Case Report

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MODIFIED ALVEOLAR CORTICOTOMY: A CASE REPORT

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ABSTRACT:

An increasing number of adult patients have been seeking orthodontic treatment and a short treatment time has been a recurring request. To meet their expectations, a number of innovative techniques have been developed to accelerate orthodontic tooth movement. Significant acceleration in orthodontic tooth movement has been reported following a combination of selective alveolar decortication and bone grafting surgery with the latter being responsible for the increased scope of tooth movement and the long-term improvement of the periodontium. Periodontally accelerated osteogenic orthodontics is one of the procedures that can dramatically reduce the molar protraction time that premises to shorten the time period in orthodontics. In this case report a 20 year old male with class I malocclusion seeks orthodontic treatment having missing first molar. A full- thickness flap elevated from 34 to 37 multiple perforations made in the edentulous area. Bone graft material placed in the corticotomy perforations. The orthodontic tooth movement is started within two weeks after surgery.

Key words: Regional Acceleratory Phenomenon, Corticotomy, Xenograft.

INTRODUCTION:

Corticotomy is defined as any intentional surgical injury to cortical bone. [1] Currently, many adult patients are seeking orthodontic treatment. However, when treating adult patients successful orthodontic treatment can be difficult when treating adult patients because dento-alveolar development ceases after adolescence. The average orthodontic treatment time for adults is considerably longer than adolescent patients, ranging from 18.7 to 31 months [2-4]. It is also more likely for adult patients to experience root resorption because of an aplastic, narrow and less vascular periodontal membrane.[5]

History: Since 1800s, surgically assisted orthodontic tooth movement has been used. Corticotomy-facilitated tooth movement was first described by L.C.Bryan in 1893. Heinrick Kole's combined radicular corticotomy(or) supra-apical osteotomy technique described in 1959. Wilcko et al further modified the corticotomy-assisted orthodontic

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technique with the addition of alveolar augmentation and patented the procedure as Periodontally accelerated osteogenic orthodontics(PAOO) [6]

Periodontally Accelerated Osteogenic Orthodontics: This technique is a combination of a selective decortications-facilitated orthodontic technique and alveolar augmentation. With this technique one tooth can be moved 2-3 times further in one-third or one-fourth of the time required for traditional orthodontic therapy. It can be used to treat moderate to severe malocclusions in both adolescents and adults and can also reduce the need for extractions.[7]

Unlike the usual corticotomy, PAOO doesn't cut into the bone, but decorticates it, i.e., some of the external surface of bone is removed. The bone then goes through a phase known as osteopenia, where its mineral content is temporarily decreased. Alveolar bone releases rich deposits of calcium, and new bone begins to mineralize in about 20 to 55 days. While your alveolar bone is in this transient state, braces can move your teeth very quickly, because the bone is softer and there is less resistance to the force of the braces.[9]

Securing appropriate anchorage is an imperative factor for achieving the objectives of orthodontic treatment. Anchorage loss often produces unsatisfactory treatment results,

particularly in patients who require maximum anchorage, with a resultant increase in the treatment period.[1]

Advantages and Disadvantages of Paoo Surgery: [8]

Advantages:

1. Reduced treatment time

2. Less root resorption due to decreased resistance of cortical bone

3. More bone support due to the addition of bone graft material

4. History of relapse has been very low.

5. Less need for extra-oral appliances & headgear. (Depending on the case).

6. You can wear either metal (or) ceramic brackets.

Disadvantages:

1. Extra-surgical cost

2. Mildly invasive surgical procedure, & like all surgeries, it has its risk.

3. Some pain & swelling, and the possibility of infection.

4. Not applicable to all cases, Proper case selection is necessary to attain a good result.

CASE DETAIL:

A 20 years old male patient with a class I malocclusion and missing left mandibular first molar referred from department of orthodontics , wanted to complete his orthodontic treatment more quickly than the normal treatment time of two years. A decision was made to perform Periodontally accelerated osteogenic orthodontics. Periodontally

accelerated osteogenic orthodontics was explained to the patient and informed consent was obtained for the surgical alveolar corticotomy from the patient.

Surgical Procedure: Under local anesthesia, a papilla preservation flap was raised using No: 15 BP blade. Incision was made from mesial of 34 to distal of 37. Elevation of flap extended beyond the apical of the right premolar and molar region. Special care was taken not to tear the flaps and any interdental papillary tissue that remained inter-proximally was left in the place. Care was exercised not to damage any of the neurovascular bundles and not to disturb the muscular attachment. Numerous corticotomy perforations were made in the cortical layer. Perforations were done by using 0.5mm diameter stainless steel round bur. The perforations were deepened in the cortical bone for about 1.5 to 2mm and more than ten perforations made randomly in the bone. Care was taken not to sever the Inferior alveolar nerve and mental nerve.

After bleeding is controlled, Bone graft material (osseo mold) were placed into the perforations and nicely condensed in to the perforations. Care was taken not to place excessive amount of graft material, as this might interfere with replacement of the flaps. Mucoperiosteal flaps was repositioned and sutured with interrupted sutures using 3-0 braided black silk suture material. Post surgical instructions are the same as any standard oral surgical procedures. Antibiotics, analgesics, and antiseptic mouth wash should be given to the patient. The active orthodontic treatment was begun within two week after surgery.

Post-treatment evaluation of patient revealed no probing pocket depths greater than 3mm, good preservation of interdental papillae, no gingival changes.

DISCUSSION:

Reduction of orthodontic therapy time is considered to be an important goal in the management of malocclusion. Corticotomy has been proposed as an alternative to conventional orthodontic treatment in difficult adult cases for rapid tooth movement. Chung et al reported that the complete retraction of anterior teeth combined with corticotomy in a severe bimaxillary protrusion case took less than 3½ months. Germac et al observed the total dramatically reduction in the orthodontic treatment time (16 months) when compared with the average treatment time for extraction therapy (31months). In corticotomy-facilitated orthodontics, the reduction of orthodontic treatment time by approximately 50% was observed. [7]

When responding to a traumatic stimulus, the bony tissues initially have a biologic stage called Regional Acceleratory Phenomenon (RAP) characterized by a transient increase in bone turnover and a decrease in trabecular bone density. Alveolar corticotomies are surgical interventions limited to cortical bone that were

suggested as an alternative to facilitate the treatment of complex occlusal problems. The two main features of RAP in bone healing include decreased regional bone density and accelerated bone turn-over, which are believed to facilitate orthodontic tooth movement. [7]

Regional Acceleratory Phenomena (RAP) (Wilcko et al, 2000,2001,2003,2008) is local response to a noxious stimulus describes a process by which tissue forms faster than the normal regional regeneration process. This phenomenon makes healing occur 2-10 times faster than normal physiologic healing (Frost, 1983). The RAP begins within a few days of injury, typically peaks at 1-2 months, usually lasts 4 months in bone and may take six to more than 24 months to subside.

A recent histological study showed that selective alveolar decortication induced increased turnover of alveolar spongiosa (Sebaoun et al 2008).The surgery results in a substantial increase in alveolar demineralization. This will results in osteopenia. The osteopenia enables rapid tooth movement because teeth are supported by and moved through trabecular bone. As long as tooth movement continues, the RAP is prolonged. When RAP dissipates, the osteopenia disappears and radiographic image of normal spongiosa reappears. When orthodontic tooth movement is completed, an environment is created that favours alveolar re-mineralization. [8]

Alveolar augmentation with DFDBA/ xenograft(bovine bone) or alloplastic graft(bioactive glass) was described by wilcko et al to cover any fenestrations and dehiscences and increase the bony support for teeth with corticotomy assisted orthodontic tooth movements. The authors noticed that particles of xenograft were not fully incorporated at reentry. These graft materials; having the advantages of availability and no secondary surgery, are not comparable with autogenous bone graft, which facilitates bone integration. Literature has shown that only 37% of bone to graft contact was present for bovine bone xenograft after 6 to 7 months. Biopsies from DFDBA particles embedded in dense connective tissue with little to no new bone formation. Biopsies from bovine bone xenograft showed dead particles surrounded by connective tissue and only isolated sections showed host bone bovine contact with various degree of new bone formation. In a different study it was found that particulate DFDBA remained encapsulated in connective tissue when used for lateral ridge augmentation. [6]

In this case report, numerous corticotomy perforations were made in the cortical layer in the edentulous area between 35 to 37.The design of the selective decorticating was more to maximize the marrow penetration and bleeding than to create blocks of bone. The corticotomy cuts & perforations extended barely into the medullary bone. Care was taken not to sever the inferior alveolar nerve.

This study included only one patient, the conclusions are limited.

1. PAOO is an effective treatment approach to decrease treatment time and reduce the risk of root resorption.

2. Using a modified surgical approach and limiting the corticotomy to the buccal & labial aspects produced the RAP needed to significantly reduce treatment time.

3. The reduction of surgery time and patient discomfort are basic advantages to a modified surgical approach.

4 .More clinical researches are needed to determine the optimal amount of autogenous bone graft.

CONCLUSION:

The combined procedure of Corticotomy and Orthodontics is an effective treatment to decrease the treatment time and increase the quality of the treatment. The periodontist should choose appropriate corticotomy technique, according to the alveolar topography.

REFERENCES:

1. Shadw Mohammed Badr El-Din Aboui-Ela, Amr Ragab El-Beialy, Karim Mohamed Fawzy El-Sayed,Essam Mohamed Nassef Selim, Nagwa Helmy EL- Mangoury, Yehya Ahmed Mostafa Miniscrew implant – Supported maxillary canine retraction with and without Corticotomy- facilitated orthodontics.Am J Orthop.2011.139(2):252-259

2. Vig PS, Weintraub JA, Brown C, et al.The duration of orthodontic treatment with and without extractions: a pilot study of five selected practices.Am J Orthop.1990;97(1): 45-51

3. Kocadereli I. Changes in soft tissue profile after orthodontic treatment with or without extractions. Am J Orthop.2002;122(1): 67-72

4. Wilcko WM, Wilcko T, Bouquot JE, Ferguson DJ, et al.Rapid Orthodontics with Alveolar Reshaping: Two Case Reports of Decrowding. Int J Periodontal Restorative Dent.2001;21(1):9-19

5. Retain K. Biomechanical principles and reactions.In: Graber TM, Swain BF.Orthodontics: Current Priniciples and Techniques.St. Louis, MO: C.V. Mosby Company;1985:101-192

6. Nowzari H, Yorita FK, Chang HC.Periodontally Accelerated Osteogenic Orthodontics Combined with Autogenous Bone grafting:Compendium;2008:29(4):2-9

7. Bhat SG, Singh V, Bhat MK.PAOO technique for the bimaxillary protrusion : Perio-Ortho interrelationship: Journal of Indian Society of Periodontology.2012;16(4):584-587

8. Ali Saad Thafeed AlGhamdi.Corticotomy facilitated orthodontics: Review of a

technique:The Saudi Dental Journal.2010;22:1-5

9. Lynn.S .Surgical technique that shortens your time in braces.Wilcodontics Website

FIGURES:

Figure: 1 pre-operative

Figure: 2 Incisions placed in the buccal and lingual side

Figure: 3 Flap reflected (buccal & lingual)

Figure: 4 Perforations placed in edentulous space

Figure: 5 Multiple perforations placed

Figure: 6 Bone Graft mixed with saline

Figure: 7 Bone graft material placed

Figure: 8 Sutures placed