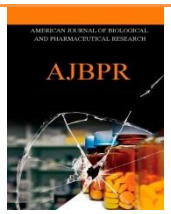
e-ISSN - 2348-2184
Print ISSN - 2348-2176

AMERICAN JOURNAL OF BIOLOGICAL AND PHARMACEUTICAL RESEARCH

Journal homepage: www.mcmed.us/journal/ajbpr



PERIODONTAL LIGAMENT THE CONNECTING LINK - A REVIEW

Khan Farah*[1], Agarwal Raghu Raghav[2], Archana Malviya[3], Chaudhary Umesh Chandra[4], Singh Parteek[2], Ahmad Naeem[5]

[1]PG student, Department of Prosthodontics, Kothiwal Dental College, Moradabad, Uttar Pradesh, India.
[2]PG student, Department of Periodontics, Kothiwal Dental College, Moradabad, Uttar Pradesh, India.
[3]PG student, Department of Prosthodontics, Chandra Dental College & Hospital, Lucknow, Uttar Pradesh, India.
[4]PG student, Department of Pedodontics, Chandra Dental College & Hospital, Lucknow, Uttar Pradesh, India.
[5]Senior Lecturer, Department of Prosthodontics, CPGIDS, Lucknow, Uttar Pradesh, India.

Article Info

Received 25/07/2015
Revised 30/07/2015
Accepted 07/08/2015

Key words: -Gingival, Periodontium, Furcation, Probing depth, Stem cells.

ABSTRACT

Dentistry has progressed from the times when a missing tooth was replaced by an animal tooth to the present when it is being replaced with an implant. We have moved into a new era in which dentistry can no longer be practiced in isolated specialty divisions to meet the overall needs of the patients. The team approach is replacing the individual approach resulting in more effective patient care. It has been shown that stem cell transplantation can regenerate periodontal tissue, and several clinical trials involving transplantation of stem cells into human patients have already begun or are in preparation. However, stem cell transplantation therapy is a new technology, and the events following transplantation are poorly understood. Several studies have reported side effects and potential risks associated with stem cell transplantation therapy. Hence the present article discusses the present and future of periodontal ligaments- the connecting link.

INTRODUCTION

The best way to serve patients for continued dental health is through early recognition and prevention. Here an attempt is made to bring about the various periodontal aspects to be considered in designing a prosthesis which may be called as "Periodontal Restorative Inter relationship". The periodontium is the attachment apparatus of the teeth and consists of cementum, periodontal ligament, alveolar bone and a portion of the gingival [1,2]. Gingiva is divided anatomically into marginal, attached and interdental areas. The attached gingiva extends from the mucogingival junction to the projection on the external surface of the bottom of the gingival sulcus. The width of the attached gingiva on the facial aspect differs in different areas of the mouth. It is generally greatest in the incisor region (3.5 to 4.5mm) and less in the posterior segments with the least width in the first premolar area 1.9mm. Mucogingival junction remains stationary throughout the adult life. Width of the attached gingiva increases with age and in supraerupted teeth. Keratinized gingiva includes both the attached gingiva as well as the marginal gingiva. Clinical gingival sulcus depth normally measures 2-3mm. Periodontal Ligament It is composed of collagen fibres arranged in bundles that are attached from the cementum of the tooth to the alveolar bone. In humans the width of the periodontal ligament ranges from 0.15 to 0.38mm. Occlusal loading in function affects the width of the periodontal ligament. If occlusal forces are within physiologic limits, increased function leads to increase in the width of the ligament [3].

Corresponding Author

Naeem Ahmad
Email:- naeem_bds@yahoo.co.in

In single rooted teeth, the axis of rotation is located in the area between the apical third and middle third of the root. In multirooted teeth, the axis of rotation is located in the bone between the roots. The ligament is narrowest in the region of axis of rotation. Due to physiologic mesial migration, the periodontal ligament is thinner on the mesial surface than on the distal surface [4].

Functions of Periodontal Ligament

Physical

- Resistance to impact occlusal forces.
- Transmission of occlusal forces to bone.
- Formative and remodeling function.
- Nutritional and sensory function.

Pathological deepening of gingival sulcus is termed as periodontal pocket. It is due to the direct extension of gingivitis into the alveolar bone [5].

Probing: The thinnest probe is desired that permits probing the depth of the pocket without patient discomfort. While probing the dentist must pay attention to the root anatomy. Local anesthesia is recommended when the bony contours are probed to establish whether surgery is necessary. This procedure is called Bone Sounding.

Mobility: It can be determined by holding the tooth between the handles of two metallic instruments or with one metallic instrument and one finger. An effort is made to move the tooth in all directions. Mobility is graded as:

Grade I – Barely distinguishable tooth movement.

Grade II – Any movement upto 1mm (Labiolingual or mesiodistal).

Grade III – Any movement more than 1mm or teeth that can be depressed or rotated in their sockets.

Trauma from occlusion: When the occlusal forces exceed the adaptive capacity of the tissues, tissue injury results. The resultant injury is termed trauma from occlusion.

Trauma from occlusion may be caused by altrations in occlusal forces or reduced capacity of the periodontium to withstand occlusal forces. When trauma from occlusion is the result of alterations in occlusal forces, it is called primary trauma from occlusion. When it results from reduced ability of the tissues to resist occlusal forces, it is known as secondary trauma from occlusion. Trauma from occlusion occurs in the supporting tissues and does not affect the gingiva.

The changes in TFO consists of a) increased width of periodontal ligament space, b) thickening of lamina dura along the lateral aspect of the root, c) vertical rather than horizontal destruction of interdental septum, d) root resorption, e) radiolucence and condensation of alveolar bone. Thus, in the absence of inflammation, the response to TFO is limited to adaptation to increased forces. In the presence of inflammation, the changes in the shape of the crest may be conducive to angular bone loss with infrabony pockets. Most common clinical sign of TFO is increased tooth mobility.

Radiographs: The radiograph is a valuable aid in the diagnosis, prognosis and evaluation of the treatment outcome of periodontal disease. The most useful technique in evaluating the tooth to bone relationship is the long cone technique. A film positioning holder should be used. The areas to be reviewed on the radiographs are [6]

1) Alveolar crest resorption.
2) Integrity and thickness of lamina dura.
3) Evidence of generalized horizontal bone loss.
4) Evidence of vertical bone loss.
5) Widened periodontal ligament space.
6) Density of the trabeculae of both the arches.
7) Size and shape of the roots compared to crown, to determine crown root ratio.

Occlusion and its effect on periodontium

The effect of occlusal forces on the periodontium is influenced by their severity, direction, duration and frequency. When severity increases, the periodontal fibers thicken and increase with the alveolar bone becoming denser. Changing the direction of occlusal forces changes the orientation of periodontal ligament fibres. The principal fibres of the periodontal ligament best accommodate occlusal forces along the long axis of the tooth. Lateral forces initiate bone resorption in areas of pressure and bone formation in areas of tension. Rotational forces cause tension and pressure on the periodontium and are most injurious forces.

Adequate attached keratinized tissue

To know the width of attached gingiva, one must first differentiate between attached and unattached gingiva. In the best of situations, the gingival sulcus will probe atleast 1mm so that this amount of keratinized tissue will be unattached. Next we encounter a millimeter of junctional epithelial cells, accounting for another millimeter of unattached gingiva. Thus inorder to provide atleast 1mm of attached gingiva in an ideal situation of a very shallow probing depth, atleast 3mm of keratinized tissue must be present. If more than 1mm of gingiva coincides with the sulcus depth, then an even greater amount of keratinized tissue is necessary.

Baumrind *et al* has given a method of placing the margins subgingivally with a collar of metal. First step is to prepare the tooth to the crest of the gingiva. Gingival retraction is obtained with a chord or electrosurgery. A diamond point with an angled tip of calibrated length is introduced to prepare the bevel. This instrument eliminates the sharp edge of the shoulder and the undercut which extends apically from the shoulder [7].

Classification of furcation involvement

Grade I – Incipient or early lesion. Radiographic changes not seen.
Grade II – Bone is destroyed on one or more aspects of the furcation, but a portion of alveolar bone and periodontal ligament remains intact, permitting only partial penetration of probe into the furcation.
Grade III – Interradicular bone is completely destroyed, but facial or lingual orifices of the furcation are occluded by gingival tissue.
Grade IV – Interradicular bone is completely destroyed and gingival tissue is also receded apically so that the furcation opening is clinically visible [8].

Pre-prosthetic periodontal surgery

Mucogingival surgery: Teeth with subgingival restorations and narrow zones of keratinized gingiva have higher gingival inflammation scores than teeth with similar restorations and wide-zones of attached gingiva. Coverage of denuded roots is also another objective of mucogingival surgery. Mucogingival surgery can also create some vestibular depth when it is lacking.
Techniques for increasing attached gingiva.

- Free gingival autografts.
- Apical displacement flap.

When there is a pocket formation, thick manageable pocket walls can be used for an apically displaced flap – this flap should be the first choice. When the pockets are absent and there is a need for increasing width of attached gingiva, free gingival graft is the technique of choice.

Implant supported restorations: The main principles that determine success or failure from a periodontal view point for an implant supported restoration are:

- Patient selection.
- Investing tissues.
- Force distribution

Investing tissues can be defined as including both hard and soft tissue. Both the bone height and width must be adequate for implant placement. In partially edentulous patients it has been observed that keratinized tissue around implants offer the greatest resistance to peri-implant infection.

CONCLUSION

In this paper, we have provided an overview of the state of periodontal regenerative therapy using stem cells. Many patients suffer from periodontitis, and clinicians have struggled to regenerate the lost alveolar bone. Stem cell therapy is a promising nascent therapy that may allow the regeneration of lost periodontal tissue. Although there are many issues that need to be resolved before stem cell therapies become common, clinicians should continue to keep a watchful eye on the progression.

REFERENCES

1. Sculean A, Berakdar M, Pahl S. (2001). Patterns of cytokeratin expression in monkey and human periodontium following regenerative and conventional periodontal surgery. *J Periodontal Res,* 36, 260-8.
2. Moxham BJ, Evans L. (1995). The effects of aging upon the connective tissues of the periodontal ligament. *Connect Tissue Res,* 33, 31-5.
3. Shimonishi M, Takahashi I, Terao F. (2010). Induction of MMP-2 at the interface between epithelial cells and fibroblasts from human periodontal ligament. *J Periodontal Res,* 45, 309-16.
4. Shimonishi M, Hatakeyama J, Sasano Y. (2008). Mutual induction of non-collagenous bone proteins at the interface between epithelial cells and fibroblasts from human periodontal ligament. *J Periodontal Res,* 43, 64-75.
5. Rincon JC, Young WG, Bartold PM. (2006). The epithelial cell rests of Malassez-a role in periodontal regeneration. *J Periodontal Res,* 41, 245-52.
6. Crumley J. (1964). Collagen formation in the normal and stressed periodontium. *J of Periodontology,* 2, 53-61.
7. Baumrind S, Buck D. (1970). Rate changes in cell replication and protein synthesis in the periodontal ligament incident to tooth movement. *Am. J. Orthod,* 57, 109-31.
8. Koumas H, Matthews L. (1969). Effect of pressure on the formation of collagen in the periodontal ligament. *Am. J. Orthod,* 56, 604-12.