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Orthodontic urgencies and their management during COVID-19 pandemic-A web-based survey

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Abstract

OBJECTIVES: This investigation aimed to evaluate the most common orthodontic urgencies, their management, and changes in routine biosafety measures and the total income of the dental office in South India during the COVID-19 pandemic.

METHODS: A questionnaire was drafted using Google Forms with questions in four domains pertaining to orthodontic urgencies, biosafety measures, treatment duration, and income. After validation, this questionnairewas sent to 750 orthodontists via WhatsApp messenger (WhatsApp Inc, Menlo Park, Calif) over a period of 14 days.Descriptive statistics and comparisons were performed using independent *t*- and *Chi*-square tests.

RESULTS: Majority of the orthodontists (62.3%) had closed their clinics only during the first lockdown. Many (63%) had scheduled urgent appointments along with routine limited patients per day. The most frequent urgencies were related to the breakage of brackets, archwires, molar tubes, bands, and temporary anchorage devices. Aligners were the least problematic. The treatment time was also prolonged. Telephonic advice and virtual assistance via WhatsApp messages/videos were found to be successful in the management of urgencies.Most orthodontists had strengthened their routine biosafety measures.The financial impact of this pandemic was considerable, with nearly 50% reduction in total income.

CONCLUSIONS: Urgencies linked to preadjusted edgewise appliances, such as breakage of brackets and tubes, and archwire-related injuries were the most common. Prolongation of treatment time and negative financial impact were the other problems encountered during this pandemic. Drastic changes had occurred in routine biosafety measures, which prevented the spread of infection among orthodontists and patients.

Keywords:

COVID-19, fixed orthodontic appliances, orthodontic emergencies, orthodontic urgencies

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Introduction

COVID-19 has affected all aspects of an individual's life, including routine health visits. Patients undergoing regular treatment procedures have found it difficult to continue them owing to the imposition of quarantine and lockdown measures by the central government. An article published by the New York Times reported that dentists were at a high risk of getting infected by SARS-CoV-2 because of cross-infection from their patients.[1] Hence, many countries had recommended their registered dental practitioners to avoid elective procedures pertaining to orthodontic treatment, aesthetic restorations, planned surgeries, etc., Therefore, only patients with orthodontic emergencies and urgencies were being seen by orthodontists while adhering to strict precautions for the prevention of infectious diseases.[2-5]

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There is a fine dividing line between the terms "urgency" and "emergency."[6,7] Emergencies are those problems that involve a risk of death.[7] According to Single Nations Guidelines, orthodontic problems (such as general dentistry problems), represent urgencies and not true emergencies.[6] Thus, any problem arising from orthodontic appliances or accessories in which an unscheduled appointment is required to solve the issue can be considered an orthodontic urgency.[6] While orthodontic emergencies are extremely rare, orthodontic urgencies are not uncommon. The duration of orthodontic treatment is approximately 2–3 years, and during this period, approximately 85% of the patients report with some kind of urgency.[8]

A study conducted by Cotrin *et al*.[9] among Brazilian orthodontists concluded that breakage of brackets, archwires or tubes, and bands was the most common cause for urgent appointments during the early stages of the pandemic.

Delay in the management of orthodontic urgencies may lead to trauma, unwanted tooth movements, prolongation of total treatment time, and loss of patient motivation. Proper handling of these urgencies provides rapid relief from pain and discomfort, thereby enhancing the patient's confidence in the orthodontist.[10,11] The compromised situation during the pandemic might have altered the nature of urgencies and the mode of handling them. Regional variations may also exist with respect to the above issue.

Fear of spreading COVID-19 among the staff, patients, and their families has led to a majority of the dentists making a drastic change in their routine biosafety measures. A reduction in the number of patients seeking routine dental care and an escalation of costs because of the incorporation of new biosafety measures might have resulted in uncertainties regarding the generation of income.[12]

The pandemic situation has led to several new concerns. National bodies in different countries took various steps to suspend dental practices to prevent the spread of the disease. China, where the pandemic was first reported, advised dentists to suspend all routine dental care for three months from January 2020. The dentists were allowed to provide emergency care only with the use of strict personal protection.[4,13] Countries with close links to China, such as Singapore, Taiwan, and Hong Kong, also closed down routine dental care during the earlier outbreak.[2] UK, apparently, had a different view. Dentists there were initially advised by National Health Service to continueproviding routine dental care for patients with no symptoms or close contact history. American Dental Association had recommended a risk-based approach, i.e. postpone elective procedures, surgeries, and nonurgent dental visits only in those parts of the country where COVID-19 infections were accelerating or peaking.The World Health Organization recommendation was to delay routine dental care during the pandemic.[14,15]

The objectives of this web-based survey were to evaluate the most common orthodontic urgencies, their management, changes in routine biosafety measures, and variation in the income generated by orthodontists in South India during the pandemic.

Materials and Methods

This cross-sectional study was conducted after obtaining approval from the Institutional Ethics Committee (Protocol No. 224/2021/DCC).

A panel of five orthodontists with >15 years of experience was selected for drafting a questionnaire with items related to orthodontic urgencies, biosafety measures, treatment duration, and income generation.

The constructed questionnaire was validated among 20 orthodontists who had a clinical experience of >10 years in South India. Relevant changes were made after obtaining their input. The final version of the questionnaire was then created in Google Forms in such a manner that only orthodontists who had not completely closed their clinics during the pandemic would be able to complete it.

The questionnaire comprised four domains, i.e. 1. orthodontic urgencies, 2. biosafety measures, 3. treatment duration, and 4. income. The first domain was concerned with the nature of urgencies and their management, including accessories involved.The second domain was focused on steps taken for enhancing/modifying the sterilization procedures, care of patients, and personal protection. Unlike other dental procedures, orthodontic treatment has a long duration, which would invariably be affected in such situations and indirectly influence the income generated. The third and fourth domains were focused on these areas. Table 1 depicts the items used in the survey and potential responses.

The sample size was calculated with a confidence interval of 95%, a margin of error of 5%, and a prevalence of 85% [obtained from a previous study.[8] Based on the calculation, a minimum sample size of 205 subjects/responses was deemed necessary.

The Google Form questionnaire was sent to approximately 750 orthodontists all over South India via the WhatsApp Messenger App (Meta platforms, Inc, Menlo Park,

Table 1: Questionnaire used in the study

Items and potential response
Gender
Male
Female
Third gender
Age
20–29
30–39
40–49
50 & Above
Designation
Professor
Reader
Assistant professor
Senior lecturer
Private practitioner
Clinical experience
Less than 5 years
5–10 years
11–20 years
More than 20 years
Was your orthodontic practice shut down during COVID-19 pandemic?
Shut down only during the first lockdown
Shut down only during the second lockdown
Shut down only during the first & second lockdown
Functioning during lockdown
How were the appointments in your practice scheduled during COVID-19 pandemic?
• Routine & urgency care appointments with the usual schedule.
• Routine & urgency care appointments with limited patients per day
• Only urgency care was scheduled
How did your patient get in touch to schedule the urgency care?
• Messages to the dental office's WhatApp
• Dental office's phone call
• Personal orthodontist's phone calls and/or WhatApp message/ video
• Enquired in person
• Personal orthodontist's webpage on social networks.
What types of appliances have caused the most urgent appointments? Select all alternatives that apply.
Stainless steel fixed appliances
Esthetic fixed appliance
Self-ligating fixed appliances
Removable retention appliances
Fixed retainers
Removable functional/orthopaedic appliances
Fixed functional appliances
Fixed expansion appliances
Orthodontic accessories
Aligners
What were the most frequent urgencies you handled in your office during this quarantine? Select all alternatives that apply
Bracket breakage
Molar tubes/band breakage/loose bands
Metallic ligatures causing injuries
Archwire causing injuries [breakages, overextended, displaced]
Loss of elastic ligatures
Breakage of removable appliances or aligners
Breakage/Loosening of bonded expanders/fixed functional appliances
Breakage of fixed lingual retainers
Urgencies related to poor oral hygiene
Urgencies related to tooth movement
Loss of removable retainers
How did you manage the abovementioned orthodontic urgencies during this pandemic?
• Advice over the phone that no action is required.
• Telephonic instructions and guidance on management of the problem.
• Virtual assistance through WhatsApp in the form of video/web link, pictures, or live video calls.
• Clinical appointment for management of urgency
Have you had urgencies related to orthodontic accessories?
Yes
No
If so, what type of accessories?
Intermaxillary elastics
Mini-implants
Miniplates
Kobayashi hooks
Extraoral appliances
Others
Have you noticed "Trampoline effect "in any of the patients during this pandemic?
Yes
No
What were the most frequent urgencies related to temporary anchorage devices?
Lacerations
Pain
Mucosal coverage
Dislodgement of elastomeric chains
Mobility of TADs
How did you manage the urgencies related to orthodontic accessories during this pandemic?
• Advice over the phone that no action is required.
• Telephonic instructions and guidance on management of the problem.
• Virtual assistance through WhatsApp in the form of video/web link, pictures, or live video call.
• Clinical appointment for management of urgency
Did the telephonic advice/virtual assistance through Whatsapp help the patients manage the urgency by themselves?
Yes
No
With the pandemic, was there a change in the biosafety routine of the office?
Yes
No
What changes were made in your routine orthodontic practice during this pandemic? Select all alternatives that apply
• Preappointment screening processes like wellness screening questions, temperature check, and sanitizing

Contd...

Table 1: Contd...

Items and potential response
• Taking prior appointment • Reductions in the number of appointments per day • Reception area is prepared for maintaining social distancing. • Instructing the parents/bystanders not to enter the reception to avoid crowding. • Scheduling aerosol and nonaerosol appointments separately • Use of PPEs like surgical gown, face shield, Level 3 surgical mask/N 95 mask and examination gloves • Use of HEPA filters in the clinic • Proper hand washing/sanitization of hands after each patient treatment • Disinfecting the chair and the entire clinic after aerosol-generating procedures. • Preprocedural mouth rinse
How were the reusable instruments sterilized after each patient treatment? Select all alternatives that apply
• Cleaning the instrument and wiping it with alcohol disinfectants. • Cleaning the instrument and dipping it in chemical disinfectants like glutaraldehyde • Autoclaving • Use of UV-C radiation-emitting sterilizers
How was the total duration of treatment affected due to this pandemic?
Remains the same
Increased by three months
Increased by six months
Increased by more than six months
With the pandemic, was there a reduction in the total income of the office?
No change
Reduction by 10%
Reduction by 25%
Reduction by 50%
Reduction by more than 50%

Calif). The questionnaire was available for a period of 14 days (November 15–29, 2021). Any item that might reveal the identity of the orthodontist was not included in the questionnaire.

Statistical analysis

The data obtained were analyzed usingthe Statistical Package for Social Science, SPSS (version 21.0, SPSS, IBM Corporation, USA) software. Descriptive statistics was performed. Comparison between men and women was performed using independent *t*-test and *Chi*-square test.

Results

Over a period of 14 days, 212 orthodontists from South India responded to the questionnaire, of which 77.4% were men and 22.6% were women. Furthermore, 46.2% were aged between 30 and 39 years, 33% between 40 and 49 years, 15.6% were >50 years of age, and 5.2% were between 20 and 29 years of age. As far as experience was concerned, 29.2% had 11–20 years, 27.8% had 5–10 years, 23.1% had >20 years, and 19.8% had <5 years of clinical experience.

The survey revealed that the majority of orthodontists [62.3%] had closed their clinics only during the first episode of the lockdown. Only some professionals had chosen to close down during both episodes [24.5%]. Others had opted to remain fully functional throughout the period [11.3%]. A small segment did not respond to the question. It was observed that 63% of the orthodontists had scheduled both routine and urgent appointments with limited patients per day. A small fraction [25%] had dealt with urgencies only.

The official telephone in the dental office appeared to be the most preferred choice of communication by the patient. WhatsApp messages were also common.

A comparison of the various appliances that necessitated urgent appointments and their nature/frequency is given in Figure 1. Stainless steel fixed appliances topped the list [91%], which was followed by fixed retainers [25.1%]. The least on the list were patients on aligners [2.8%].

The most frequent orthodontic urgencies that necessitated reporting to the dental office pertained to debonding of brackets, followed by molar tube and archwire injuries. Majority of the urgencies were managed by scheduling specific clinical appointments [81.5%]. Telephonic interactions also proved to be useful [41.2%] [Figure 2].

Of the orthodontists who had reported urgencies due to orthodontic accessories, elastomeric chains/intermaxillary elastics appeared to be the most frequent cause [62.8%] and was followed by miniimplants [40%] and extraoral appliances [21%]. Those pertaining to temporary anchorage devices (TADs) were mainly due to mucosal coverage [51.2%], followed by mobility [45.3%], and dislodgement of elastomeric chains [37.2%] [Figure 3]. These urgencies were managed mainly via clinical appointments (80.2%) and a small percentage via telephonic instructions and guidance.The survey revealed that 51.2% of the orthodontists who had participated noticed "trampoline effect" in their patients duringthe pandemic.

Telephonic advice and virtual assistance via WhatsApp were found to be successful in the management of urgencies in 75.6% of the cases.

Most orthodontists [94.8%] had changed their routine biosafety measures to avoid contamination in the dental office. The use of the personal protective equipment [PPE] topped the list [91.5%], followed by pre-appointment screening of the patient, reducing the number of daily appointments, reception area

preparations, and instructions for bystanders to avoid crowding. Scheduling aerosol and non-aerosol appointments separately and the use of high-efficiency particulate absorbing [HEPA] filters were least followed. Routine sterilization procedures were implemented after each patient appointment, and the majority of the practitioners [72.5%] preferred autoclaving. Ultraviolet-radiation-emitting sterilizers were found to be the least used [Figure 4].

The treatment time was reported to be increased by 3 [44.32%]–6 [31.9%] months.

A 25% reduction in the total income was reported by 34% of the orthodontists, and in 27.6%, the reported reduction was 50%.

Discussion

More than 75% of the participants were men, which indicates the higher percentage of male than female orthodontists in South India. Overall, three-fourths of the participants were <50 years of age, which is similar to previous findings.[9,16-18]

Majority of the orthodontists had closed their clinic/private practice during the first lockdown (62.3%) as per the recommendation of the central government and also because of the fear of spreading COVID-19. However, during the second lockdown, only one-fourth of the participants closed their practice completely. A possible reason may be the fear of the burden of financial liabilities experienced during the first lockdown. Various surveys have shown that dentists were apprehensive about the decrease in the total income and the management of recurring monthly expenses.[19–21] Our findings also reveal that the pandemic had negatively affected the total income of most orthodontic offices. While 34% of the orthodontists reported a 25% reduction in their income, 27.6% stated a reduction of 50% and 16.7% even more than that. This reduction could be attributed tothe decrease in the total number of patients, nonpayment due to financial crisis, and the sharp increase in expenses to provide a biologically safe working environment for themselves, patients, and staff.

Most orthodontists managed routine and urgent care with limited patients per day. Some had handled only orthodontic urgencies. This finding indicates the concern of and the precautions taken by orthodontists to prevent the spread of the infection.

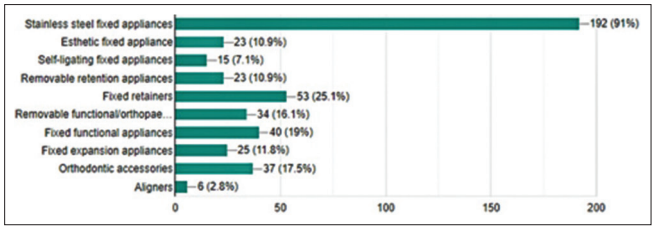

Figure 1: Frequency of urgent appointments scheduled for various orthodontic appliances

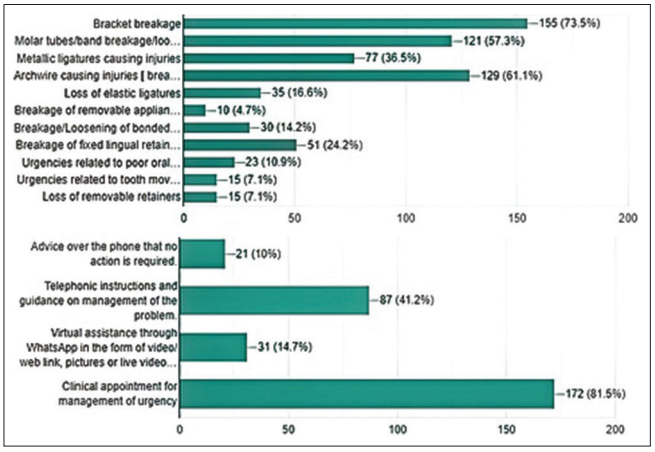

Figure 2: A comparison of the nature of reported orthodontic urgencies and their management strategies

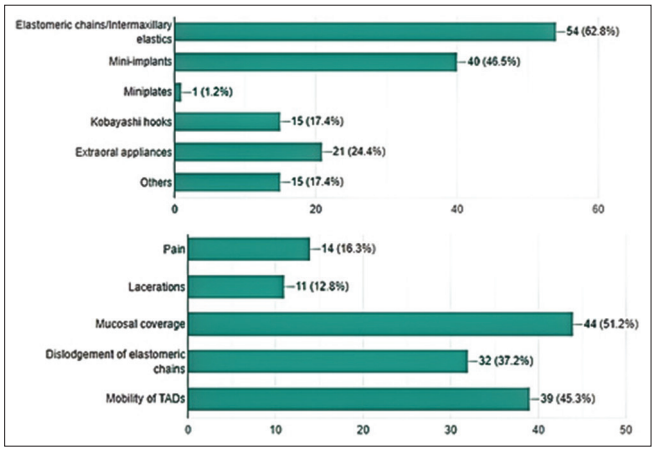

Figure 3: Urgencies related to orthodontic accessories and their management strategies

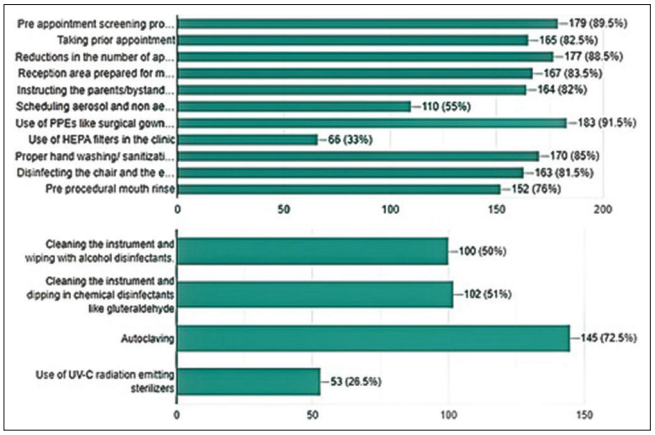

Figure 4: Biosafety measures and sterilization protocols undertaken during COVID-19 pandemic

The orthodontic specialty is characterized by the use of various treatment modalities, such as fixed, removable, and growth modification appliances for the correction of different kinds of skeletal and dental malocclusions. The past three decades have witnessed an increase in the use of preadjusted fixed appliances.[22] Our findings reveal that most of the orthodontic urgencies were related to commonly used stainless steel fixed appliances, followed by fixed retainers, fixed functional appliances, and orthodontic accessories. Urgencies related to aesthetic brackets, such as ceramic and self-ligating brackets, were fewer probably because these are less commonly used in the given population. Functional, orthopedic, and fixed expansion appliances apparently did not require urgent appointments, which agrees with the observations of Cotrin *et al*.[9]

In this survey, the most frequently reported orthodontic urgency was the breakage of brackets, which is similar to that observed in previous literature.[9,23,24] Although every orthodontist gives clear and repeated instructions to the patients and their bystanders, breakage is a fairly common occurrence, which happens chiefly because of negligence on the patient's part.[10,11] Archwire-related injuries, breakage of molar tube/band, metallic ligature-related injuries, and fixed retainer dislodgement were the other commonly reported urgencies. A study by Jones *et al*.[23] also reported archwire-related problems that amounted to 13% ofthe total urgencies.The least reported were the urgencies related to problems in tooth movement, breakage of removable appliances, and loss of removable retainers.

Of the various orthodontic accessories, issues with elastomeric chains/intermaxillary elastics were the most frequent cause of all urgencies, as reported by two-thirds of the surveyed orthodontists, followed by miniimplants, extraoral appliances, and Kobayashi hooks. Urgencies related to elastomeric chains/intermaxillary elastics were difficulty in placement of elastics due to soft tissue coverage on molar hook, loosening of molar band, and shortage of elastics.The trampoline effect was reported in >50% of the patients. Previous research has reported that loss to follow-up might lead to inadvertent movements during space closure, such as tipping and bite deepening due to the "trampoline effect."[25]

In recent times, TADs have become an integral part of orthodontic accessories for obtaining skeletal anchorage. Complications related to miniimplants were the second most commonones with regard to urgencies associated with accessories. Delay in the management of urgencies related to TADs may affect their stability. Studies have documented that the failure rate of TADs under orthodontic loading varies between 11% and 30%.[26-30] Unstable TADs should be removed and reinserted/replaced. In this study, soft tissue coverage was the most common urgency linked to TADs, which is also a major risk factor for the mobility of miniimplants. Other urgencies reported were mobility of miniimplants, dislodgement of elastomeric chains, and pain. Majority of TAD-related urgencies were managed by scheduling urgent clinical appointments and the remaining via telephonic instructions.

Our observations indicate that teleorthodontics and remote monitoring played an important role during this COVID-19 pandemic. The availability of high-quality software and hardware technology, along with experts, has led to the exponential use of telemedicine in this field. Teleorthodontics allow the orthodontists to connect with their patients not only in their clinics but also at home. The commonly used modalities include personal/office phone calls, personal/office WhatsApp messenger, live videos/teleconferences, and emails.[31] In our research, office phone calls were the most common mode of communication between the patient and the dental team (64.9%), followed by the orthodontist's personal phone/WhatsApp messenger and the dental office WhatsApp. More than 50% ofthe orthodontists managed these urgencies remotely via telephonic instructions and virtual assistance via WhatsApp in the form of videos/weblinks/pictures. Nearly three-fourths of them were able to do so without the need for a clinical appointment.

Another observation of our study is that almost half of the practitioners (44.3%) reported an average increase in the treatment time by three months. The rest of them (31.9%) reported an average increase of ≥6 months. This increase was probably because orthodontists were unable to provide routine care to their patients, which could have prolonged the average treatment time. Only a minor percentage reported no change in the overall treatment time. These findings are supported by previous studies that have demonstrated the case of missed appointments leading to the prolongation of treatment time.[32,33]

This pandemic resulted in a radical change in routine biosafety measures among the orthodontists to avoid contamination in the dental office. Cotrin *et al*.[34] had reported that the provision of sanitizers for patients at thereception, avoiding crossover of patients, and the use of disposable surgical masks, head caps, laboratory aprons, and face shields were the preferred precautionary measures. Most of the above measures were adopted by our participants too during the pandemic.

The key limitation of our study is that it reflects the responses of orthodontists in South India only and, hence, may not provide a national perspective.

Conclusion

The implementation of two lockdowns and quarantine has increased orthodontic urgencies and the total duration of treatment and reduced the total income of the practitioners during the COVID-19 pandemic. Urgencies related to preadjusted edgewise appliances, such asbracket breakages, archwire-related injuries, and breakage of molar tubes were the most common orthodontic urgencies encountered during this pandemic. Drastic changes occurred in the biosafety measures at the dental office, which aided in preventing the spread of infections among orthodontists and patients. Furthermore, the financial impact of this pandemic was considerable among the orthodontists. Thus, it is apparent that the pandemic has severely affected the orthodontic profession in South India, as in many other countries.

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Conflicts of interest
There are no conflicts of interest.

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