

Splinting – A Healing Touch for an Ailing Periodontium

Mahijeet Singh Puri¹, Harpreet Singh Grover², Anil Gupta³, Naveet Puri⁴, Shailly Luthra⁵

ABSTRACT

Periodontal disease results in destruction of the attachment apparatus causing uneven distribution of occlusal forces resulting in additional damage to the alveolar bone. Occlusal adjustment, periodontal and restorative dentistry may alter occlusal relationship and redirect forces thereby reducing traumatism. This may result in teeth becoming firmer. Increasing the support of the tooth may also increase their firmness; the device used for such treatment is the Splint. Splinting teeth to each other allows weakened teeth to gain support from neighbouring ones. When used to connect periodontally compromised teeth, splinting can increase patient comfort during chewing

Keywords: Occlusal Trauma, Tooth Mobility, Splints

¹MDS (Periodontics)
Professor
Laxmibai Dental College
Patiala, Punjab, INDIA.

²MDS (Periodontics)
Professor and Head
Department of Periodontics & Oral Implantology
SGT Dental College, Hospital & Research Institute
Gurgaon, Haryana, INDIA

³MDS (Pedodontics)
Professor and Head
Department of Pedodontics
IDST Dental College and Hospital
Modinagar, UttarPradesh, INDIA

⁴MDS (Orthodontics)
Reader
Laxmibai Dental College
Patiala, Punjab, INDIA

⁵Post Graduate Student
Department of Periodontics & Oral Implantology
SGT Dental College, Hospital & Research Institute
Gurgaon, Haryana, INDIA

INTRODUCTION

Periodontal disease results in destruction of the attachment apparatus causing uneven distribution of occlusal forces resulting in additional damage to the alveolar bone.

Occlusal adjustment, periodontal and restorative dentistry may alter occlusal relationship and redirect forces thereby reducing traumatism. This may result in teeth becoming firmer. Increasing the support of the tooth may also increase their firmness; the device used for such treatment is the Splint.

Definition: A splint has been defined as any apparatus, appliance, or device employed to prevent motion or displacement of fractured or movable parts.

- **The Glossary of Prosthodontic terms defines Splinting as:** A rigid or flexible device that maintains in position a displaced or movable part; also used to keep in place and protect an injured part (1).
- **A second definition of splint used in this same glossary is:** A rigid or flexible material used to protect, immobilize or resist motion in a part (1).
- **According to Glossary of**

Periodontic terms it is: An appliance designed to stabilize mobile teeth (2).

HISTORY OF VARIOUS FORMS OF SPLINTING

The first documented splinting of teeth for the treatment of jaw bone fractures took place in Egypt in the 16th century B.C. (3,4). Hippocrates, (born 460 B.C.) used the occlusal relationship of the teeth to assessment mandibular deviations and used gold wires and linen threads to splint teeth (3,5). Intermaxillary fixation (IMF) used for the immobilization of jaw bone fractures was first described in a handwritten manuscript in the 14th century A.D. but was forgotten until its revival at the end of the 19th century (4).

CORRELATION BETWEEN TOOTH MOBILITY AND OCCLUSION REHABILITATION

Occlusal trauma is described as trauma to the periodontium from functional or parafunctional forces causing damage to the attachment apparatus of the periodontium by exceeding its adaptive and reparative capacities (6).

Generally, two forms of occlusal trauma are recognized:

Contact Author

Dr. Shailly Luthra
shaillyluthra@gmail.com

J Oral Health Comm Dent 2012;6(3)145-148

- **Primary occlusal trauma:** A condition in which the pathologic occlusal forces are considered the principal aetiology for observed changes in the periodontium (7).
- **Secondary occlusal trauma** occurs when the periodontium is already compromised by inflammation and bone loss (7). Consequently, occlusal forces which might otherwise be well tolerated in a healthy periodontium now have deleterious effects because of pre-existing periodontal disease. Teeth with a reduced adaptive capacity and compromised periodontium may then migrate when subjected to certain occlusal forces.

Factors such as the frequency, duration, and rate of these occlusal forces, not just their magnitude, may be of greater significance in the development of tooth hypermobility. This mobility is a common clinical sign of occlusal trauma (8).

Other factors that contribute to tooth mobility include:

- The number and distribution of the remaining teeth in the arch.
- The number of roots, root form, root proximity, amount of inter-radicular bone, and a history of root amputation

INCREASED TOOTH MOBILITY VERSUS INCREASING TOOTH MOBILITY (9)

Two clinical features should be considered to appreciate the relationship between occlusal trauma and tooth mobility:

Increased Tooth Mobility

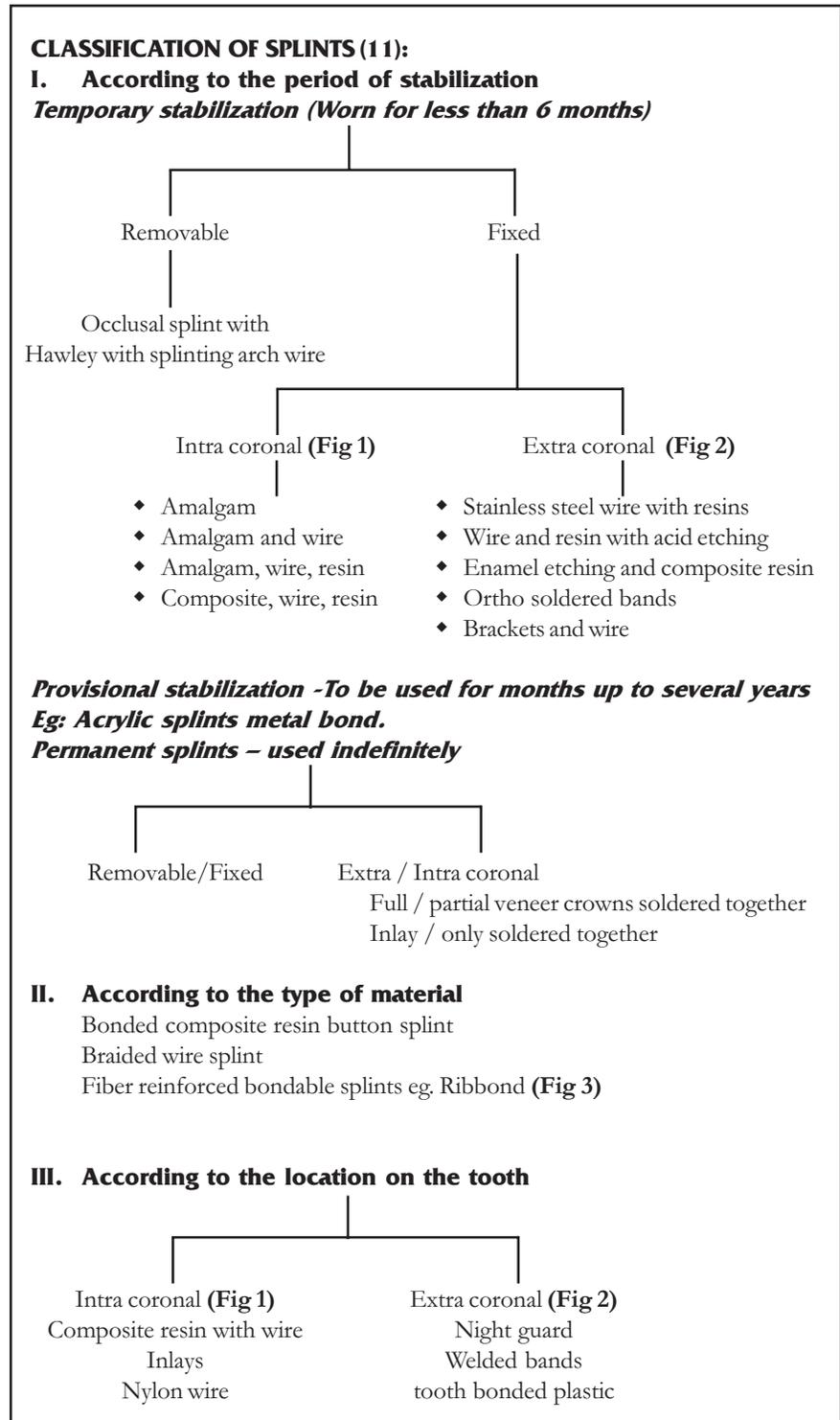
This is the adaptive process of the periodontium to occlusal forces that may not necessarily be considered pathologic. In the absence of inflammation, mobile teeth with a complete and healthy connective tissue attachment can be maintained. The radiographic appearance of a widened periodontal ligament (PDL) space coupled with a clinical diagnosis of increased tooth mobility may simply be the manifestations of adaptive changes to increased functional demand (8).

Removal of the excess occlusal load through equilibration balancing of occlu-

sal stresses, producing simultaneous tooth contacts, or harmonizing cuspal relations may be all that is needed to reverse this hypermobility and conventional splint therapy can decrease and, often times, eliminate tooth mobility.

INCREASING TOOTH MOBILITY

This clinical condition is best managed by treating any localized inflammation, performing an occlusal equilibration, and stabilizing or splinting the affected mobile teeth (10).



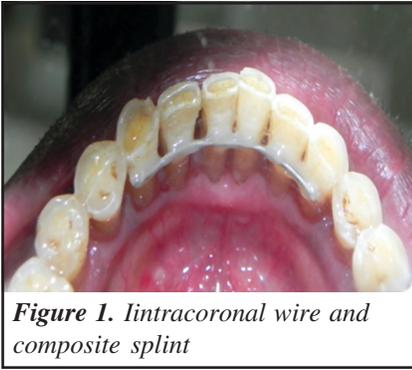


Figure 1. Intracoronary wire and composite splint

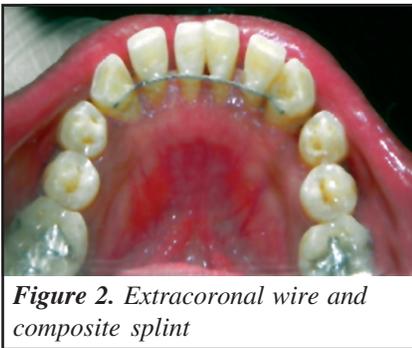


Figure 2. Extracoronary wire and composite splint

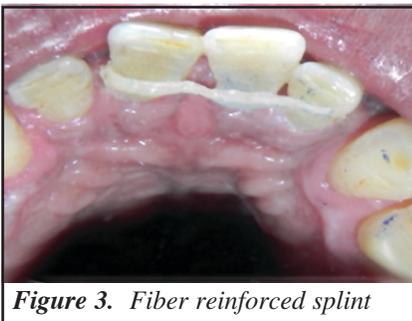


Figure 3. Fiber reinforced splint

Therefore, patients diagnosed with increased tooth mobility may need only an occlusal equilibration and, perhaps, conventional splint therapy. While those who are diagnosed with increasing tooth mobility must first receive periodontal therapy. Treatment should include an occlusal analysis and equilibration, followed by a re-evaluation for extraction or splinting of the affected teeth.

OBJECTIVES OF SPLINTING (11)

- **To provide rest:** Occlusal rest provided by splint therapy of one form or another helps eliminate or neutralize some adverse occlusal factors.
- **For redirection of forces:** The forces of occlusion are redirected in a more axial direction over all the teeth included in the splint.

- **For redistribution of forces:** Stabilization by splinting increases resistance to applied force. Thus the redistribution of forces ensures that forces do not exceed the adaptive capacity.
- **To preserve arch integrity:** Splinting restores proximal contacts, reducing food impaction and consequent breakdown.
- **Restoration of functional stability:** Splinting restores a functional occlusion, stabilizes mobile abutment teeth and increases masticatory comfort.
- **Psychological well-being:** Splinting gives the patient comfort from mobile teeth thereby giving him a sense of well-being.
- **To stabilize mobile teeth during surgical therapy:** especially regenerative therapy.
- **To prevent the supraeruption of unopposed teeth.**

INDICATIONS OF SPLINTING

The most complete literature review on tooth stabilization was by Lemmerman in 1976. He reviewed 94 articles and concluded that tooth stabilization was indicated (12):

- To stabilize moderate to advanced tooth mobility that cannot be reduced by other means that has not responded to occlusal adjustment and periodontal therapy.
- Stabilize teeth in secondary occlusal trauma.
- Stabilize teeth after orthodontic movement.
- Stabilize teeth with increased tooth mobility, which interfere with normal masticatory function.
- Stabilize teeth after acute dental trauma i.e., subluxation, avulsion etc.
- Facilitates scaling and surgical procedures.
- Prevent tipping and drifting of teeth.
- Prevent extrusion of unopposed teeth.

CONTRAINDICATIONS

Splinting teeth is not recommended if occlusal stability and optimal periodontal conditions cannot be attained (13). Any tooth mobility present before treatment must be reduced by means of occlusal equi-

libration combined with periodontal therapy; otherwise if the involved tooth does not respond, it must be extracted prior to continuing from provisional restorations to definitive treatment (13).

QUALITIES FOR AN IDEAL SPLINT(14)

- It should be simple, Economical, Stable and efficient
- Non irritating, Non interfering with treatment
- Esthetically acceptable, Biologically compatible
- Should not provoke iatrogenic disease
- Should not cause entrapment of food
- Should not impair phonetics (speech)
- Protect the gingiva from food impaction
- Rigid and durable

PRINCIPLES OF SPLINTING

The main objective of splinting is decreasing tooth movement three-dimensionally. This can be achieved by the proper placement of a cross-arch splint. On the other hand, unilateral splints that do not cross the midline tend to permit the affected teeth to rotate in a facio-lingual direction about a mesio-distal linear axis.

To achieve success by splinting the center of rotation of the affected teeth must be located in the remaining supporting bone thus; the affected teeth are able to resist tooth movement. Otherwise, the prognosis for any splint will be unfavourable if the occlusal or masticatory forces exceed the resistance provided by the splinted teeth(15).

Hence, the ideal splint should reorient and redirect all occlusal and functional forces along the long axis of teeth, prevent tooth migration and extrusion, and stabilize periodontally weakened teeth (16).

EFFECTS OF SPLINTING

The stabilizing effects of splint are transient. Studies by Renggli HH (17) investigating mobility of posterior teeth found that after scaling and root planning, occlusal adjustment, and oral hygiene education, stated that there was no significant differ-

ence in mobility between splinted and non-splinted teeth. More mobile teeth received no significant benefit from splinting when compared with less mobile teeth. Galler and colleagues (18) showed that splinting had little effect on tooth mobility after osseous surgery.

In patients carefully selected for their exemplary oral hygiene standards and dedication to the maintenance of their dentitions, Nyman and Lang demonstrated long-term stability and maintenance of splinted dentitions that had greater than 50% attachment loss of each abutment tooth although Ante's law was not satisfied, in the absence of inflammation, severely periodontally compromised dentitions could be maintained for extended period of time, in some cases more than 20 years(19).

In a study by Kleinfelder and Ludwig they concluded that reduced periodontal tissue support does not seem to limit bite force with maximal strength in natural dentitions as measured by a device that opens the bite by 4 mm. Furthermore, maximal biting forces at 4 mm mouth opening are increased when molar teeth are included in a posterior splint (20).

CONCLUSION

Tooth splinting proves to be beneficial in several clinical situations but, the overall objective is to create an environment where

tooth movement can be contained within physiologic limits while restoring function and patient comfort. Splinting teeth to each other allows weakened teeth to gain support from neighbouring ones. When used to connect periodontally compromised teeth, splinting can increase patient comfort during chewing. However, splinting makes oral hygiene procedures difficult. Therefore, to ensure the longevity of the connected teeth, special attention must be given to instructing the patient about enhanced measures for oral hygiene after placement of the splint.

REFERENCES

1. The Glossary of Prosthodontic Terms. 7th Edition. *The Journal of Prosthetic Dentistry* 1999.
2. The Glossary of Periodontal Terms, 4th Edition, The American Academy of Periodontology 2001.
3. Oikarinen K. Tooth splinting: a review of the literature and consideration of the versatility of a wire-composite splint. *Endod Dent Traumatol* 1990;6:237-50.
4. Hoffmann-Axtehl W. The treatment of maxillofacial fractures and dislocations, in historical perspective. In: Kruger E, Schilili W, Oral and Maxillofacial Traumatology. Berlin: Quintessenz, 1982;1:17-40.
5. Gahhos F, Ariyan S. Facial fractures: Hippocratic management. *Head Neck Surg* 1984;6:1007-13.
6. Gher ME. Non-surgical pocket therapy: Dental Occlusion. *Ann Periodontol* 1996;1:567-80.
7. Carranza FA, Newman, MG. Clinical Periodontology 1996, Eighth edition, 314-315.
8. Serio FG, Hawley CE. Periodontal Trauma and Mobility. Diagnosis and treatment planning. *Dent Clin North Am* 1999;43:37-44.
9. Bernal G, Carvajal JC, Muñoz-Viveros CA. Clinical management of mobile teeth. *J Contemp Dent Pract* 2002;4:10-22.
10. Giarga M, Lindhe J. Tooth Mobility and Periodontal Disease. *J Clin Periodontol* 1997;24:785-95.
11. Reddy S. Essentials of clinical periodontology and periodontics, 2nd edition, New Delhi, Jaypee Brothers, 2008:378-80.
12. Lemmerman K. Rationale for stabilization. *J Periodontol* 1976;47:405-11.
13. Siegel SC, Driscoll CF, Feldman S. Tooth stabilization and splinting before and after periodontal therapy with fixed partial dentures. *Dent Clin North Am* 1999;43:45-76.
14. Baruch H, Ehrlich J, Yaffe A. Splinting—a review of the literature Refuat Hapeh Vehashinayim 2001;18:29-40.
15. Malone W, Koth D. Theory and Practice of Fixed Prosthodontics. 8th Edition. Pg:71-87.
16. Ferencz J. Splinting. *Dent Clin North Am* 1987;31:383-93.
17. Renggli HH, Schweizer H. Splinting of teeth with removable bridges - biological effects. *J Clin Periodontol* 1974;1:143-46.
18. Galler C, Selipsky H, Phillips C, Ammons WF Jr. The effect of splinting on tooth mobility. (2) After osseous surgery. *J Clin Periodontol* 1979;6:317-33.
19. Nyman SR, Lang NP. Tooth mobility and the biological rationale for splinting teeth. *Periodontol* 2000 1994;4:15-22.
20. Kleinfelder JW, Ludwig K. Maximal bite force in patients with reduced periodontal tissue support with and without splinting. *J Periodontol* 2002;73:1184-87.