



Accelerated Orthodontic Treatment Using PAOO Procedure in a 26-Year-Old Female Patient with Limited Treatment Timeframe and Reduced Bone Turnover

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Abstract:

This case report presents the successful application of the Periodontally Accelerated Osteogenic Orthodontics (PAOO) procedure in a 26-year-old female patient who faced the challenge of limited treatment time due to personal and professional commitments, as well as reduced bone turnover. The PAOO technique was employed to expedite tooth movement and achieve efficient orthodontic results within the patient's constrained timeframe. This case highlights the benefits of integrating PAOO into orthodontic treatment plans for patients with complex treatment needs.

Introduction:

Orthodontics, the branch of dentistry focused on correcting dental and skeletal irregularities, has witnessed remarkable advancements over the years. One ground-breaking technique that has gained considerable attention is Periodontal Accelerated Osteogenic Orthodontics (PAOO). This innovative procedure combines the principles of periodontal surgery and orthodontics, offering an accelerated and comprehensive approach to correct malocclusions, improves periodontal health, and enhances patient satisfaction.^{1,2} Traditional orthodontic treatment typically involves prolonged durations, spanning months or even years, to achieve desired tooth movement and occlusal alignment. However, PAOO aims to expedite the orthodontic process by stimulating rapid bone remodeling and facilitating faster tooth movement, thereby reducing the overall treatment time. This procedure has revolutionized the field of orthodontics, providing a viable alternative for patients who seek efficient and timely correction of dental irregularities.^{3,4}

This case report presents a 26-year-old female patient who sought orthodontic treatment but had personal and professional commitments that necessitated shortened treatment duration. Additionally, the patient exhibited characteristics associated with reduced bone turnover and increased bone density⁵. The PAOO procedure was chosen to expedite tooth movement and address the patient's unique treatment needs. The core principle of PAOO lies in the activation of the regional acceleratory phenomenon (RAP), a natural biological response of the bone to injury or trauma. By strategically creating controlled micro-injuries to the periodontal ligament and underlying alveolar bone, orthodontic forces are intensified, initiating a cascade of cellular events that promote accelerated bone remodeling. As a result, tooth movement becomes more rapid and efficient, shortening the overall treatment duration.

The case report will provide valuable insights into the potential applications of PAOO in various clinical scenarios and its impact on patient satisfaction and treatment duration. As the orthodontic landscape continues to evolve, incorporating novel techniques like PAOO into the armamentarium of orthodontists holds immense promise for optimizing treatment outcomes. By harnessing the regenerative capabilities of the human body, this procedure paves the way for shorter treatment durations, improved periodontal health, and enhanced patient experiences. This case report article serves as a stepping stone in expanding our understanding and embracing the remarkable potential of Periodontal Accelerated Osteogenic Orthodontics.

Case Report:

A 26 year old female patient reported to the department with a complaint of forwardly placed upper front teeth with spacing between the teeth. The case was diagnosed as Angles Class II malocclusion with proclination and spacing of maxillary anterior teeth. The treatment plan included PAOO for the correction of spacing and proclination, taking into consideration all the clinical and biological conditions. Surgical procedure was described to the patient along with the orthodontic treatment options available including Orthognathic surgery. The patient expressed a strong desire for shorter treatment duration due to upcoming life events and work commitments. Clinical examination revealed limited bone turnover, characterized by dense alveolar bone and a history of slow tooth movement during previous orthodontic treatment attempts. A treatment plan was devised to integrate orthodontic treatment with the PAOO procedure. This approach aimed to expedite tooth movement and achieve desired outcomes within the patient's constraints. The PAOO procedure involved localized alveolar decortication and selective corticotomy to stimulate bone turnover and enhance orthodontic tooth movement^{1,4}. Comprehensive orthodontic treatment with preadjusted edgewise appliances was initiated, focusing on minimizing treatment duration while ensuring optimal results.

A written informed consent for the procedure was obtained from the patient. Prior to surgical and orthodontic treatment, periodontal health of the patient was restored by phase I periodontal therapy including plaque control measures and scaling and root planning.

Surgical procedure

The surgical procedures were performed under local anaesthesia. An intra-crevicular buccal and lingual incisions were made. Full thickness muco-periosteal flaps were reflected beyond the level of the apices of the maxillary anterior teeth. Vertical buccal and lingual grooves were made through the cortical layer of the exposed bone with a round fissure bur mounted on a micro motor hand piece with concomitant saline irrigation, starting 1.5 mm below the interdental crest. Perforations were made to the apices of the teeth. Adequate bio absorbable grafting material was placed over the decortication site. The surgical sites were vigorously irrigated with saline prior to flap repositioning and sutured. Analgesics and adjunctive antibiotics were prescribed for 1 week. The patient was recalled for follow-up and regular orthodontic visit. The patient showed satisfactory results within 12 weeks. The patient showed faster tooth movement in a shorter period of time.

Results:

Throughout the treatment period, the patient exhibited remarkable progress. The combination of orthodontic mechanics and the PAOO procedure facilitated efficient tooth movement, resulting in the timely correction of malocclusion and alignment of dental arches. The patient's goals for shorter treatment duration and improved esthetics were successfully achieved.

Discussion:

The utilization of the PAOO procedure in cases with limited treatment timeframes and reduced bone turnover offers several advantages. Periodontal accelerated osteogenic orthodontics (PAOO) is a procedure which combines selective alveolar corticotomy, particulate bone grafting, and the application of orthodontic forces. This very procedure is theoretically based on the pattern of bone healing known as the regional acceleratory phenomenon (RAP).⁶ PAOO results in an increase in alveolar bone width,⁷ shorter treatment time,⁸ increased post-treatment stability, and decreased amount of apical root resorption.⁹ It involves surgically manipulating the bone and gums around the teeth to enhance the rate of tooth movement. Small perforations or cuts in the bone stimulates local inflammation and increases blood flow which causes local inflammation triggering an accelerated healing process, which can aid in quicker tooth movement. The corticotomy reduces the resistance that the teeth encounter while moving through the bone by temporarily altering the density and structure of the bone. Orthodontic forces encounter less resistance, facilitating quicker tooth movement with PAOO⁸. This is especially beneficial for patients who, like the one presented here, have personal and professional commitments that demand expedited orthodontic treatment.

Conclusion:

This case report underscores the successful integration of the PAOO procedure in the orthodontic treatment of a 26-year-old female patient with limited treatment timeframes and reduced bone turnover. The technique proved effective in expediting tooth movement, achieving desired treatment goals within the patient's constraints. The case emphasizes the importance of tailoring orthodontic treatment to individual patient needs and underscores the benefits of combining orthodontics with periodontal surgical procedures in complex cases.

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Photographs:

Figure 1. Pre-treatment photographs

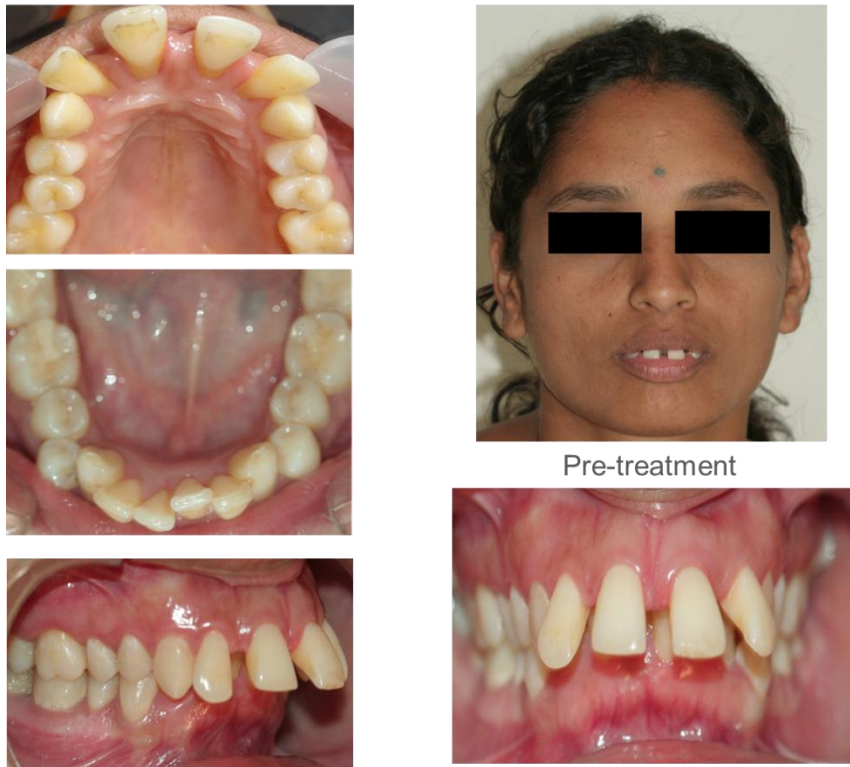
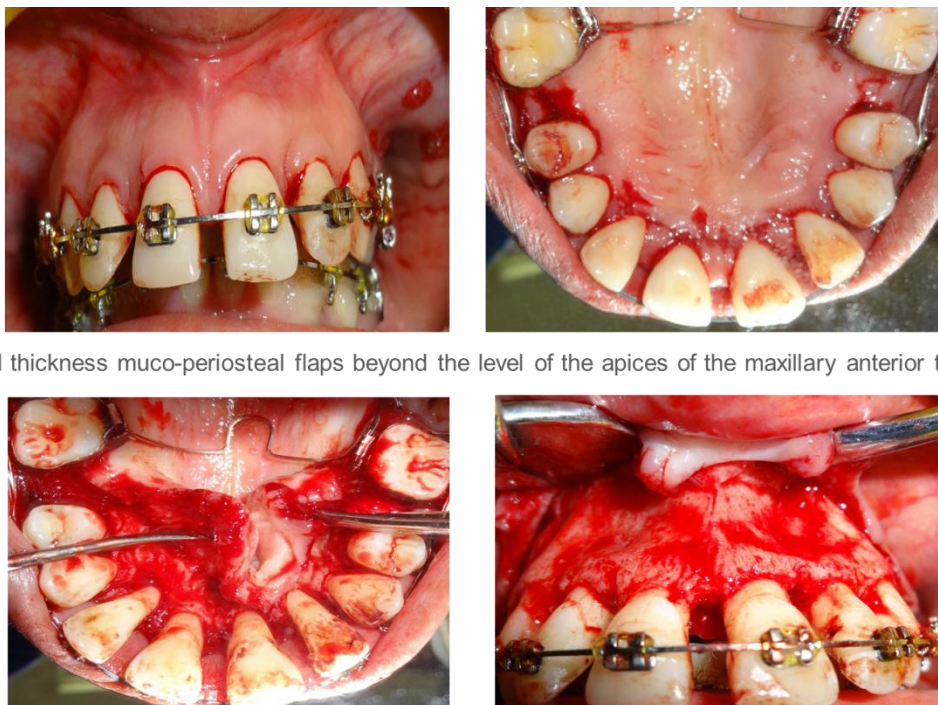
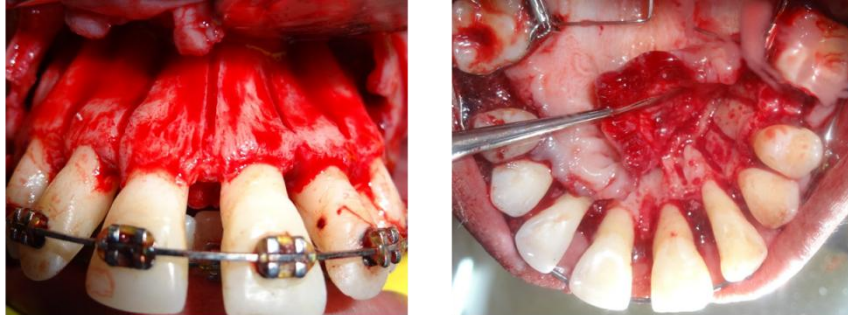


Figure 2. Full thickness muco-periosteal flaps beyond the level of the apices of the maxillary anterior teeth.



Full thickness muco-periosteal flaps beyond the level of the apices of the maxillary anterior teeth

Figure 3. Vertical buccal and lingual grooves were made through the cortical layer of the exposed bone with a round fissure bur



Vertical buccal and lingual grooves were made through the cortical layer of the exposed bone

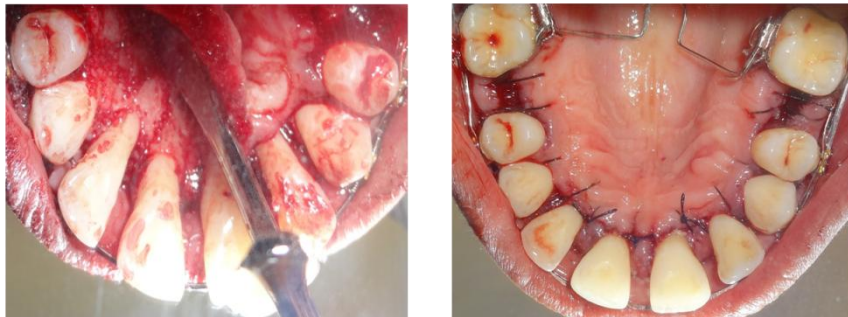


Figure 4 . Comparison of pre- treatment and 12 weeks post PAOO surgery

