

PERIODONTIC- PROSTHODONTIC THERAPY

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ABSTRACT- Periodontally accelerated prosthodontic therapy is a clinical procedure that combines selective alveolar corticotomy, particulate bone grafting. This procedure is theoretically based on the bone healing pattern known as the regional acceleratory phenomenon (RAP). It results in an increase in alveolar bone width, shorter treatment time, increased post treatment stability, also with decreased amount of apical root resorption. Tooth movement can be enhanced further following up the cases completed with increased alveolar volume providing for a more intact periodontium, decreased need for extractions, degree of facial remodelling with increased bone support for teeth and overlying soft tissues, thereby augmenting gingival and facial esthetics.

KEYWORDS- Periodontics, corticotomy, prosthodontics

INTRODUCTION-

An increasing number of adult patients are seeking prosthodontic treatment. There are various biological, mechanical, technical and clinical differences between the prosthodontic treatment of children with more of adults. Elders have more specific objectives and concerns related to facial, dental management, their aesthetics, the methodology of prosthodontic treatment, the duration of treatment and the appliances to be used. In children, growth is a major significant factor. In addition, also the cell mobilisation, cell conversion of collagen fibers is much slower in adults than in children. Finally, treatment to adult prosthodontic management are more prone to periodontal complications since their teeth are confined in non-flexible alveolar bone.

These considerations make prosthodontic treatment of adults different and necessitate special and challenging concepts and methods and materials as in the minimal period of treatment, the use of lighter forces and more accurate tooth movements. The introduction of corticotomy-assisted prosthodontic treatment opened the doors and offered solutions to many limitations in the prosthodontic treatment of adults

The impacts of periodontal/implant health on prosthetic therapy

Prior to treatment plan, tooth prognosis should be addressed both on individual tooth and the overall dentition. Several periodontal prognostication systems have been introduced based on either periodontal stability¹ or certain parameters²⁻⁴, such as furcation involvement, tooth mobility, the severity of bony destruction, etc. After identifying the etiology and contributing factors of periodontal diseases, these prognostication systems indicate the possibility of tooth sustainability in short term and long term. As an integral portion of dental practice, determination of individual teeth prognosis allows a virtual approach on interdisciplinary conversation for treatment strategies. Overall prognosis is beneficial to communications between lay people and professionals.

Active periodontal/peri-implant diseases and contributing factors should be eliminated or controlled prior to prosthodontic constructions. The signs of active periodontal inflammation include pocket formation, the presence of bleeding on probing or suppuration, and tissue changes of gingiva. Without controlling the existing periodontal inflammation, a cascade of adverse events of periodontal destruction would take place and cause persistent inflammation, bone resorption and eventually tooth loss. In other words, function and lifespan of the prosthesis will be compromised if periodontal diseases remain uncontrolled after delivery. In addition, periodontal inflammation results in soft tissue changes in terms of texture, color, size and gingival consistency. It then leads to impaired esthetic outcomes by deteriorating the harmony between periodontium and prosthesis.

In addition to inflammation control, periodontists could offer a hand for soft and hard tissue management to prepare sites for successful prosthetic treatments. Surgical procedures, such as ridge and bone augmentation as well as sinus lifting, could be performed for future implant sites to correct existing ridge deformities. Although the effects of mucogingival defects

on periodontal/peri-implant inflammation remained inconclusive⁵⁻⁷, mucogingival procedures may also benefit esthetic outcomes and oral health maintenance.

Regular periodontal maintenance is a key to reduce the incidence of tooth or implant loss following prosthetic therapy. Due to limitation of routine home cares, regular professional maintenance therapy plays a key role on reduction of periodontal inflammation induced by plaque accumulation, especially in the subgingival space. For those patients who had history of periodontitis, regular supportive periodontal therapy is even more beneficial to prevent further disease progression. Previous studies showed that sites with treatment but without maintenance had a 2 times higher tooth loss than the sites with regular maintenance after periodontal treatment^{2,3}. A recent study even showed a 3 time higher tooth loss in the irregular compliers comparing with patients with regular maintenance over a 5-year observation period. Besides, the results also showed that the majority of these teeth were missing due to periodontal origins. In other words, regular compliance of periodontal maintenance is the key to prevent the recurrence of periodontal diseases and to maintain the integrity of treatment outcomes⁸.

The impacts of prosthetic factors on periodontal/ peri-implant health

Prostheses should be carefully designed and performed, in harmony with the surrounding periodontium, to maintain periodontal/ peri-implant health. Defective restorations contribute to disease progression by increasing accumulation of dental plaque and retention of food debris. Invasion of biologic width may also result in periodontal inflammation.

Timing of Prosthodontic Treatment

The few more specific complicated mucogingival procedures combined with the technique, and there is a lack of fixed prosthodontic appliances which may easily enable flap manipulation and suturing taking much lesser time than involved. After flap manipulation and repositioning of the flap, a quick and volumed amount of orthodontic force can be applied to the teeth and in all cases initiation of orthodontic force should not be delayed more than 2 weeks after surgery. A longer delay will result in fail for the full advantage of the limited time period that in the regional access has been occurring. The orthodontist has a certain particular amount of time to accomplish the accelerated tooth movement. That period is usually from 4 to 6 months, and after that the finishing movements occur with a normal range of speed.

INDICATIONS AND CLINICAL APPLICATIONS-

Several clinical applications for Periodontic- prosthodontic therapy have been reported. Corticotomy was used to facilitate orthodontic tooth movement and to overcome some shortcomings of conventional orthodontic treatment, with limited envelope of tooth movement and difficulty of producing movements in some specific modified directions. The general applications are included in the following:

1. Resolve crowding and shorten treatment time
2. Accelerate canine retraction after premolar extraction
3. Enhance post-orthodontic stability
4. Facilitate eruption of impacted teeth
5. Facilitate slow orthodontic expansion
6. Molar intrusion and open bite correction
7. Manipulation of anchorage

LIMITATIONS-

Patients with active periodontal disease or gingival recession are not good candidates for Prosthodontic therapy. In addition, This method should not be considered as an alternative for surgically assisted palatal expansion in the treatment of severe posterior teeth cross-bite. The therapy is also not indicated in cases where bimaxillary protrusion is accompanied with a gummy smile, which might be beneficial more from segmental osteotomy.

CONTRADICTIONS-

Although It is a very active technique, there are a few cases where it is not indicated.

- 1) Bone loss.
- 2) Periodontal ligament disease
- 3) Class-III malocclusion
- 4) Root damage

COMPLICATIONS AND SIDE-EFFECTS-

Although Periodontic- prosthodontic therapy may be considered a less-invasive procedure than osteotomy-assisted orthodontics there have still been several reports regarding adverse effects to the periodontium after corticotomy such as interdental bone loss and loss of attached gingiva, periodontal defects, Subcutaneous hematomas of the face and the neck, some post-operative swelling and pain is expected for several days.

ADVANTAGES-

The advantages of this technique are as follows,

- 1) Less time in brackets
- 2) Accelerated treatment time.
- 3) Less risk of post orthodontic gingival recession and subsequent cervical abrasion.

- 4) Greater post orthodontic stability and retention of the tooth.
- 5) Less risk of root reabsorption.
- 6) Less risk of an unfavourable crown to root grading.
- 7) Less furcation invasion
- 8) Less relapse

DISADVANTAGES-

The disadvantages of the technique are,

- 1) An expensive procedure
- 2) It is a mildly invasive surgical procedure, and it has its risks
- 3) Mild to moderate pain and insidious swelling, and most likely infection is seen
- 4) Not recommended in Class II malocclusion

TISSUE MODIFICATIONS-

Suggestive acceleration in prosthodontic tooth movement has been extensively reported following a combination of selective alveolar decortication and bone grafting surgery, with the material thereafter being responsible for the increased scope of tooth movement and the long-term improvement of the periodontium.

An alternative approach has been recently introduced by Park (20), consisting of incisions directly through the gingiva and bone using a combination of blades and a surgical mallet. While decreasing the surgical time (no flaps or sutures; only cortical incisions), this technique and method had not offered the benefits of bone grafting to increase periodontal support in the areas where expansive tooth movement was also desired. In addition to the extensive hammering in office to perform the cortical incisions appears to certain patients to be somewhat aggressive alternated.

Dibart (21) developed Piezocisio procedure combining microincisions, minimal piezoelectric osseous cuts to buccal cortex only and bone and soft tissue grafting concomitant with tunnel approach.

The therapy can be successfully combined with gingival augmentation procedures. This is particularly important to the adult patient who presents with significant gingival recession. In such methodical situations a sub-epithelial connective tissue graft is placed over the denuded root surface in addition to particulate graft installation. The graft is gathered by scrapping out a 1 to 2mm thickness of gingival connective tissue from the elevated palatal flap.

DISCUSSION-

The fact that the teeth can be moved more rapidly, thus resulting in shortened treatment times, is certainly advantageous to the patient's periodontal health because less time in fixed appliances reduces patient "burnout" and substantially reduces the time available for relatively benign commensal bacterial biofilms to assume qualitative changes and convert to a destructive cytotoxic potential often seen when fixed appliances have remained on the teeth for more than 2 to 3 years. The significance of the increase of the rate of tooth movement, however, pales in comparison to the fact that the teeth can be moved two to three times further than would be possible with traditional orthodontics alone, and that the cases can be completed with an increased alveolar bone volume. This increased alveolar volume can provide for a more intact periodontium, a decreased need for extractions, a degree of facial reshaping, and an increase in the bony support for both the teeth and the overlying and soft tissues.

The ability to increase the post treatment alveolar volume and cover vital root surfaces can result in the repair of preexisting alveolar dehiscences over root prominences and lessen the likelihood of new dehiscence formation, which can be a contributing factor to gingival recession.

CONCLUSION-

From an esthetic perspective the technique not only addresses tooth alignment, but also facial features and, as such, is truly in vivo tissue engineering. With a combination of both in-office periodontal surgery and prosthodontic treatment, we can now more routinely address the esthetics of the entire lower face. The technique requires the utilization of numerous modified diagnostic and treatment parameters, but once these are mastered the orthodontist has a powerful new treatment option to offer his or her patients. With the increasing number of adults considering orthodontic treatment, the propensity for adults and even some non growing adolescents for periodontal problems, the technique can be an especially attractive treatment option and be a "win-win" situation for the prosthodontist, the periodontist and the patient.

REFERENCES-

- 1) Kole H. Surgical operations on the alveolar ridge to correct occlusal abnormalities. *Oral Surg Oral Med Oral Pathol.* 1959; 12(5):515-529.
- 2) Wilcko WM, Wilcko T, Bouquot JE, et al. Rapid orthodontics with alveolar reshaping: two case reports of decrowding. *Int J Periodontics Restorative Dent.* 2001;21(1):9-19.
- 3) Gantes B, Rathbun E, Anholm M. Effects on the periodontium following corticotomy-facilitated orthodontics. Case reports. *J Periodontol.* 1990;61:234-8.
- 4) Wilcko WM, Ferguson DJ, Bouquot JE, et al. Rapid orthodontic decrowding with alveolar augmentation: case report *World J Orthod.* 2003;4:197-205.
- 5) Frost HM. The regional acceleratory phenomenon: a review. *Henry Ford Hosp Med J.* 1983;31(1):3-9.
- 6) Frost HM. The biology of fracture healing. An overview for clinicians. Part I. *ClinOrthopRelat Res.* 1989;(248):283-293.
- 7) Yaffe A, Fine N, Binderman I. Regional accelerated phenomenon in the mandible following mucoperiosteal flap surgery. *J Periodontol.* 1994;65:79-83.
- 8) Ferguson DJ, Wilcko WM, Wilcko MT. Selective alveolar decortication for rapid surgical-orthodontic resolution of skeletal malocclusion treatment. In: Bell WE, Guerrero C, editors. *Distraction Osteogenesis of the Facial Skeleton.* Decker, Hamilton, BC: 2006. pp. 199-203.
- 9) Frost HM : A 2003 update of bone physiology and Wolff's Law for clinicians: *Angle Orthod.* 2004 Feb;74(1):3-15
- 10) Shih MS, Norrdin RW. Regional acceleration of remodeling during healing of bone defects in beagles of various ages. *Bone.* 1985;6:377-9.
1. Kwok V, Caton JG. Commentary: prognosis revisited: a system for assigning periodontal prognosis. *J Periodontol* 2007; 78: 2063-71.
2. Becker W, Becker BE, et al. Periodontal treatment without main- tenance. A retrospective study in 44 patients. *J Periodontol* 1984; 55: 505-9.
3. Becker W, Berg L, et al. e long term evaluation of periodontal treatment and maintenance in 95 patients. *Int J Periodontics Restorative Dent* 1984; 4: 54-71.
4. McGuire MK, Nunn ME. Prognosis versus actual outcome. II. e e ectiveness of clinical parameters in developing an accurate prognosis. *J Periodontol* 1996; 67: 658-65.
5. Lang NP, Loe H. e relationship between the width of keratin- ized gingiva and gingival health. *J Periodontol* 1972; 43: 623-7.
6. Wennstrom J, Lindhe J. Plaque-induced gingival in ammation in the absence of a ached gingiva in dogs. *J ClinPeriodontol* 1983; 10: 266-76.
7. BouriAJr, Bissada N, et al. Width of keratinized gingiva and the health status of the supporting tissues around dental implants. *Int J Oral Maxillofac Implants* 2008; 23: 323-6.
8. Costa FO, Lages EJ, et al. Tooth loss in individuals under peri- odontal maintenance therapy: 5-year prospective study. *J Peri- odontal Res* 2014; 49: 121-8.
- 11) Goldie RS, King GJ. Root resorption and tooth movement in orthodontically treated, calcium-deficient, and lactating rats *Am J Orthod.* 1984;85(5):424-430.
- 12) wilcko MT, Wilcko WM, Marquez MG, et al: Chapter 4: The contributions of periodontics to orthodontic ther- apy, in Dibart S (ed): *Practical Advanced Periodontal Surgery.* Ames, IA, Wiley Blackwell, 2007:23
- 13) Liou E. Dental distraction. *Am J OrthodDentofacialOrthop* 1998;114:372.
- 14) Bill MT, Wilcko WM, Bissada NF. An evidence based analysis of periodontally accelerated orthodontic and osteogenic techniques: A synthesis of scientific perspectives. *SeminOrthod* 2008;14:305-16.
- 15) Mostafa YA, Mohamed SalahFayed M, Mehanni S, ElBokle NN, Heider AM. Comparison of corticotomy-facilitated vs standard tooth-movement techniques in dogs with miniscrews as anchorage units. *Am J OrthodDentofacialOrthop.* 2009 Oct;136(4):570-7
- 16) Iino S, Sakoda S, Ito G, Nishimori T, Ikeda T, Miyawaki S. Acceleration of orthodontic tooth movement by alveolar corticotomy in the dog. *Am J OrthodDentofacialOrthop.* 2007;131:448.e1-448.e8.

- 17) Sebaoun JD, Ferguson DJ, Wilcko MT, Wilcko WM. Alveolar osteotomy and rapid orthodontic treatments. *Orthod Fr.* 2007;78:217–25.
- 18) Sebaoun JD, Surmenian J. Piezocision: a minimally invasive, periodontally accelerated orthodontic tooth movement procedure. *CompendContinEduc Dent.* 2009;30:342–4.
- 19) Wang HL. Periodontic and orthodontic treatment in adults. *Am J OrthodDentofacialOrthop.* 2002;122:420–8.
- 20) Park HS, Kyung HM, Sung JH. A simple method of molar uprighting with micro-implant anchorage. *J ClinOrthod.* 2002;36:592–596.
- 21) Dibart S., Surmenian J., Sebaoun J.D., Montesani L. Rapid treatment of Class II malocclusion with piezocision: two case reports. *Int J Periodontics Restorative Dent.* 2010; 30(5):487-493.

