Research Article

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Assessment of Effect of Orthodontic Treatment on the Integrity of Endodontically Treated Teeth Covered with Prosthetic Crown

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ABSTRACT

Background: The present study was conducted to assess the effect of orthodontic treatment on the integrity of endodontically treated teeth covered with a prosthetic crown.

Materials & Methods: 78 root canal treatment (RCT) teeth in 54 patients who had undergone fixed orthodontic treatment were selected. In all patients, panoramic radiographs were taken and were evaluated before the start and after the completion of orthodontic treatment. Apical periodontitis (AP) was evaluated by the probability index (PRI) of periapical bone destruction.

Results: During pre-orthodontic treatment in 52 teeth periapical destruction was not present, in 10 cases unsure and 16 cases, periapical destruction was almost definitely present. During Post-orthodontic treatment, in 41 cases, periapical destruction was not present, in 7 cases, unsure and in 30 cases, periapical destruction was almost definitely present. The number of teeth with periapical destruction increased following orthodontic treatment.

Conclusion: Authors found that the number of teeth with periapical destruction in endodontic treated teeth covered with prosthetic crown increased following orthodontic treatment.

Keywords: Apical periodontitis, Orthodontic, Periapical destruction.

INTRODUCTION

The orthodontic movement of endodontically treated teeth has become a routine treatment due to increased awareness and demand for aesthetics by older patients seeking orthodontic treatment that present with a high rate of substandard root-canal-treated teeth.[1] The goal of orthodontic treatment is minimizing the biological damage and pain besides enabling an adequate teeth movement. Orthodontic movement of endodontically treated teeth was approached with suspicion for many years, and clinicians abstain from applying orthodontic movement to these teeth.[2] However, there are close

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relations between all professional fields of dentistry; the relation between endodontics-orthodontics has attracted the attention of researchers less frequently, and there have not been any definitive judgments on the subject. This makes planning and follow-up of the treatment difficult for clinicians and causes problems in terms of complications that may occur during the treatment and approaches to the complications.[3]

Apical periodontitis (AP) is an inflammatory process in the periapical tissues that can occur as a sequel to caries, trauma, or operative dental procedures when bacteria infect the dental pulp. AP is one of the most common endodontic diseases and is considered the primary indication for RCT, which may affect the prognosis of orthodontic treatment.[4] AP frequently progresses without subjective symptoms; therefore, early diagnosis is essential, and radiographs are the only diagnostic tool for the detection of AP and treatment planning. An issue can arise when orthodontic treatment is considered for an endodontically treated tooth/teeth with AP. Orthodontic movement of endodontically treated teeth with periapical lesions that are asymptomatic and functional has become common practice.[5] The present study was conducted to assess the effect of orthodontic treatment on the integrity of endodontically treated teeth covered with a prosthetic crown.

MATERIALS & METHODS

This retrospective study was conducted among 78 root canal treated teeth covered with a prosthetic crown in 54 patients who had undergone fixed orthodontic treatment. All patients were informed regarding the study and their consent was obtained. Ethical clearance was obtained before starting the study. The data was collected from 8 orthodontic private practitioners in the Delhi-NCR region. The patient selection criteria included those patients that had at least one endodontically treated tooth and which has to be present both the starting and end of the fixed orthodontic treatment. The exclusion criteria included the patients with absence of RCT teeth, poor quality panoramic radiographs, endodontically retreated teeth during orthodontic treatment and incomplete orthodontic treatment. Data such as name, age, gender etc. was recorded. In all patients, panoramic radiographs were taken and were evaluated before the start and after the completion of orthodontic treatment. Panoramic radiographs were taken because of them being the most commonly used essential clinical diagnostic aid. All the digital panoramic radiographs were taken using Hyperion X9 machine with a specification of 10mA current, 80Kvp tube voltage, 7sec exposure time (software iRYS 8.0, MyRay Italy). Apical periodontitis (AP) was evaluated by the probability index (PRI) of periapical bone destruction. Other variables related to the quality of root canal fillings were included, such as RCT quality index, length, and homogeneity, and coronal restoration was also recorded. Results thus obtained were subjected to statistical analysis. P value less than 0.05 was considered significant.

RESULTS

Table I: Distribution of RC treated teeth covered with prosthetic crown

Teeth	Number	P value
Incisor	14	0.05
Canine	12	
Premolar	20	
Molar	32	

Table I shows that root canal treated teeth were incisor (14), canine (12), premolar (20) and molar (32). The difference was significant (P< 0.05).

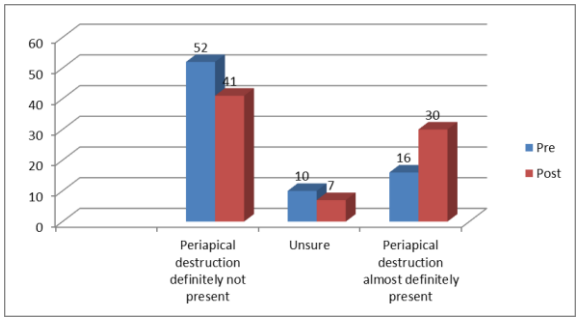
Table II: Assessment of pre- and post-orthodontic measured probability index.

PRI	Pre-orthodontic treatment	Post-orthodontic treatment	P value
Periapical destruction definitely not present	52	41	0.05
Unsure	10	7	0.12
Periapical destruction almost definitely present	16	30	0.02

Table II, the graph I show that during pre-orthodontic treatment in 52 teeth periapical destruction was definitely not present, in 10 cases unsure and in 16 cases, periapical destruction was almost definitely present. During Post-orthodontic treatment, in 41 cases, periapical destruction was definitely was not present, in 7 cases, unsure and in

30 cases, periapical destruction was almost definitely present. The number of teeth with periapical destruction increased following orthodontic treatment.

Graph I: Assessment of pre- and post-orthodontic measured probability index



DISCUSSION

Orthodontic force, which is called as controlled trauma, can damage the pulp because the lack of collateral circulation in the pulp makes pulp one of the most sensitive tissues of the body.[6] The symptoms, which can be diagnosed earlier in the pulp tissues, after orthodontic force is applied are hemodynamic changes with the increase in the volume of blood vessels and circulatory disorders within the 1st hour. When an orthodontic force is applied, pulp tissue reacts with pulp hyperemia at first, and degranulation of mast cells is characterized by cell damage and biochemical reactions.[7] These are the features of classical acute inflammation in which acute inflammatory mediators such as vasodilatation, bradykinin, neuropeptides, prostaglandins and growth factors, vascular permeability, and histamine, which causes a rise in blood flow with oedema, are released.[8] An increasing neural activity and an increased response threshold to electrical stimulation of pulp develop after a few days. Then, because of the alteration in the metabolism of pulp, which is stated with increased enzymatic activity, apoptosis, and necrosis of pulp cells increase. The changes in the tissue respiration and possible hypoxia, which develop during orthodontic treatment, cause an increase in aspartate aminotransferase (AST) activity levels and affect dental pulp tissue by changing pulpal neural response.[9] The present study was conducted to assess the effect of orthodontic treatment on the integrity of endodontically treated teeth covered with a prosthetic crown.

In the present study, root canal treated teeth were incisor (14), canine (12), premolar (20) and molar (32). The difference was significant (P< 0.05). Alqerban et al[10] evaluated the periapical status of endodontically treated teeth and the integrity of endodontic treatment before and after orthodontic treatment among 128 teeth with root canal treatment (RCT According to the PRI, the proportion of teeth with periapical bone destruction was significantly higher after orthodontic treatment. Overall, there was no significant change in the PAI scores after orthodontic treatment. However, the quality of the endodontic treatment moderated the change in the PAI score, as well as the change in the PRI. There was no significant increase in PAI and PRI scores after orthodontic treatment for adequately treated teeth. However, the risk for periapical lesions and bone destruction after orthodontic treatment was significantly increased for teeth receiving inadequate endodontic treatment compared with those receiving adequate endodontic treatment.

We found that the number of teeth with periapical destruction increased following orthodontic treatment. During pre-orthodontic treatment in 52 teeth periapical destruction was definitely not present, in 10 cases unsure and in 16 cases, periapical destruction was almost definitely present. During Post-orthodontic treatment, in 41 cases, periapical destruction was definitely was not present, in 7 cases, unsure and in 30 cases, periapical destruction was almost definitely present. Ørstavik et al[11] developed the most popular PAI, based on the use of 2D radiographs. Estrela et al[12] developed a new PAI using CBCT. CBCT has been proven to be better than periapical radiographs for the detection of periapical lesions. The accuracy of CBCT images compared with periapical and panoramic radiographs is significantly better for the detection of AP.

CONCLUSION

Authors found that the number of teeth with periapical destruction in endodontic treated teeth covered with prosthetic crown increased following orthodontic treatment.

CONFLICTS OF INTEREST

The authors declare they have no potential conflict of interests regarding this article.

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