Guest Editorial

The COVID-19 pandemic suggests opportunities for researchers to investigate pertinent topics in orthodontics

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After initially appearing in China, COVID-19 quickly escalated to a pandemic with a wide range of symptoms reported.[1] The complete clinical manifestations of COVID-19 are not yet clear, and the transmission risk is not adequately understood.[2] Efforts are still underway to develop a vaccine or antiviral agent for COVID-19.[3]

Previously published reviews and editorials have demonstrated how the dental profession and our specialty have been affected by the pandemic.[4–10] However, to fully understand the far-reaching consequences, there are many new opportunities for research projects related to orthodontics that should be undertaken by scientists and clinicians to investigate how we, as a specialty, can best cope with the multifaceted problems facing us during the COVID-19 pandemic. Some suggestions for topics that should be explored follow in this guest editorial.

First, it is recommended that studies be undertaken to determine how the pandemic might be affecting patients currently involved in orthodontic treatment. This could help clinicians to adopt appropriate measures to better care for their patients. Therefore, it is proposed that the effects of the COVID-19 pandemic, the associated lockdown, delayed appointments, and effects on the consequent treatment results for orthodontic patients be investigated. The associated issues might cause psychological distress to patients and clinicians. During the middle stages of orthodontic treatment, patient enthusiasm and motivation tend to decrease progressively, often leading to worsening of oral hygiene practices.[11] Psychological aspects and factors related to the overall patient experience during treatment have been related to patient compliance issues.[12] With the added psychological burdens caused by the pandemic, oral hygiene and orthodontic patient compliance are possible areas for research. Previously, emotional stress has been associated with reduced orthodontic tooth movement, more severe orthodontic root resorption,[13] more considerable orthodontic pain experience,[14] and periodontal disease.[15] The doctor–patient relationship and psychological status of patients can affect their overall satisfaction with treatment outcomes.[16,17] Therefore, many aspects of orthodontic treatment might be affected by the pandemic and can be studied, including patient and clinician psychological status, total treatment duration, orthodontic tooth movement, effect of treatment on periodontal tissues, root resorption, pain experience, satisfaction with the treatment results, and the actual quality of treatment outcomes provided during the pandemic. Case-control and prospective cohort studies with historical controls are suggested for these purposes.

Second, since maintaining clinician–patient rapport through virtual communication has been proposed as a means of improving the situation, virtual media is another area of research suggested. Can virtual communication affect patient oral hygiene or compliance during treatment? Applications and computer-assisted oral hygiene instructions have already been successful.[11,18] However, virtual communication through social media is another area for further research. What are the best timelines (duration and frequency) for these communications to be the most effective? Is virtual examination as effective as physical examination for purposes of diagnosis and treatment planning? Digital orthodontic study models (e-models) have previously been approved as a valid alternative to traditional plaster study models in treatment planning.[19] However, virtual examination is still a new concept requiring further study. Clinical trials are the suggested study design for this purpose.

Third, in-office measures to reduce the chance of viral transmission are another area of further investigation since preventive approaches have been strongly recommended. Are other alternatives available in orthodontic practice to reduce transmission during traditionally high aerosol-producing procedures, such as bonding, debonding, and adhesive removal? For instance, clear aligners may not require attachments in mild orthodontic malocclusions. Studies comparing the efficacy of clear aligners with fixed orthodontic treatment are few and heterogeneous, and their quality is debatable.[20] Therefore, it is suggested that treatment efficacy be compared between fixed orthodontic

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treatment and clear aligners without attachments in mild cases with high-quality, standardized study protocols. In moderate to severe cases, aerosol-producing procedures can be modified by using other devices instead of the routine protocols. Lasers have already been studied and shown to have some degree of efficiency for enamel etching,[21–23] conditioning of loose metallic[24] and ceramic brackets,[25] and adhesive removal from enamel surfaces.[26] In some studies, lasers have been investigated and suggested to limit the pulpal temperature changes within the histopathological limits if used without water cooling.[27–29] In addition to efficiency, the aerosol production with these devices should be compared to routine protocols. In vitro studies and clinical trials are suggested to address this area.

Finally, it is suggested that office protocols to prevent viral transmission be investigated when aerosol production is inevitable. Air filtration systems[30] and negative pressure facilities[31] have been suggested in the literature to prevent viral transmission. Which of these methods or combinations most effectively reduces the viral load in the office? What is the best time interval between routine orthodontic patient appointments and those with aerosol-producing procedures with and without additional filtration facilities in the office? Another area of research could be investigating how oral rinses recommended to combat COVID-19 affect fixed orthodontic appliances. Both 0.2% povidone iodine or 1.0% to1.5% hydrogen peroxide have been recommended for patients due to the vulnerability of COVID-19 to oxidation. However, their safety for orthodontic patients may be another area for research. Also, the possible effect on orthodontic bonding procedures and orthodontic appliance susceptibility to corrosion and metal ion release is important. Only one study has reported the effect of povidone iodine mouthrinse on orthodontic bond strength.[32] The effect on orthodontic bond strength of hydrogen peroxide as an oral rinse has not been studied; however, studies have reported mixed data regarding enamel bleached with hydrogen peroxide, from having no effect on orthodontic bond strength to decreased bond strength.[33,34] Some mouthwashes can result in galvanic corrosion of fixed appliances.[35] In vitro studies and studies in clinical settings are recommended for elucidating these effects.

In conclusion, at least temporarily, modifications in research areas of interest within the specialty of orthodontics should be considered and implemented to help provide evidence-based standard guidelines and treatment strategies to combat COVID-19. The authors hope this article will inspire and help potential investigators in this regard.

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