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An Article Review on Speeding Orthodontics

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ABSTRACT
The need for orthodontic care has increased significantly during the past few years. How to shorten orthodontic treatment is one of the most important questions since patients' main complaint about orthodontic treatment is that it takes too long and puts a lot of stress on them. Various procedures and strategies can be used to improve orthodontic tooth mobility. The evidence supporting the effectiveness of various techniques for accelerating orthodontic tooth movement was evaluated and presented in the current study.

Keywords: Acceleration, Orthodontics, Speeding, Tooth movement.

1. INTRODUCTION

Numerous issues, such dental cavities, root resorption, and periodontal infections, could become more severe as a result of prolonged orthodontic therapy (1). The average length of thorough orthodontic treatment is about two years, though variations can be exacerbated by a number of circumstances (1,2). Both orthodontists and patients began to place increased importance on reducing this average time. The remodelling of the bone around the tooth apices determines the rate of orthodontic tooth movement (OTM) (3). Since the processes of cellular behaviour regulation govern how the bone remodels, OTM can be sped up by identifying and controlling the cellular regulators. Teeth movement is determined by the physiologic response of tissues to orthodontic pressures (3). Various approaches and strategies, such as pharmacological stimulation, physical stimulation, and surgically assisted treatments, can be used to accelerate OTM. Therefore, the purpose of this review is to summarise the data pertaining to the effectiveness of various approaches for accelerating OTM.

Chemical stimulation

To speed up OTM, a variety of chemical agents are utilised, including corticosteroids, cytotoxins, vitamin D, leukotrienes, and vasoactive drugs. However, rather than having local effects on the targeted cells, these drugs have systemic effects (4-7). A few studies suggested that local vitamin D3 treatment may improve the rate of OTM (4, 6, 7).

Physical stimulation

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In this technique, the periodontal ligaments are mechanically and physically stimulated by the use of vibration, a low-dose laser, and electromagnetic field applications. The use of pulsed electromagnetic fields to accelerate OTM is supported by flimsy data (8, 9). Over the past few years, OTM has been accelerated using low-level laser treatment (LLLT) (10,11). According to Colson et al. (2017), LLLT can be useful for accelerating OTM (10). However, more research is need to concentrate on determining the ideal wave length and dose for LLLT. To ascertain the effects of LLLT and its ideal procedures for accelerating OTM (10) high-quality research are required. Because it may encourage bone growth, LLLT can also be given during the retention period to lessen the likelihood of relapse (12).

Surgical aided procedures

The idea behind these surgical techniques is to cause bone damage, which will subsequently improve the biological response of tissues. Physiological healing mechanisms, which include rapid osteoblastic activity in the first instance and then osteoclastic activity later, are used to accelerate OTM (13). A regional acceleratory phenomenon (RAP), which is the tissue's reaction to these alterations, is characterised by transitory localised bone demineralization and increased bone turnover in wounded areas

Corticotomy-assisted treatments: Since Köle invented the one-block approach in the 1950s, surgical treatments to accelerate orthodontic therapy have been used (14). Bone blocks have been made mobile using this technology. In order to unite these cuts into one block, a full-thickness flap must be created, and buccal and lingual interdental cortical bone as well as the alveolar bone behind the teeth's roots must be removed. When bone marrow is preserved, Köle asserted, periodontal disease and pulpal death can be avoided. Suya adopted supra-apical horizontal corticotomies beyond the tooth apices in 1991 to replace Köle's technique.

Periodontal ligament distraction: After the first premolar was extracted, a distraction device was put on the canine and molar to accomplish this method. Canine moved into the first premolar's extraction space. The interseptal bone distal to the canine is undermined with a bur during the surgical preparation, and a buccal and lingual vertical groove is made inside the extraction socket toward the end (15).

Dentoalveolar distraction: Dentoalveolar distraction was first introduced by Kişnişci et al. (16) in 2002. In this technique, a hard distraction device was used prior to the extraction of the premolar teeth, and the osteotomy incision curved apically from the canine's apex. After extraction, the buccal cortical bone of the socket was carefully removed. The distraction device was put in place right away, activating twice daily at 0.4 mm

Periodontally accelerated osteogenic orthodontics: Accelerated Osteogenic Orthodontics was a novel treatment established in 2001 by Thomas and William Wilcko (17). They asserted that after corticotomy, decorating the bone over the roots improves the response to orthodontic stresses. The RAP procedure can be used to explain this answer.

Corticision: Park et al. developed the flapless, less invasive corticision approach as a corticotomy operation substitute. The inter-radicular gingiva was attached, and the researchers made an incision in the interproximal cortical bone at a 45–60 degree angle with the long axis of the root without raising a full flap.(18)

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Piezocision: It is a minimally invasive method that Dibart et al. first introduced in 2009(28). A flapless localised piezoelectric alveolar decortication is a part of this procedure. This method's biological underpinnings are based on RAP (19). Additionally, it is asserted that the piezosurgery device's vibrations facilitate quicker movement. However, some individuals report discomfort from these vibrations. This procedure needs a piezotome, a pricey equipment that not all clinics have on hand.

Discision method: In 2018, a decision was made to expedite OTM in patients with crowding in the maxillary and mandibular arches (20). This technique can successfully accelerate OTM by 35.5%. (21). Disc-shaped saw-burs are installed on a micromotor, which is typically utilised for implant surgery, during the decision-making process. This disc costs less than piezosurgery equipment and is 0.3 mm thinner than a piezosurgery knife.

Micro-osteoperforations (MOP): Perforations in the buccal cortical bone are another less invasive alternative procedure. Teixeira et al. (2010) drilled holes in adult rats' teeth that were 0.25 mm deep and 0.25 mm in diameter and looked at cytokine expression and tooth mobility. Additionally, they found that the rate of OTM in the intervention group was dramatically raised by micro-osteoperforations (MOP). According to Teixeira et al., these perforations can hasten bone remodelling (22)

2. REFERENCES

1. Zahrowski J, Jeske A. Apical root resorption is associated with comprehensive orthodontic treatment but not clearly dependent on prior tooth characteristics or orthodontic techniques. J Am Dent Assoc. 2011; 142(1):66-68.
2. Talic N F. Adverse effects of orthodontic treatment: A clinical perspective. Saudi Dent J. 2011; 23(2):55-59.
3. Huang H, Williams RC, Kyrkanides S. Accelerated orthodontic tooth movement: Molecular mechanisms. Am J Orthod Dentofacial Orthop. 2014; 146(5):620- 632.
4. Al-sayagh N, Al-Jumaili Kh, AI-Sadi H. Effect of local injection of 1,25-dihydroxycholecalciferol on the velocity of Orthodontic Tooth Movement and Bone Density. Int. J. Enh. Res. Sci. Tec. Eng.2014; 3(4)146-155.
5. Teixeira CC, Khoo E, Tran J, et al. Cytokine expression and accelerated tooth movement. J Dent Res. 2010; 89(10):1135-1141.
6. Iosub Ciur MD, Zetu IN, Haba D, Viennot S, Bourgeois D, Andrian S. Evaluation of the Influence of Local Administration of Vitamin D on the Rate of Orthodontic Tooth Movement. Rev Med Chir Soc Med Nat Iasi. 2016; 120(3):694-699.
7. Varughese ST, Shamanna PU, Goyal N, et al. Effect of Vitamin D on Canine Distalization and Alveolar Bone Density Using Multi-slice Spiral CT: A Randomized Controlled Trial. J Contemp Dent Pract. 2019; 20(12):1430-1435.
8. Yi J, Xiao J, Li H, Li Y, Li X, Zhao Z. Effectiveness of adjunctive interventions for accelerating orthodontic tooth movement: a systematic review of systematic reviews. J Oral Rehabil. 2017; 44(8):636- 654.
9. Long H, Pyakurel U, Wang Y, Liao L, Zhou Y, Lai W. Interventions for accelerating orthodontic tooth movement: a systematic review. Angle Orthod. 2013; 83(1):164-171.

10. Fromont-Colson, C., Marquez-Diaz, M., Badran, Z. et al. Efficiency of low-level laser therapy for orthodontic tooth movement: a review. Laser Dent Sci. 2017;1:47–56.
11. Baghizadeh Fini M, Olyaee P, Homayouni A. The Effect of Low-Level Laser Therapy on the Acceleration of Orthodontic Tooth Movement. J Lasers Med Sci. 2020; 11(2):204-211.
12. Franzen TJ, Zahra SE, El-Kadi A, Vandevska-Radunovic V. The influence of low-level laser on orthodontic relapse in rats. Eur J Orthod. 2015; 37(1):111- 117.
13. Frost HM. The regional acceleratory phenomenon: A review. Henry Ford Hosp Med J. 1983; 31(1):3-9.
14. Köle H. Surgical operations on the alveolar ridge to correct occlusal abnormalities. Oral Surg Oral Med Oral Pathol. 1959; 12(5):515-529.
15. Liou EJ, Huang CS. Rapid canine retraction through distraction of the periodontal ligament. Am J Orthod Dentofacial Orthop. 1998; 114(4):372-382.
16. Kişnişci RS, Işeri H, Tüz HH, Altug AT. Dentoalveolar distraction osteogenesis for rapid orthodontic canine retraction. J Oral Maxillofac Surg. 2002; 60(4):389- 394.
17. Wilcko WM, Wilcko T, Bouquot JE, Ferguson DJ. Rapid orthodontics with alveolar reshaping: Two case reports of decrowding. Int J Periodontics Restorative Dent. 2001; 21(1):9-19.
18. Park YG. Corticision: A Flapless Procedure to Accelerate Tooth Movement. Front Oral Biol. 2016; 18:109-117.
19. Frost HM. The regional acceleratory phenomenon: A review. Henry Ford Hosp Med J. 1983; 31(1):3-9.
20. Yavuz MC, Sunar O, Buyuk SK, Kantarcı A. Comparison of piezocision and discision methods in orthodontic treatment. Prog Orthod. 2018; 19(1):44.
21. Alfawal AMH, Hajeer MY, Ajaj MA, Hamadah O, Brad B. Evaluation of piezocision and laser-assisted flapless corticotomy in the acceleration of canine retraction: a randomized controlled trial. Head Face Med. 2018; 14(1):4
22. Teixeira CC, Khoo E, Tran J, et al. Cytokine expression and accelerated tooth movement. J Dent Res. 2010; 89(10):1135-1141.