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A Novel Approach to Speed up the Orthodontic Tooth Movement; Corticotomy: A Case Report

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Abstract: The purpose of this case report was to determine therapeutic outcomes of corticotomy assisted orthodontic procedure in conjunction with orthodontic therapy and its effect on the periodontal status of the involved teeth. The surgical procedure included crevicular incisions and vertical releasing incisions and raise the buccal and palatal mucoperiosteal flaps of the involved teeth. Using high speed fissure and small round burs, Buccal and palatal vertical grooves were made between the roots in the depth of 2.0 mm just 2.0.to 3.0 mm below the interproximal alveolar bone margin. The orthodontic appliance was activated next dayafter surgery.
Keywords: Orthodontic tooth movment, Corticotomy, alveolar process surgery, malpositioned teeth.

INTRODUCTION

Reduction of orthodontic treatment time is considered an important goal in the treatment of dental malocclusions in the adult patient. Orthodontic therapy needed for the treatment of dentalmal occlusions that produce an adequate relationship between teeth during occlusion. One of the main disadvantages of Conventional orthodontic therapy is time consuming procedure [1].

One option for shortening treatment time is the corticotomy-facilitated bone augmentation approach called the periodontally accelerated osteogenic orthodontics procedure [2]. A technique was first introduced by Kole in 1959 which included partial removal of the cortical layer of the alveolar bone. Corticotomy-facilitated orthodontic treatment may be considered an intermediate therapy between Orthognathic surgery and conventional orthodontics therapy [3]. For the completion of Periodontally accelerated osteogenic orthodontics treatment,25% to 50% less time required then Conventional orthodontic therapy [4]. Hence, It has been calculated that the rate of tooth movement by Corticotomy-facilitated orthodontic treatment is doubled (2.5mm to 3mm at day 25) in comparison to Conventional orthodontics therapy without any significant adverse effects on periodontal tissues However, Conventional orthodontic therapy applies slight forces and moves teeth slowly and It take generally 1- 2 year.

Thus, this surgically assisted approach for rapid tooth movement is beneficial for cross bite management, molar intrusion, space closure and open bite management.

CASE REPORT

A 24 year old female patient came to the Department of orthodontic and Dentofacialorthopaedics , Career P.G. Institute of Dental Sciences, Lucknow, Uttar Pradesh, with the chief complaint of irregular teeth. She wants her orthodontic treatment to be completed in shorter duration. So, from there she was referred to the Department of Periodontology for evaluation of periodontal status. On her intra oral examination, revealed periodontal health was good and cross bite of upper right Central incisor was found. After that, Corticotomy procedure was planned for speeding up the orthodontic tooth movement and Patient was informed about the procedure and consent was taken.

Before the surgery, local anesthesia was first administered , the crevicular incision around the teeth

and two vertically releasing incisions were placed at line angle of mesial surface of the canine on one side to line angle of distal surface of central incisor on other side .A full-thickness mucoperiosteal flap was elevated with periostealelevator. After elevation of mucoperiosteal flap, Using high speed fissure and small round carbide burs with copious irrigation, labial and palatal corticotomy was doneby creating two vertical line (2 mm in depth) along the root of right maxillary central incisor, just 2-3 mm below the crest of interproximal alveolar bone of the mesial and distal surface of maxillary right central incisor. The depth of the cuts was limited to the cortical layer to preserve all medullary bone. Thereafter, the flap was sutured using non-resorbable silk suture material.

After that, wire chosen for the purpose was 0.014 AJ wilcock plus Australian wire. Double vertical loop in mesial and distal region on labial aspect of affected teeth were fabricated and placed for desired movement and 0.016AJwilcock premium plus was engaged on eighth day and activated .Two week after activation of loop, correction of cross bite was obtained and follow up evaluations revealed, no loss of tooth vitality, gingival recession and nocrestal bone height reduction was detected.

Steps for Corticotome procedure

Fig-1: Palatal View: Preoperative

Fig-2: Front View: Preoperative

Fig-3:Incision Placed

Fig-4: After elevation of full thickness mucoperiosteal flap

Fig-5: Removal of alveolar bone along proximal surface of root

Fig-6: Immediately after Suturing

Fig-7: 1 week After corticotomy of right cental incisor

Fig-8: one month after corticotomy of right cental incisor

DISCUSSION

The alveolar corticotomy technique has been modified over the years to eliminate its possible risks, such as loss of tooth vitality, gingival recession and crestal bone height reduction due to inadequate blood supply [5]. Bichlmayr developed a surgical technique for rapid correction of severe maxillary protrusion with orthodontic appliances in 1931 which included wedges of bone were first removed to reduce the thickness of bone by which the roots of the maxillary anterior teeth would need to be retracted [6]. In 1959, Köle expanded Bichlmayr method by introducing additional movements including space closure and cross bite correction and he stated that tooth movement has been slow due to resistance power of the cortical plates of bone and if disrupting its continuity, orthodontics treatment could be completed in very short time than normally expected [3].

A more recent surgical orthodontic therapy was introduced by Wilcko et al. which include corticotomy surgery with bone grafting, referred to as Accelerated Osteogenic Orthodontics (AOO) [2]. In 2008, Wilcko et al again introduced Periodontally accelerated osteogenic orthodontics (PAOO) Which included comprehensive fixed orthodontic appliances with full thickness flaps and labial and lingual corticotomies around teeth to be moved. Bone graft consisting of demineralized freeze-dried bone (DFDBA) andbovine bone with clindamycin was applied directly over the bone groove [4, 8].

Conventional orthodontic tooth movement occurs through crestal bone resorption. Although prolonged compression of the periodontal ligament may produce histologic changes in periodontal fibers as well as root resorption. So, light biomechanical forces should beappliedto avoid the risk of periodontal damage when treatingadult patients. However, this therapeutic approach is very lengthy [1].

Orthopedist Harold Frost concluded that after the surgical wounding of the cortical bone, the regional acceleratory phenomenon (RAP) stimulate tissue re-organization and healing by way of a transient burst of localized hard and soft tissue remodeling. It has been demonstrated that the residual soft tissue matrix has the ability to induce remineralization after the cessation of tooth movement [2]. However, Longitudinal studies have shown that shallow gingival sulcus lose approximately 0.5 mm of clinical attachment level after corticotomy procedure [7].

In this case report, right maxillary central incisor was come in alignment approximately at the end oftwo week without any adverse effect on periodontium after the corticotomy procedure.

CONCLUSION

Corticotomy assisted orthodontic treatment is an effective modality for adults but it requires adequate amount of bone thickness and it is beneficial for those patient who wants complete orthodontic treatment in short duration but due to lack of evidence-based studies about therapeutic effects and efficiencies of Corticotomy assisted orthodontic treatment are the main drawbacks of Corticotomy. So, More longitudinal studies are required before Corticotomy assisted orthodontic treatment can become a routine procedure for orthodontic tooth movement.

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