

Case Report

Periodontally accelerated osteogenic orthodontics: A boon in a severe periodontally compromised Class II division 1 malocclusion patient

ABSTRACT

Periodontally accelerated osteogenic orthodontics (PAOO) is a combination of a selective decortication facilitated orthodontic technique and alveolar augmentation. With this technique, one is no longer at the mercy of the preexisting alveolar volume, and teeth can be moved two to three times further than required for traditional orthodontic therapy. It is used to treat moderate-to-severe malocclusions in both adolescents and adults. PAOO technique increases alveolar volume which can provide a more intact periodontium, in turn decreases need for extractions, increases a degree of facial reshaping. This technique also increases the bony support for both the teeth and the overlying soft tissues. Here is a case report which highlights the above-mentioned uses with PAOO technique in a severe periodontally compromised Class II division 1 malocclusion patient treated with nonextraction line of orthodontic treatment.

Keywords: Demineralized freeze-dried bone graft, nonextraction, periodontally accelerated osteogenic orthodontics, periodontally compromised

INTRODUCTION

We live in a fast-paced world and society. Hence, our patients also seek for fast and quick treatment procedures for their malocclusions. Periodontally accelerated osteogenic orthodontics (PAOO) is one of the effective procedures in accelerating orthodontic tooth movement and also increases net alveolar volume after orthodontic treatment. It is a combination of a selective decortication facilitated orthodontic technique and alveolar augmentation.^[1] It can be used to treat moderate-to-severe malocclusions in both adolescents and adults and can reduce the need for extractions. With the increasing number of adults and even some nongrowing adolescents with periodontal problems considering orthodontic treatment, the PAOO technique can be an attractive treatment option and be a “win-win” situation for the orthodontist, the periodontist, and the patient.^[2,3] PAOO can also play an important role in the comprehensive treatment of a patient’s occlusal and esthetic needs.^[4]

This article illustrates in detail the effect of orthodontic treatment in a Class II division 1 malocclusion patient with severe periodontally compromised upper central incisors which was treated with nonextraction line of orthodontic treatment along with the aid of PAOO technique and to discuss the surgical and the orthodontic steps involved.

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CASE REPORT

A 27-year-old female patient had a complaint of forwardly placed upper front teeth with spacing between the teeth. Initial examination revealed poor periodontal conditions with gingival recession and bone loss seen in relation to 11, 21 (buccal and palatal), and 26 (furcation involvement). 41, 42, and 31 were previously extracted due to severe mobility. Extraorally, patient had euryprosopic facial pattern with convex profile and incompetent lips. Intraorally, upper anteriors were severely proclined with Class II molar relation on the left side and endon on the right side. Spacing of 12 mm in the upper arch and scissor bite in relation to 15 and 45 with extruded 32 and 33 [Figures 1 and 2] is the pretreatment lateral cephalogram and pretreatment OPG which shows impacted 43. Cephalometric findings with Steiner's analysis showed a Class II Division 1 skeletal pattern, ANB of 5° and hypodivergent mandible. Upper1 – NA of 17 mm and 46° along with interlabial gap of 5 mm.

Treatment objectives were to level and align the upper and lower arches, to consolidate the spacing and to correct the proclination in relation to upper arch. Molar relation is also to be corrected bilaterally. Appropriate treatment plan was made through an interdisciplinary approach and PAOO was decided, mainly for the purpose of increasing the periodontal support for the tooth movement.

Treatment progress

Initial phase of treatment started with periodontal therapy which involved oral prophylaxis, root planning, and debridement. Followed by comprehensive orthodontic care with PAOO technique was used to accelerate the tooth

movement and to increase the periodontal support. Since there was already an existing space of 12 mm in the upper arch, it was decided for nonextraction line of treatment. The fixed orthodontic appliance (0.022 slot MBT bracket system) was placed onto the upper arch only. Maxillary arch was fully leveled and aligned using the increasing size of nickel-titanium alloy wires (0.014", 0.016", 0.019 × 0.025"-rectangular). Bite opening was achieved once 0.019 × 0.025 stainless steel wire was placed along with anterior bite plate bite. Later, mandibular arch was banded and bonded with a similar sequence of wires as with that of maxillary arch were placed.

Surgical technique

Surgical procedure for PAOO was performed after obtaining the consent of the patient. Under local anesthesia, full-thickness mucoperiosteal flaps were raised with sulcular incisions while preserving interdental papilla on the buccal sides of maxillary anterior regions only, which showed dehiscence in relation to 11. No flap elevation or corticotomy was performed on the palatal side in this case. Vertical corticotomy cuts were performed with round burs with water irrigation and in between roots from the mesial of canine to the mesial of the opposing canine. These vertical cuts were extended approximately 2 mm past the apices of the teeth stopped about 2 mm short of the alveolar crests. Both corticotomy cuts and perforations were extended through the entire thickness of the cortical plate, just barely into the cancellous bone. Adequate bioabsorbable grafting material, i.e., demineralized freeze-dried bone with nano-hydroxyapatite bone particle, was placed over the decortication site. The surgical sites were vigorously irrigated with saline before flap repositioning and interrupted sutures were placed [Figure 3]. Analgesics and adjunctive antibiotics were prescribed for 1 week.^[5]

After PAOO procedure, upper and lower arch 0.019 × 0.025 SS wires were placed along with it. Class 2 elastics were used to close the spacing, to correct molar relation and upper anterior proclination. The orthodontic adjustments were made at 2-week



Figure 1: Pretreatment extraoral and intraoral photographs

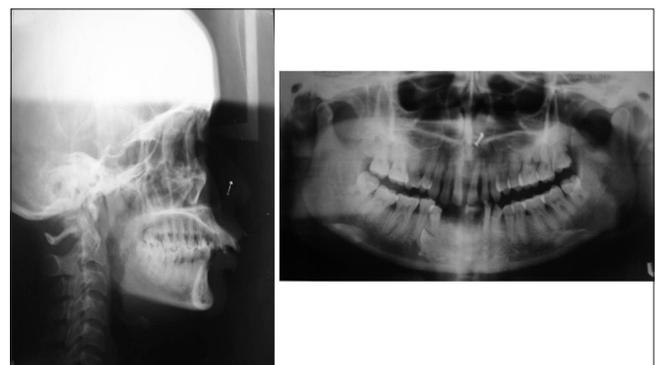


Figure 2: Pretreatment lateral cephalogram and orthopantomogram

intervals, and removable clear plastic retainers were utilized after debonding which also acted as a provisional bridge. Ideal esthetics and functional results were achieved along with straight profile and competent lips. Class I occlusion was obtained along with correction of severe proclination. Periodontal condition and bone support of the patient improved drastically as shown in posttreatment intra- and extra-oral photographs [Figure 4]. Posttreatment lateral cephalogram and OPG are shown in Figure 5. Cephalometric findings showed reduction of Upper 1 – NA from 17 mm and 46° – 5° mm and 20° (Steiner's analysis).

DISCUSSION

PAOO technique provides an increased net alveolar volume, and one is no longer at the mercy of the preexisting alveolar volume. Teeth can be moved two to three times further in (1/3) to (1/4) the time required for traditional orthodontic therapy.^[6,7]

The alveolar augmentation can correct the dentoalveolar defecting that presumptively results when the teeth are tipped labially and can also provide for a degree of subtle facial "morphing." Very frequently there are preexisting alveolar inadequacies such as fenestrations and dehiscences over the root surfaces.^[6,7] As long as the root surfaces in these defects are vital and as long as there has been no apical epithelial migration, these alveolar deficiencies can be corrected with the alveolar augmentation which is in conclusion with the present case report.

PAOO technique is an interdisciplinary collaboration that has integrated the use of traditional orthodontic tooth movement in conjunction with periodontal tissue engineering and regenerative surgery.^[8] Hence this technique differs from prior techniques by the additional step of alveolar bone grafting. This additional step is believed to be responsible for the increase in posttreatment alveolar bone width, which may be responsible for enhanced long-term orthodontic stability.^[9]

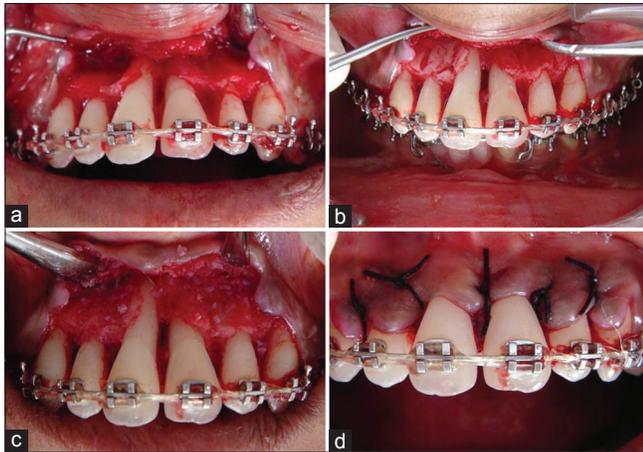


Figure 3: (a) Mucoperiosteal flap reflection, (b) Y-cut and vertical osteotomy, (c) demineralized freeze-dried bone graft material with nanohydroxyapatite bone particle, (d) interrupted sutures placed



Figure 4: Posttreatment extraoral and intraoral photographs

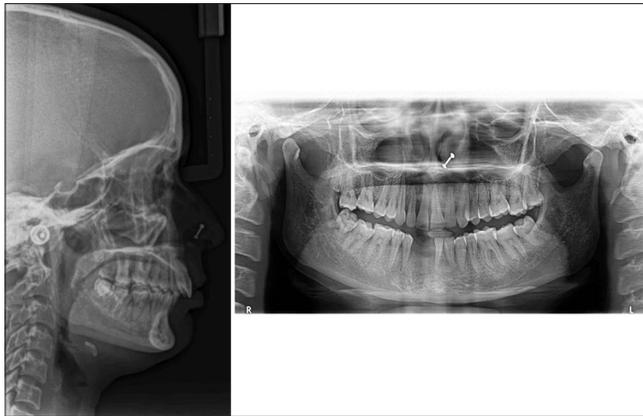


Figure 5: Posttreatment lateral cephalogram and orthopantomogram

Significance of the increase of the rate of tooth movement, however, pales in comparison to the fact that the teeth can be moved two to three times further than would be possible with traditional orthodontics alone, and that the cases can be completed with an increased alveolar bone volume.^[10] The current article concurs all these previously published findings on PAOO technique.

CONCLUSIONS

Cases which were treated with PAOO technique have shown an increased alveolar bone volume as seen in the present case report. It also increased alveolar volume which in turn provided a more intact periodontium, increased the bony support for both the teeth and the overlying soft tissues. From an esthetic perspective, the PAOO technique not only addressed tooth alignment and periodontal condition but also the facial features.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other

clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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