¹⁵ Similarly, another study conducted in Pakistan demonstrated a reduction in plaque index during orthodontic treatment in the text message group, thereby proving its efficacy in enhancing oral hygiene.¹⁶ These findings align with our results, which illustrate that tele dentistry methods can improve oral hygiene and bracket failure in orthodontic patients. However, unlike our study, Naveda et al found that during the COVID-19 quarantine, orthodontic patients exhibited a low frequency of orthodontic appliance interference in daily life, and most of them reported

maintenance of oral hygiene habits.¹⁷ This behavioral difference can be attributed to the age difference, as the patients in our study were predominantly teenagers. As for bracket breakage, another study revealed that 15.42% (n = 54) of all patients had ≥ 1 bracket bonding failure during the COVID-19 pandemic.¹⁸ Chugh et al found in their study that the maximum number of patients reported bracket debonding four months after the lockdown. Nearly half of the patients reported debonding of at least one of the brackets.¹⁹ This is likely due to the indefinite postponement of orthodontic treatments and the impact of lockdown conditions, which may reduce the motivation of orthodontic patients.²⁰ Under such conditions, orthodontic patients may consume foods that are not allowed in their diet, leading to poor oral hygiene and the loss of orthodontic appliances, which may slow down the treatment process. In a study on Brazilian orthodontists conducted during the COVID-19 pandemic, the primary reasons for orthodontic appointments were bracket breakage (67.6%), arch wire issues (60.5%), and problems with tubes and/or bands (44.1%). Among these, stainless steel fixed appliances emerged as the most prevalent type associated with breakage and unscheduled visits.²¹ Similarly, in our study, bracket breakage was identified as the primary concern among patients, accounting for 73% of cases, followed by ligature decay of 25%.

Our study's limitation is that the time between orthodontic appointments, eating and brushing habits could not be maintained uniformly in all patients. Furthermore, there is a need for additional research on the etiology of bracket breakage, as it emerged as a significant concern among patients in our study. Upcoming research endeavors ought to involve larger sample sizes, as our study's inclusion of only 76 patients may prove insufficient to draw definitive conclusions, especially in the climate of uncertainty and challenge.

Conclusion

This study underscores the potential of tele-dentistry to not only improve access to oral

healthcare and its delivery but also to reduce incidents of bracket breakage and promote better oral hygiene among orthodontic patients. Although tele-dentistry may not completely replace traditional methods, it serves as a valuable adjunct to the compromised dental system during this unprecedented health crisis.

Acknowledgment

It is hereby acknowledged that dental assistants Mr Zahid and Mr Umer helped in data collection and managing patient appointments.

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CONFLICT OF INTEREST

Authors declared no conflicts of Interest.

GRANT SUPPORT AND FINANCIAL DISCLOSURE

Authors have declared no specific grant for this research from any funding agency in public, commercial or nonprofit sector.

DATA SHARING STATMENT

The data that support the findings of this study are available from the corresponding author upon request.

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