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Endodontic-Orthodontic Interreationships : A Review of Literature

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Abstract

The endodontic-orthodontic interrelationship is not well understood due to the limited scientific literature on the topic. This article aims to provide an overview of the orthodontic treatment of endodontically treated teeth and the risk of root resorption, the effects of orthodontic tooth movement on dental pulp and endodontically treated teeth, the role of orthodontics in endodontic-restorative treatment planning, and interdisciplinary patient management.

Keywords: Dental Pulp, orthodontic, Root Canal.

Introduction

There is a paucity of information on the concise relationship between endodontics and orthodontics during treatment planning decisions. Orthodontic Endodontic consideration is one of the important topic in Dentistry that has been discussed many years ago. Applying forces to move endodontically treated teeth was approached with caution for many years, and many precautions were considered during orthodontic movement to endodontically treated teeth.

Effect of orthodontic forces and dental pulp

During rapid tooth movement pulpal injury may occur. [1] This is primarily due to an alteration in the blood vessels in apical periodontium and those entering the pulp. Clinically the teeth may also have altered sensation to the stimuli. [2]

The impact of the tooth movement on the pulp is focused primarily on the neurovascular system, in which the release of specific neurotransmitters (neuropeptides) can

influence both blood flow and cellular metabolism. The responses induced in these pulps may impact on the initiation and perpetuation of apical root remodeling or resorption during tooth movement. The incidence and severity of these changes may be influenced by previous or ongoing insults to the dental pulp, such as trauma or caries. Pulps in teeth with incomplete apical foramen, whilst not immune to adverse sequelae during tooth movement, have a reduced risk for these responses.

Teeth with previous root canal treatment exhibit less propensity for apical root resorption during orthodontic tooth movement. Minimal resorptive/remodeling changes occur apically in teeth that are being moved orthodontically and that are well cleaned, shaped, and three-dimensionally obturated. This outcome would depend on the absence of coronal leakage or other avenues for bacterial ingress.

A traumatized tooth can be moved orthodontically with minimal risk of resorption, provided the pulp has not been severely compromised (infected or necrotic). If there is evidence of pulpal demise, appropriate endodontic management is necessary prior to orthodontic treatment. If a previously traumatized tooth exhibits resorption, there is a greater chance that orthodontic tooth movement will enhance the resorptive process. If a tooth has been severely traumatized (intrusive luxation/avulsion) there may be a greater incidence of resorption with tooth movement. This can occur with or without previous endodontic treatment. Very little is known about the ability to move successfully teeth that have undergone periarticular surgical procedures. Likewise, little is known about the potential risks or sequelae involved in moving teeth that have had previous surgical intervention. Especially absent is the long-term prognosis of this type of treatment. [3,4,5,6]

There are conflicting reports on effect of force on pulp vitality. Though very few studies suggested that heavy forces can lead to loss of tooth vitality but there are not enough evidences to support this fact. [7]

Traumatized incisors, especially maxillary lateral incisors have high chance of pulpal necrosis during orthodontic intrusion than normal teeth. [8] Usually heavy forces are applied on teeth while doing orthopedic treatment of jaws such as maxillary expansion, head gear and reverse pull head gear therapy. Force equivalent to capillary blood pressure is taken as ideal orthodontic force which ranges from 10 mm HG to 22 mm HG1. [8,9, 10, 11]

Orthodontic treatment and Root resorption:

It is not very uncommon to see root resorption at the apical end of teeth during or after orthodontic treatment.[3, 12] There are many factors which include the magnitude of orthodontic force, type of force (continuous, interrupted, or intermitted), direction of tooth movement, amount of apical movement, sequence of the arch wire, type of orthodontic appliance, duration of orthodontic treatment, and treatment technique.[13]

Also, patient factors include genetic factors, chronological age, dental age, gender, ethnic factors, syndromes, psychological stress, increased occlusal force, tooth vitality, type of teeth, dental invaginations, features of dentoalveolar and facial structures, existing root resorption before treatment, proximity of the root to the cortical bone, nutrition, systemic factors (illnesses that cause inflammation, asthma, allergy, etc.), hormonal irregularities, systemic medicine use, metabolic skeletal disorders, parafunctional habits, morphology of teeth/root, developmental abnormalities of roots, properties of cementum mineralization, hypofunction of the periodontium, history of trauma, endodontic treatment, density of the alveolar bone, and type and

severity of malocclusion and alcoholism. {15]

However, one must understand that this situation arises when heavy forces are placed during orthodontic movement, especially in cases where extrusion of teeth is being performed. Appropriate and balanced forces never lead to root resorption. The situation gets grave in case root-end resorption starts in endodontically treated teeth. In such cases, gutta-percha gets exposed to the periarticular environment and, at times, initiates an inflammatory response. Such a situation may require immediate intervention by means of surgical or non-surgical methods of removing gutta-percha to alleviate the patient's symptoms. [9,13, 14,15,16]

Orthodontic treatment in endodontically treated teeth

In the current context of Dentistry, there are more and more healthy teeth, and the required endodontic treatment comes from needs related to dental trauma. However, there is still many teeth endodontically treated because of dental cavity, especially clinical cases in which the necessity or not of endodontic retreatments is questioned. The improvement in eco-nomic and social conditions leads many adults to undergo orthodontic treatments and among older adults previously performed endodontically treatments are still very common . [16]

Although there could be possible consequences; Besides the pseudo-overfilling by the end of the orthodontic treatment, other consequences are in -dependent from the orthodontic movement, such as the persistence of the lesion or its partial regression, or even its increase. In these cases, the endodontic treatment must be evaluated regarding its capacity of completely eliminating the microbiota, closing the spaces occupied by it and the possibility of the involved tooth having a different morphology that would complicate the elimination of the microbiota by the endodontic treatment, such as apical del-ta, dilacerations, developmental groove and others. To assign the failure to the fact that the tooth was orthodontically moved is not pertinent . [16,17,18]

Orthodontic treatment in previously traumatized teeth:

With or without periapical lesion, endodontically treated teeth for aseptic pulp necrosis due to dental trauma, if orthodontically moved could have the same behavior expected from those teeth endodontically treated for pulp necrosis with infected canals. However, this situation must be faced in a different way by the following rule: Every tooth previously traumatized, if moved, may present earlier and more intense root resorptions by the end of the orthodontic treatment. This rule is regardless if the tooth was endodontically treated by aseptic necrosis or not. In dental trauma there is a greater chance of repair of the cementoblastic layer be, focally and in eventual spots, done with cells of osteoblastic lineage that have receptors for bone turnover mediators. [18]

conclusion:

Endodontic and orthodontic treatment in a patient poses a magnificent challenge to a clinician. It is essential to understand that both the specialty treatments have their own strategic importance. Thus, a comprehensive plan for the patient based on history , clinical symptoms and orthodontic knowledge needs to be formulated and then executed it in such a manner that the final outcome turns out to be beneficial for the patient .

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