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Case Report

PAOO Technique for The Bimaxillary Protrusion: A Case Report

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Abstract

Background: Bimaxillary protrusion is a common malocclusion that can lead to functional and aesthetic issues. Conventional orthodontic treatment may not always be effective, and surgical approaches can be invasive. The Periodontally Accelerated Osteogenic Orthodontics (PAOO) technique is a minimally invasive alternative that involves corticotomy and orthodontic treatment.

Objective: This case report aimed to evaluate the effectiveness of the PAOO technique for the correction of bimaxillary protrusion in a 16-year-old female patient.

Methods: The PAOO technique involved corticotomy and piezocision on a 16-year-old female patient undergoing orthodontic treatment with a fixed appliance. The patient was being followed up for 18 months after orthodontic appliance placement with premolars extractions but did not get any favorable result and was referred by the Department of Orthodontics to undergo corticotomy procedure. The effectiveness of the treatment was evaluated using cephalometric and occlusal analyses.

Results: The PAOO technique significantly improved the patient's skeletal and dental parameters. The maxillary and mandibular incisors were retracted, resulting in a significant improvement in the patient's profile. The occlusal analysis showed good intercuspation and a stable occlusion.

Conclusion: The PAOO technique is a viable option for the correction of bimaxillary protrusion, as it can achieve significant improvements in skeletal and dental parameters with minimal invasiveness. Further studies are needed to validate these findings and compare the PAOO technique with conventional surgical and orthodontic approaches.

Keywords: PAOO; Bimaxillary Protrusion; Orthodontics; Corticotomy; Piezocision; Orthognathic Surgery; Accelerated Orthodontics

Introduction

Bimaxillary protrusion is a common malocclusion characterized by the protrusion of both the maxillary and mandibular dentition [1]. Patients with bimaxillary protrusion often present with increased overjet, deep overbite, and lip protrusion, which can negatively affect their facial esthetics and self-confidence [2]. The traditional orthodontic treatment for bimaxillary protrusion involves the extraction of premolars to reduce dental protrusion and achieve a favorable occlusion. However, this approach can lead to compromised facial esthetics and stability of the orthodontic treatment [3].

The Periodontally Accelerated Osteogenic Orthodontics (PAOO) technique is a novel approach that combines corticotomy and orthodontic treatment to enhance the stability of the orthodontic treatment and improve the overall facial esthetics [4]. The PAOO technique involves selective alveolar corticotomy, which creates a controlled injury to the alveolar bone, followed by orthodontic treatment to achieve tooth movement [2]. The corticotomy accelerates the bone turnover rate, which facilitates tooth movement and allows for faster orthodontic treatment [1]. The PAOO technique has been used successfully in the treatment of various malocclusions, including bimaxillary protrusion [1].

Case Report

A 16-year-old female patient referred from the Department of Orthodontics with a chief complaint of protruding front teeth and an unattractive smile as shown in Fig. 1. As she wanted faster result from orthodontic treatment she came to the Department of Periodontology for needful treatment. Clinical examination revealed a Class II skeletal malocclusion with a protrusive maxilla and mandible with extracted first premolars. The patient had a convex profile and a deep overbite. The cephalometric analysis showed a skeletal Class II relationship with a bimaxillary protrusive maxilla and mandible. The patient was explained regarding the PAOO and the consent was obtained for the surgical corticotomies.

The treatment plan involved corticotomy procedure of both maxilla and mandible as shown in Fig. 2. The PAOO procedure was performed under local anesthesia using a piezoelectric device on maxillary arch and with bur technique in mandibular arch [1]. A mucoperiosteal flap was elevated beyond the apices of the lower incisor. The procedure involved performing selective alveolar corticotomy in the maxillary and mandibular arches to create a controlled injury to the alveolar bone. The corticotomy was performed on the buccal surfaces of the alveolar bone, creating a perforation of the cortical plate without damaging the periodontal ligament. The greatest mesiodistal width of the incisors guided the vertical bone cuts in the cortical bone from the gingival margin to 2-3 mm below the apices of the teeth [1]. The vertical cuts were performed from the distal of the right lower canine to the distal of left canine with a round bur. These vertical cuts were deepened in the cortical bone about 1.5-2 mm and extended to the spongiosa. The vertical cuts were joined using the horizontal cuts. The procedure was followed by bone grafting using a Demineralized Freeze-Dried Bone Allograft (DFDBA) to enhance bone regeneration and support tooth movement as shown. The flap was repositioned and closed with interrupted sutures. The active orthodontic treatment was begun within 1 week after surgery. A similar surgical procedure was followed for the maxillary teeth using piezosurgical unit and was given postoperative antibiotics and anti-inflammatory agents 5 days following the surgery [1].

The patient was recalled and reviewed after a week for suture removal and the healing observed was satisfactory with no complaint of pain and swelling. The patient was reviewed after 1 month, showing she had achieved significant improvement in facial aesthetics and occlusion, with a reduction in overjet and overbite as shown in Fig. 3. The cephalometric analysis showed a reduction in the SNA angle (from 84 to 82 degrees) and an increase in the SNB angle (from 82 to 81 degrees) and Naso-labial angle (from 89 to 97 degrees) resulting in a more favorable skeletal relationship and the patient was happy with the result.

Figure 1: Preoperative view. A: Extraoral lateral view of face; B: Extraoral frontal view of face; C: Intraoral lateral view of jaws; D: Intraoral frontal view of jaws.

Figure 2: Intaoperative view. A: Flap reflected and corticotomy carried out with round diamond bur in anterior mandible; B: Corticotomy completed in anterior mandible region; C: Suture placed in mandible; D: Flap reflected and corticotomy carried out with piezoelectric device in anterior maxilla; E: Coricotomy completed in anterior maxilla region; F: Suture placed in maxilla.

Figure 3: Postoperative view. A: Intraoral lateral view of jaws; B: Intraoral frontal view of jaws; C: Extraoral lateral view of face.; D: Extraoral frontal view of face.

Discussion

The PAOO technique has been used as an effective treatment modality for the correction of bimaxillary protrusion. It is a minimally invasive surgical technique that significantly improves facial aesthetics, occlusion, and airway function [1]. The PAOO technique involves corticotomy and piezocision, which create a surgical insult to the bone and activate the alveolar remodeling process [1,3,4]. This process leads to rapid tooth movement, and the expansion of the alveolar bone can be observed within a few weeks after the procedure. Selective alveolar decortication is performed in the form of decortication cuts and at points up to 0.5 mm in depth, combined with selective medullary penetration to enhance bleeding. This poses little threat to tooth vitality and makes it much safer than the osteotomy technique, in which cuts extend into the medullary bone around the teeth that are to be moved. This technique is preferred over traditional orthodontic treatment in cases of severe bimaxillary protrusion, where conventional orthodontic treatment may not be sufficient to achieve the desired results [4].

The effectiveness of the PAOO technique in the treatment of bimaxillary protrusion has been demonstrated in several studies. In a case report by Kim, et al., the PAOO technique was used to treat a patient with severe bimaxillary protrusion, and significant improvements were observed in facial aesthetics and occlusion after treatment [5]. The authors concluded that the PAOO technique is an effective treatment option for bimaxillary protrusion, especially in cases where traditional orthodontic treatment may not be feasible.

Moreover, in a systematic review by Alqerban, et al., the authors evaluated the effectiveness of the PAOO technique in orthodontic treatment [6]. The review included 14 studies, and the results showed that the PAOO technique can significantly reduce the treatment duration, improve the quality of orthodontic treatment, and enhance the stability of the treatment outcome. The authors concluded that the PAOO technique is a promising treatment option in orthodontics.

Another study by Zhao, et al., investigated the effect of the PAOO technique on the airway function of patients with bimaxillary protrusion [7]. The study included 30 patients who underwent the PAOO procedure, and the results showed that the PAOO technique can significantly improve the airway function of patients with bimaxillary protrusion. The authors suggested that the PAOO technique can be considered as an effective treatment option for patients with bimaxillary protrusion who have airway obstruction.

Conclusion

In conclusion, the PAOO technique is an effective treatment option for bimaxillary protrusion, and it offers several advantages over traditional orthodontic treatment. The PAOO technique can provide rapid tooth movement, enhance the stability of the treatment outcome, improve airway function, and achieve significant improvements in facial aesthetics and occlusion. Future studies are needed to investigate the long-term stability of the treatment outcome and the effectiveness of the PAOO technique in a larger sample size.

Conflict of Interest

The authors have no conflict of interest to declare.

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