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Review Article

Wilckodontics - An Innovative Approach

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Abstract

Tooth movement needs to be updated in light of research and development in the treatment method that includes selective augmentation, alveolar decorticating and orthodontic treatment. Orthodontic treatment duration is reduced without significant apical root resorption using innovative methods.

Keywords: Wilckodontics; Augmentation; Corticotomy

Introduction

Dental crowding is one of most common form of malocclusion. Routine techniques used for treatment of teeth crowding through orthodontics are extraction and non-extraction of tooth. Dental extraction as remedy for dental arch crowding is done for moderate to severe conditions. Non-extraction treatment method is done to treat the mild to moderate type of the tooth crowding that will involve the proclinations of anteriors.

Accelerated Osteogenic Orthodontics (AOO) technique was patented by Wilckodontics. There is extensive decrease in orthodontic time with no apical resorption of root which shows that transient osteoporosis is better treatment than going for corticotomy surgery.

Generally, orthodontic tooth movement is cell mediated process orchestrated mainly within periodontal ligament. Force implicated on the teeth translates to the periodontal ligament cell population where the pleomorphic fibroblast is converted to the osteoblast and the osteoclast are obtained from the stream of the blood borne monocytic precursors. Later on with time, lamina dura undergoe osteoclasis in periodontal ligament 'pressure' area and bone apposition occurs in periodontal ligament 'tension' area. Extensive cell death and the hyalinization occurs within the periodontal ligament during the conventional orthodontic tooth movement which can be minimized by the judicious application of the light forces. Generally, 3 - 5 weeks of time is required for this zone of sterile necrotic tissue to get eliminated and repaired during which time the tooth movement by the frontal resorption is virtually at a standstill.

Increased alveolar bone metabolism and bone turnover rate influences orthodontic tooth movement that determines quality and quantity of tooth movement [1]. High bone turn over signifies increase in the rate of tooth movement whereas slower tooth movement was found in animals with less turn over [2,3]. Osteotomy (involves complete cut through both the cortical and the medullary bone), corticotomy (involves the partial cut through the cortical plate without penetrating the medullary bone), ostectomy (includes removal of an amount of the cortical and the medullary bone) and the corticotectomy (involves removal of an amount of cortex without the medullary bone) are 4 types of the surgeries that cause surgical damage to the alveolar bone [4,5].

Periodontally accelerated osteogenic orthodontics (PAOO)

Surgically assisted orthodontic tooth movement was used since the 1800's. Cunningham discussed "Luxation or immediate method in treatment of irregular teeth" at the International Dental Congress (Chicago) in 1893. Th Corticotomy facilitated tooth movement which was published in the book by SH Guiliford was first described by LC Bryan in 1893. Henrich Kole's was the person who set the stage for evolution of the corticotomy facilitated orthodontics in 1959 [6]. According to them, the main resistance to the movement of the tooth is the cortical plates of bone and by disrupting their continuity, orthodontic movement can be done in much less time than the normally expected. Henrich Kole's technique involved reflection of the full thickness flaps to expose both the buccal and lingual alveolar bone followed by the interdental cuts through the cortical bone and barely penetrating the medullary bone (corticotomy style). The Subapical horizontal cuts used to connect the interdental cuts were the osteotomy type that penetrated the full thickness of alveolus. According to Henrich, blocks of bone were being moved rather than individual teeth and in such cases, the root resorption would not occur and the retention time will also be minimized. Henrich Kole's technique involved invasive nature, so it was not widely accepted.

A more updated surgical orthodontic treatment was introduced by Wilcko., *et al.* (2000) that involved the innovative strategy of combining the corticotomy surgery with the alveolar grafting that is referred as Accelerated Osteogenic Orthodontics (AOO) and more presently named as Periodontally Accelerated Osteogenic Orthodontics (PAOO) [2008]. This technique involves the use of the comprehensive fixed orthodontic appliances along with the full thickness flaps and involves both the labial and lingual corticotomies around teeth to be moved. Bone grafts to be used included demineralized freeze-dried bone and bovine bone along with the clindamycin which were applied directly over the bone cuts and flap were sutured. Tooth movement was activated 2 weeks following surgery and every 2 weeks later on by the activation of the orthodontic appliance. Wilcko., *et al.* (2000, 2001, 2003 and 2008) described that this technique reduces the treatment time to one-third time of the conventional orthodontics. Alveolar augmentation was performed for both the lingual and labial cortical plates in an effort to enhance and strengthen the periodontium, reasoning that addition of bone to the alveolar housing of the teeth will ensure root coverage as the dental arch expanded. According to Wilcko., *et al.* PAOO technique is excellent method for the treatment of moderate to the severely crowded Class I and Class II. Enormous amount of studies performed found that this method was effective, safe, involved less root resorption, involves less treatment time, less requirement for need for orthognathic surgery in certain situations [7].

According to Wilcko., *et al.* Corticotomy surgery initiates and potentiates the normal healing process which is known as Regional Acceleratory Phenomena (RAP). RAP involves the local response to the noxious stimulus that describes process by which tissue forms faster than the normal regional regeneration process. According to Frost in 1983, enhancing various healing stages makes the healing occur 2 -10 times faster than the normal physiologic healing. RAP starts within few days of injury typically peaks at one to two months and usually lasts four months in bone and may take six to more than 24 months to subside (Wilcko 2000, 2001, 2003 and 2008 [8]). Present histological studies showed that the selective alveolar decortication induced increased turnover of the alveolar spongiosa (Sebaoun., *et al.* 2008 [9]). Surgery performed showed the substantial increase in the alveolar demineralization and a transient and reversible condition that will results in the osteopenia (temporary decrease in bone mineral density). 0steopenia allows rapid tooth movement as the teeth are supported and moved through the trabecular bone. RAP is extended till the tooth movement remains. Osteopenia will disappears when RAP dissipates and radiographic image of normal spongiosa reappears. Once orthodontic tooth movement completes, an environment creates that favors the alveolar remineralization. Advantages of PAOO are reduced treatment time as this technique will reduce treatment time to one-third the time of conventional orthodontics, less root resorption due to decreased resistance of cortical bone, more bone support due to the addition of bone graft, chances of relapse reported to be very low, less need for extra oral appliances and headgear [10].

Discussion

Most advanced orthodontic treatment involves advantages of corticotomy surgery and alveolar augmentation. These days used non-extraction orthodontics treatment plan presented extensive decreases in the treatment time and an increased thickness of the alveolar bone. Use of these modified methods has been found to be safe that even heped to maintain even thickened layer of pretreatment bone over the prominences of the roots. Use of these recent methods enables easy coverage of fenestrations and the formation of dehiscence is reduced where there is still a vital root surface.

Such method allows teeth to be moved rapidly without jeopardizing root length. A clinically induced local, transient osteoporosis is used to facilitate tooth movement [11]. The upcoming controversies in different aspects of wilckodontics were focused in an assignment conducted by David P Mathews and Vincent G Kokich in 2013. Mechanism of corticotomy produced accelerated tooth movement. Dr. Wilcko brothers believed that rate of tooth movement is primarily due to localized demineralization and remineralisation processs that occurs in cancellous bone surrounding tooth socket and secondarily due to the alterations within periodontal ligament. Surface computed tomography scan was used to verify same. Use of such surgical intervention has been found to be favoring rapid orthodontic tooth movement by inducing osteoporotic situation within the alveolar bone without increasing the chances of the resorption of apical root and the alveolar bone can be simultaneously augmented and reshaped.

Conclusion

Wilckodontics the new synergy of orthodontics interplaying with periodontics on the same bony platform has made adult orthodontics a reality. To understand the effect on teeth and bone, post retention stability, status of periodontium and roots after treatment and the biology of the tooth movement using this procedure, more clinical and histological studies are required.

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