Periodontally Accelerated Osteogenic Orthodontics in the Mandibular Premolar–Molar Region: A Case Report

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ABSTRACT

Periodontally accelerated osteogenic orthodontics (PAOO) helps in reshaping and reducing the thickness of alveolar bone and reduces orthodontic treatment time. This is based on the regional acceleratory phenomenon (RAP), which is a pattern of bone healing. This case report explains the principles and technique of PAOO for faster tooth movement orthodontically within a shorter treatment time.

Keywords: Corticotomy, Decortication, Orthodontic treatment time, Periodontally accelerated osteogenic orthodontics, Regional accelerated phenomenon.

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INTRODUCTION

Orthodontics is the art of correcting malocclusion and helps the patient in maintaining proper oral health. American Association of Orthodontists suggested that the comprehensive orthodontic period ranges between 18 months and 30 months, which depends on the severity of malocclusion, bone deformities, treatment options, and so on.¹ It was believed that orthodontic treatment can be finished sooner than the expected time, by disrupting the major resistance for the movement of teeth, the cortical plates.²

Orthodontic tooth movement assisted with surgery has been in use since 1800s. Corticotomy-facilitated tooth movement was first described by Bryan in 1893. Corticotomy used as a procedure for rapid movement of tooth was introduced by Kole in 1959.³ Recently, Wilcko et al.⁴ combined corticotomy with bone grafting and named it as accelerated osteogenic orthodontics (AOO), and recently renamed it as periodontally accelerated osteogenic orthodontics (PAOO).⁵

In PAOO, surgical scarring of cortical bone along with alveolar grafting is done. The biology behind this is regional acceleratory phenomenon (RAP) introduced by Frost.⁶ Regional acceleratory phenomenon usually occurs after arthrodesis, fracture, bone grafting, or osteotomy procedure, which requires precursor cell activation, which is also needed for healing of wound.^{7,8} Regional acceleratory phenomenon facilitates wound healing by reduced bone density and increased bone turnover, which also facilitates faster tooth movement.⁹ Faster tooth movement in short time along with safe expansion of cortical arches and improved treatment stability are some of the advantages of the technique.¹⁰ The following case report describes a patient who was treated with PAOO to facilitate orthodontic tooth movement.

CASE DESCRIPTION

A 27-year-old male patient was referred from the Department of Orthodontics for space closure between 45 and 46. The patient was undergoing orthodontic treatment for past 2 years. On clinical examination, 5–6 mm spacing was observed between 45 and 46 (Fig. 1). The surgical procedure of PAOO was explained to the patient as for which the patient consented. The patient was healthy and had no systemic contraindications for corticotomy procedure.

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SURGICAL PROCEDURES

The site was anesthetized with 2% lignocaine hydrochloride. Crevicular midcrestal incisions were given. Full thickness mucoperiosteal flaps were reflected beyond the level of the apices of the teeth (Fig. 2). Post reflection the area was thoroughly

Fig. 1: Preoperative intraoral view

Fig. 2: Flap reflection

Fig. 3: Vertical cuts were made on the buccal and lingual aspect

Fig. 4: Bone graft was placed

Fig. 5: Suturing

debrided, and curettage was done to remove any granulation tissue, if present.

Vertical grooves were made on the buccal and lingual aspects of the cortical layer of the exposed bone with a tapered fissure bur mounted on a micromotor hand piece saline irrigation, with a depth of 1.5 mm (Fig. 3).

Osseograft (xenograft) was placed over the site (Fig. 4). Flaps were repositioned and approximated with simple interrupted sutures (Fig. 5). Analgesics and adjunctive antibiotics were prescribed for 1 week. Follow-up was done after 1 week (Fig. 6). The patient was referred back for space closure between 45 and 46 to the Department of Orthodontics. One month follow-up shows complete closure of space between 45 and 46 (Fig. 7).

DISCUSSION

This case report explains about reduced treatment time after PAOO. In orthodontics, the main goal in the management of malocclusion in patients is the reduced treatment time. Conventional orthodontic treatment along with corticotomy-facilitated orthodontic movement aids in achieving this goal. The patient is benefited by the reduced treatment time. It is widely accepted that the acceleration in tooth movement after orthodontic therapy is due to

PAOO. It helps in treating class III malocclusions with crowding and class II malocclusions with palatal expansion.¹¹ In this case, PAOO was used to treat class III malocclusions.

Increased buccolingual thickness and alveolar bone volume can be obtained with PAOO.¹² Two to three times greater tooth movement can be achieved with PAOO than conventional orthodontics moreover with greater bone volume.¹³ An intact periodontium, facial reshaping, avoiding unnecessary extractions, and an increased bony support can be obtained by increasing the bone volume.¹⁴ No pain, loss of tooth vitality, or discoloration was observed.¹⁵⁻¹⁷ Due to increased treatment duration and excessive force application, resorption of root, mobility, recession, and so on may occur with conventional orthodontics. Due to bone matrix transportation and reduced density of the bone due to osteopenia created by the corticotomy procedure, these complications do not occur with PAOO.¹⁸ Every 2 weeks, the patient was reviewed at every phase of treatment. Corticotomy technique facilitated rapid tooth movement and correction of malocclusion with more stable results and minimum complications. Corticotomy-facilitated orthodontics greatly contributed to the completion of the correction of the malocclusion in reduced time than the time required for conventional orthodontics.³

Fig. 6: 1 week postoperative

Fig. 7: 1 month postoperative

CONCLUSION

Considering the clinical results of the aforementioned case, PAOO serves as an attractive treatment option to accelerate the orthodontic tooth movement and achieve space closure. With requirement of newer treatment and diagnostic parameters, the PAOO technique is a win-win situation for the periodontist, orthodontist, and the patient.

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