Case Report

MANAGEMENT OF MIDLINE DIASTEMA USING ACCELERATED OSTEOGENIC ORTHODONTICS - A CASE REPORT


Abstract:

Aim and objectives: This case report demonstrates the usefulness of Accelerated osteogenic orthodontics, that offers a short treatment time and the ability to simultaneously reshape and increase the buccolingual thickness of the supporting alveolar bone. Case description: A 23 year old female patient presented with Angles Class I malocclusion with bimaxillary dentoalveolar proclination, with maxillary and mandibular anterior spacing and with midline diastema of 8 mm. She readily agreed to Accelerated osteogenic orthodontics when presented with the proposal that her malocclusion could be corrected in one third of the treatment time required for conventional orthodontics. Conclusion: This procedure exploits the dynamics of bone physiology and redirects the emphasis in tooth movement to the manner in which the supporting bone responds to orthodontic forces applied to the teeth.

Key words: Accelerated osteogenic orthodontics, alveolar decortications, regional acceleratory phenomenon, midline diastema.

Introduction

Lengthy treatment duration is always the drawback of orthodontic treatment, especially when dealing with complex malocclusions such as large anterior spacing. The commonly used techniques include elastics, springs or the use of implants. The development of corticotomy assisted orthodontics has put forward new solutions to many limitations in orthodontic treatment. The advantages of corticotomy assisted orthodontics over conventional non surgical orthodontic treatment are less root resorption, increased alveolar volume1 and less treatment duration.

The following case report illuminates the elegancy of corticotomy assisted orthodontics in correcting upper anterior spacing.

Accelerated osteogenic orthodontics:

Corticotomy assisted orthodontics blends the orthodontic mechanics, alveolar decortications and augmentation procedures to bring down the treatment time 3-4 times faster than the conventional methods. Alveolar corticotomy is surgical intervention limited to cortical portion of alveolar bone. During the last decade the alveolar corticotomy procedure gained lot of importance in enhancing orthodontic treatment. As years passed by, corticotomy procedure also underwent lots of modification from Koles corticotomy procedure2 to Wilcko brother’s Accelerated osteogenic orthodontics (AOO)3 which resulted in reducing the complications of Koles procedure like damage to periodontium, tooth pulp vitality2, avoided the usage of combination of interradicular corticotomies and supra apical osteotomies, it reduces the treatment time by 1/3rd to 1/4th of the conventional time and also provides increased net alveolar volume.
Regional acceleratory phenomenon

AOO basically follows the principle of regional acceleratory phenomenon (RAP)4,5 by Frost in 1983. Regional Acceleratory Phenomena (RAP) is local response to a noxious stimulus describes a process by which tissue forms faster than the normal regional regeneration process. By enhancing the various healing stages, this phenomenon makes healing occur 2-10 times faster than normal physiologic healing. Regional refers to demineralization of both the cut site and adjacent bone and acceleratory refers to exaggerated or intensified bone response in cuts that extends to the bone marrow. RAP healing is a complex physiologic process with dominating features involving accelerated bone turn over and decreases in regional bone densities. Following surgical wounding of cortical bone, RAP increases the tissue reorganization and healing by transient burst of localized hard and soft tissue remodelling6. The initial phase of RAP results in an increase in cortical bone porosity because of increased osteoclastic activity. There is strong indirect evidence that the calcium depletion and diminished bone densities result in rapid tooth movement. RAP begins within a few days of surgery, attains its peak at 1-2 months and may take from 6-24 months to subside.

AOO surgical technique

AOO is an interdisciplinary technique which requires an orthodontist and a surgeon for a better treatment outcome. Orthodontic brackets and arch wires are placed at least one week before the surgery. This surgery is usually performed under local anaesthesia. A full thickness flap is raised labially and lingually using sulcular releasing incision where the tooth movement is required. The interdental papille with full thickness flap was raised except between the upper central incisor is avoided because of the nasopalatine foramen precludes the need for bone activation in this immediate area. Flaps are raised beyond the apices off the teeth to avoid damaging the neurovascular complexes existing in the alveolus. Then buccal and lingual corticotomy cuts and cortical bone perforations are made adjacent to the malpositioned teeth using low speed round burs. These cuts should not enter the cancellous bone to avoid the risk of underlying structure. After the bone activation the resorbable particulate bone grafting material is layered over the activated bone. This graft material is first wet with clyindamycin phosphate/bacteriostatic water/platlet rich plasma of 5mg/ml. This gives an antibiotic effect as well as ease of placement. The graft material can be Bovine bone powder or 100% demineralised freeze dried bone graft. The quantity of bone graft depends on the quality of pre existing bone. The quantity can vary from 0.25 to 1cc or more per tooth. The flap is repositioned using interrupted loop non resorbable suture material. Soon after flap repositioning heavy orthodontic force should be applied to the teeth. Sutures are left in place for minimum of 2 weeks. Orthodontic adjustments should be made in every 2 weeks interval. The tooth movement in this treatment is purely a physiologic process and not the repositioning of the segments of bone. An uninterrupted blood supply is very important. This procedure causes a sudden bone remodelling phenomenon on adjacent alveolar bone. When osteoclastic activity is high temporary intrabony osteopenia occurs. Osteopenia is associated with intense osteoclastic activity. Decortication will induce this state.

Case description

A 23 year old female patient came to the department with the chief complaint of spacing in upper and lower front teeth. The case was diagnosed as Angles Class I malocclusion on a Class I skeletal base with orthognathic maxilla and orthognathic mandible, with bimaxillary dentoalveolar proclination and protrusion with maxillary and mandibular anterior spacing, with midline diastema of 8 mm, with overjet of 4mm, overbite of 4 mm and with high labial frenal attachment between upper central incisors.
Conventional orthodontics could have been performed but it would have taken 1.6 years to finish. Instead, the patient opted for AOO, since she preferred to complete the treatment within a short period of time.

Patient was bonded with 0.018 Roth preadjusted edgewise appliance, 0.016 NiTi wire was placed on both upper and lower arches for initial levelling and aligning (fig.-1). Gradually progressed up to 0.016x0.022 Stainless steel wire. Flap raised and partial decortications were made on both labial and palatal aspect of maxillary anteriors followed by frenectomy procedure and suture placement (fig- 2 to fig- 4). Since the quantity of pre-existing alveolar bone was satisfactory there was no need to go for bone graft. Orthodontic force was generated with the use of E-chain placed from maxillary right lateral incisor to maxillary left lateral incisor (fig -5). E-chain was changed in every two weeks. After 8 weeks the maxillary midline was fully closed, that was followed by retraction using “single key hole” to close the space distal to maxillary lateral incisors (fig -6). Post treatment result is given in fig 7. The before and after space closure IOPA are given in (fig -8 and fig -9).

**Conclusion**

Corticotomy assisted orthodontics is an effective and reliable technique to treat severe malocclusions to reduce the treatment time and to increase the treatment quality.

Reduced root resorption, increased alveolar volume, reduced chair side time are the basic advantages of this method over the conventional techniques. However this technique should be carefully performed over the teeth and surrounding tissues to avoid the risk of devitalization of teeth and periodontal damage.

A long term follow-up studies have to be performed to evaluate the effects of corticotomy assisted orthodontics on retention and stability.

**References**

LEGENDS

Fig-1 Aligning and levelling

Fig-4 Suture closure and frenectomy

Fig-2 After flap raising and decortications

Fig-5 After 1 week of space closure

Fig-3 Decortication on palatal side

Fig-6 After 8 weeks retraction using single key hole
Legend for figures:

Fig-1 Aligning and levelling
Fig-2 After flap raising and decortication
Fig-3 Decortication on palatal side
Fig-4 Suture closure and frenectomy
Fig-5 After 1 week of space closure
Fig-6 After 8 weeks, retraction using single key hole
Fig-7 Post treatment intraoral frontal view
Fig-8 IOPA before diastema closure
Fig-9 IOPA after diastema closure