

A Case Report On Wilckodontics - A Novel Method For Accelerated Orthodontics Using Periodontal Approach

Sindhu Ghorpode, Vijayalakshmi Rajaram*, Jaideep Mahendra Ambalavanan N, Abirami Nayaki Rao P, Burnice Nalina Kumari

Meenakshi Academy Of Higher Education and Research,
Meenakshi Ammal Dental College and Hospital, Chennai, India.
Higher Education and Research, Chennai, India.

drjaideep.perio@madch.edu.in

Abstract

Increasing number of adult patients consider smile as important part in social attractiveness and even skill assessment. Many patients demand for rapid results for the treatments as patients have many obligations and pressure to look good in the society. This resulted in orthodontic professional to constantly look for ways to accelerate tooth movement and increase the treatment effectiveness. Dentofacial orthopedics is a novel field which has impelled both orthodontics and periodontics in developing an "optimal response" of the alveolar bone to applied "optimal force" with help of selective alveolar decortications. This method intensifies tooth movement and subsequently, reduces orthodontic treatment time as a whole. Wilckodontics, also known as Periodontally Accelerated Osteogenic Orthodontics (PAOO) is clinical procedure that combines selective alveolar corticotomy, particulate bone grafting, and application of orthodontic force. It increases alveolar bone width and post treatment stability and also decreases treatment time and apical root resorption.

I. Introduction

The Wilckodontics Accelerated Osteogenic Orthodontics (AOO) procedure is a technique that can make the complicated treatment scenarios more routine, make the treatment of routine cases extremely fast and predictable. Wilckodontics combines two major philosophies. The mechanical nature referring to brackets and wires and biological/augmentative natures referring to the bone and gingiva around the teeth. The amalgamation has resulted in new approach known as Wilckodontics. It is a clinical procedure that combines selective alveolar corticotomy, particulate bone grafting, and application of orthodontic force. This procedure was developed in 1995 by two brothers Dr Thomas M. Wilcko an periodontist and Dr William M. Wilcko an orthodontist [1]. In PAOO technique, cortical bone is scarred surgically on both labial and lingual sides of the teeth to be moved followed by grafting. The patient will be evaluated seen every 2 weeks, and the rapid tooth movement produced after PAOO is substantially different than periodontal ligament cell-mediated tooth movement. Recent evidence suggests that rapid tooth movement after PAOO may be caused by a localised osteoporosis state as part of a healing event known as regional acceleratory phenomenon (RAP). RAP was first described by Frost in 1983, although this phenomenon has been familiar to many histomorphometrists since 1966 [2]. Frost noticed that the initial injury sped up the normal regional healing processes.

II. Case Report

A 32 year old female reported to the department of orthodontics at Meenakshi Ammal Dental College and hospital in July 2019 for conventional fixed orthodontic therapy. She was expecting rapid results and was not comfortable with orthognathic surgery. She was then referred to the department of periodontics, for corticotomy. Her medical history showed no allergies or medical problems. There were no signs or symptoms of temporomandibular dysfunction. Her intra oral examination revealed Angle's class II malocclusion with maxillary and mandibular prognathism.



Figure 1: Pre-operative labial view



Figure 2a and 2b: Pre-operative view irt 2nd quadrant and 1st quadrant

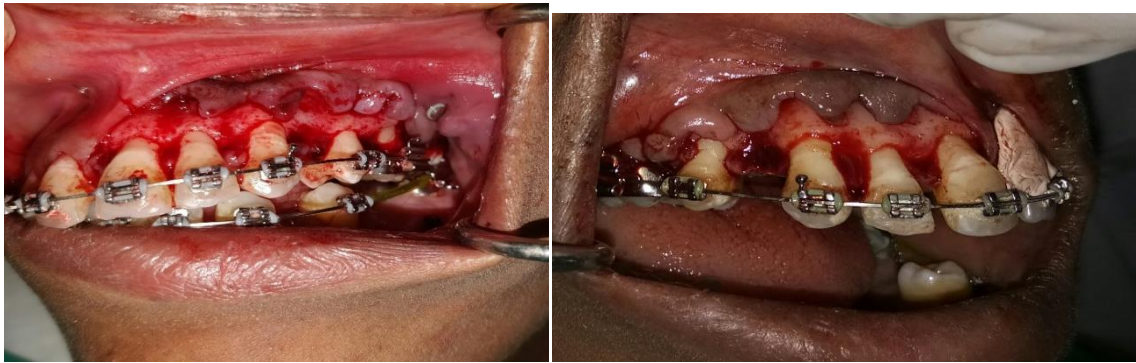


Figure 3a and 3b: Full thickness mucoperiosteal flap elevated in relation to 2nd and 1st quadrant

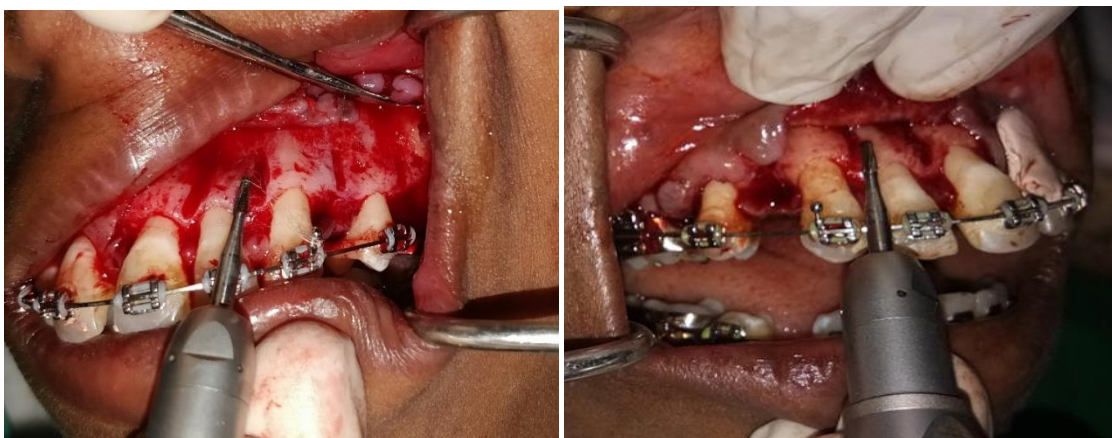


Figure 4a and 4b: Vertical cuts and corticotomy done in relation to 2nd and 1st quadrant



Figure 5a and 5b: A-PRF is mixed with bone graft

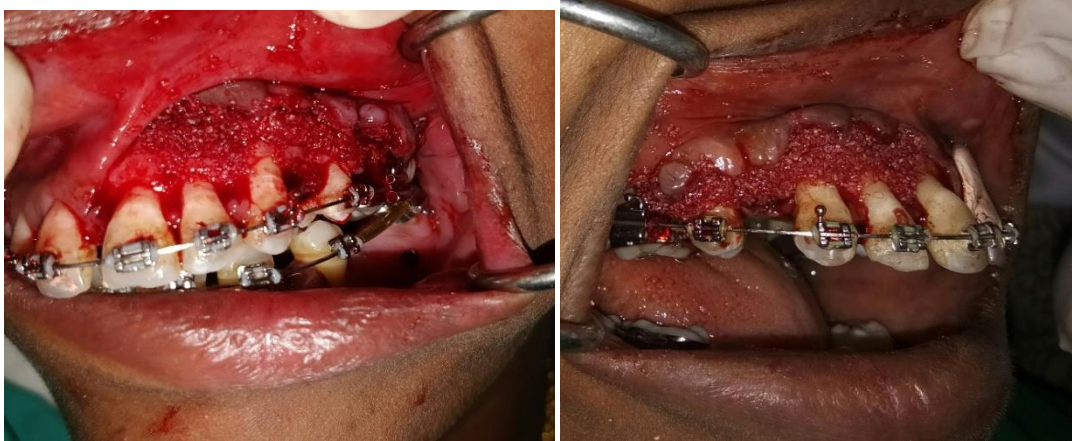


Figure 6a and 6b: Bone graft placed in relation to 2nd and 1st quadrant



Figure 7a and 7b: Continuous sling sutures placed in relation to 2nd and 1st quadrant



Figure 8a and 8b: Coe-pak placed in relation to 2nd and 1st quadrant



Figure 9a and 9b: One week post-operative view in relation to 2nd and 1st quadrant



Figure 10: One month post-operative view



Figure 11a and 11b: 4 months post-operative view in relation to 2nd and 1st quadrant

III. Surgical Technique

The surgery was scheduled after asepsis and sterilisation were completed. The area selected for surgery was anesthetized using lidocaine hydrochloride 2 % with adrenaline 1:80,000. Flap design: Crevicular incision and vertical releasing incision (Fig-2a & 2b) was place to preserve the interdental papilla and a full thickness flap was raised (Fig-3a & 3b). Corticotomy: Cortication was done with a straight fissure bur in both 1st and 2nd quadrant

under copious irrigation to prevent overheating (Fig-4a & 4b). A-PRF with bone graft was placed in 2nd quadrant (Fig-5b) and only bone graft was placed in the 1st quadrant (Fig-5a). The flap was placed back and sutured (Fig-7a & 7b). COE-Pak was placed to protect the site from trauma and food debris (Fig-8a & 8b). Patient asked to report after 7 days for suture removal (Fig-9a & 9b). The patient was recalled after a month and after 4 months and space closure was seen in both the quadrant. Patient was then sent to the department of orthodontics for archwire activation, to use the process of rapid acceleratory phenomenon for accelerated space closure. After 4 months, significantly more closure was seen in the 1st quadrant than the 2nd quadrant.

IV. Discussion

For more than a century, various forms of surgical intervention to accelerate tooth movement have been used. Corticotomy-facilitated tooth movement was first described by L.C. Bryan in 1893 [3]. However Heinrich Koe first publication in 1959, laid the foundation for the successive evolution in decortication-facilitated orthodontics [4]. Heinrich Koe's understood that the dense cortical bone caused the increased resistance to tooth movement and showed that by disrupting the continuity of the cortical layers of bone with corticotomy surgery the segments of bone could be more readily moved with traditional orthodontic forces since they would only be connected by less dense medullary bone. From Koe's work arose the term "bony block movement" to describe the suspected mode of tooth movement subsequent to corticotomy surgery [4]. Over the next 40 years, many variations of Koe's technique were reported but the facilitated tooth movement in all of these techniques continued to be attributed to "bony block movement." Unfortunately, the result of "bony block movement" made it difficult to predictably provide for facilitated tooth movement and led to some disappointing results, especially in space closing procedures. Keole et al. in 1959 reported that corticotomy with subsequent bone augmentation has been proposed to increase the volume of the alveolar process, to facilitate arch development, to prevent and treat fenestrations, and to maximize the metabolic response during orthodontic treatment [4]. In 2001, Wilcko, et al. challenged the concept of "bony block movement." It was shown that initial alveolar demineralization and subsequent remineralization was consistent with the cascading physiologic events associated with RAP and not "bony block movement." [1] Wilcko, et al. reported that the remineralization phase of the RAP was complete in the adolescent at two years post corticotomy surgery [1]. Wilcko, et al. also showed that the tooth movement was provided by surgically assisted activated thin bone layer over the root surfaces in the direction of the intended tooth movement [1]. The demineralization of this thin layer of bone left the soft tissue matrix of the bone and islands of osteoid carried with the root surfaces of the teeth remineralized in the desired position. This remineralization process is almost complete in the adolescent, but only partially complete in the adult. In 2009, Wilcko et al. reported that corticotomy-facilitated orthodontics has been indicated for non-extraction treatment of crowding, shortening treatment duration, extrusion of ankylosed teeth, intrusion of posterior teeth to close anterior open bites and impacted canines [5]. PRF is a proposed method for the use of platelet concentrate in which autologous growth factors derived from patient's own blood further accelerate tissue regeneration. Major development and

advancement were made with a liquid formulation of PRF which does not contain anticoagulant. Third generation super PRFs show superiority in effective and faster wound healing. Ghanaati et al. introduced the low-speed concept for blood centrifugation whereby lower centrifugation speeds were shown to contain numerous cells, especially leukocyte [6]. Higher centrifugation forces move the cell population from the top to the bottom, whereas lowering centrifugation G-force increases leukocyte number and keep them in the top layer. Decreasing the rpm while increasing the centrifugation time in the A-PRF group would have given an increased presence of neutrophilic granulocytes in the distal part of the clot. Also, the granulocytes have its own tissue regeneration properties. They participate in the process of wound debridement by secreting several proteases, including matrix metalloproteinase 9 (MMP9), an extracellular matrix-digesting enzyme.

V. Conclusion

This case report not only aims at rapid treatment aspect of PAOO technique but also focus on the end esthetic and facial results. As many adults and adolescents are considering orthodontic treatment, the PAOO technique can be better option for orthodontist, the periodontist and the patient as it has many benefits. Thus procedure of Wilckodontics is advantageous than the conventional orthodontic treatment as it takes lesser time to achieve the results.

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