

Management of Mobile Teeth : An Express Alternative

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Abstract

Mobile teeth have been an eternal problem and their management by splinting them has been one of the earliest known examples of dental intervention and perhaps their most preferred line of treatment for centuries. Splinting mobile teeth is advocated to restore function and comfort by establishing a stable occlusion that promotes tooth retention and the maintenance of periodontal health. This article discusses the management of mobile teeth by direct resin fixation using 4-META/MMA-TBB self-cure dental adhesive resin cement accompanied by a case report. The direct resin fixation technique using the above resin cement was found to be relatively much easier compared to other traditional techniques for splinting and offers high biocompatibility, good bond strength, aesthetic results and instant stability far superior to most other periodontal splint materials available in the market today.

Introduction

Mobile teeth have been an eternal problem and their management by splinting them has been one of the earliest known examples of dental intervention and perhaps their most preferred line of treatment for centuries. The excavations of Egyptian remains at Gizeh in the early 1900s included what could be one of the earliest known dental prostheses, a wire ligature around the cervical margins of lower left second and third molar teeth, dated at around 2500 BC, calculus around both the teeth and wire indicated that the appliance had been placed on a living patient.¹ The Glossary of Prosthodontic Terms defines splinting as "...the joining of two or more teeth into a rigid unit by means of fixed or removable restorations or devices."² Splinting the crowns of two or more teeth ensures that their relative movement is restricted and the forces applied to one of the splinted teeth are transmitted to the root systems of all the linked teeth.³

Excessive tooth mobility can contribute to discomfort while eating with decreased masticatory and occlusal function.^{4,5} Fleszar in 1980 found that decreased mobility did in fact improve the response of affected teeth to periodontal therapy.⁵ Nyman et al⁶

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 periods of time, in some cases more than 20 years.^{7,8} However, the lack of correlation between mobility or occlusal trauma and periodontal disease/ healing has also been demonstrated by many authors.⁹⁻¹³ Provisional splints can therefore provide us with valuable insight into whether or not stabilization of the teeth would provide any benefit before any irreversible definitive treatment is initiated.¹⁴

Classification of Splints: Types of Splints

I. Based on the desired duration of use splints can be classified as either removable or fixed.¹⁵

i. Removable Splints are simple to use, reversible and inexpensive. These include vacuum-formed splints, hard acrylic occlusal splints, removable orthodontic retainers.

ii. Fixed Splints are permanent or semi permanent in nature. They can be fabricated chairside like wire splints or could be laboratory fabricated offering a more long-term solution to the chairside fabricated splints.

a. Chairside fabricated Composite/Acrylic and Wire Splints are fabricated using a direct technique and are generally reversible, stable and aesthetic. The operative techniques for making this type of splint have been widely described and there are many variations.¹⁶⁻¹⁹

b. Laboratory fabricated Resin-Bonded Splints were originally described as perforated resin-bonded splints by Rochette in 1973.²⁰ Today, a non-perforated framework is recommended for use with modern Bis-GMA (e.g. Panavia 21) or 4-META cements (e.g. Superbond C&B).

II. Classification based on the durability of the appliance or the intended use they can be classified as Provisional or Definitive.²⁴

i. Provisional splints are meant to absorb

occlusal forces and stabilize the teeth for a limited amount of time. They can be useful adjuncts to many different types of treatments.²⁵ Provisional splints can either be placed externally or internally. External splints are generally fabricated using ligature wires, nightguards, interim fixed prostheses, and composite resin restorative materials. Internal splints, on the other hand, are fabricated using composite resin restorative material with or without wire or fibre inserts or directly by using 4-META/MMA-TBB adhesive system.

ii. Definitive Splints are placed only after the completion of periodontal therapy and once occlusal stability has been achieved. They are placed in order to eliminate or prevent occlusal trauma, increase functional stability, and esthetics on a long-term basis. Such treatment includes conventional fixed prostheses because they provide definitive rigidity and are better able to control and direct occlusal forces.

Splinting of Mobile Teeth using 4-META/MMA-TBB Adhesive System

In cases of hyper mobile teeth where stabilization by fixed splinting is the desired line of treatment, even impression taking can be a challenge. Temporary splinting of teeth and use of a low-viscosity impression material along with blocking out of interdental spacing with soft wax to prevent impression material engaging deep undercuts is advocated to overcome the risk of accidental/undesirable removal of teeth and facilitate easy removal of the impression. Traditionally composite resin, acrylic or impression compound have been used as temporary splinting materials,¹⁵ 4-META/MMA-TBB adhesive system offers a good alternative.

4-META/MMA-TBB adhesive system, a self-cure dental adhesive resin cement based on acrylic resin technology employs "4-META" (4-methacryloxyethyl trimellitate anhydride) as a diffusion promoter and "TBB" (tri-butylborane) as a polymerization initiator. Although 4-META/MMA-TBB dental adhesive system was recently launched in India, (Super-Bond C&B by Sun Medical

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Co. Ltd) it was introduced in Japan as early as 1983 for general dental adhesive use. Over the years it has established its credibility as a biocompatible dental adhesive resin cement with good bond strength.

This system offers some unique advantages over the traditional techniques for splinting as enumerated below:

1. Easy placement
2. Esthetically satisfactory appearance
3. Highly Biocompatibility
4. High bond strength
5. Fracture and chipping are easily repairable using the brush-dip technique
6. Express Splinting

Case Report

Case RA, a 54 year old male patient reported with missing lower right lateral incisor and chief complaint of excessively mobile lower anterior teeth. On examination there was grade II mobility of the mandibular incisors. There was loss of attachment and alveolar bone loss along with recession in mandibular incisors. Scaling and root planing (SRP) was done. The patient was motivated and educated, and oral hygiene instructions were given. Patient was called on recall visits to assess his oral hygiene and periodontal status and three weeks after SRP a decision was made to splint the involved teeth.

Armamentarium

- 1) Gingival Dam
- 2) Oil-free, fluoride-free pumice
- 3) Polishing Brush
- 4) Super-Bond C&B Kit
 - a) Contents of the kit
 - b) Monomer
 - c) Catalyst S
 - d) Polymer (L-Type Clear)
 - e) Red Activator
 - f) Dispensing Dish
 - g) Sponge(L S)
 - h) Measuring Spoon (Standard)
 - i) Measuring Spoon (Small)
 - j) Brush Handle (Bent)
 - k) Brush Tips (White L) for Brush-dip
 - l) Brush Tips (White S) for Brush-dip

Steps in Splint Placement

1. Surface Preparation

a) Prophylaxis of the teeth (Fig. 1a & b)

The teeth surfaces were cleaned and polished to remove plaque, calculus and biofilm, to achieve the best bond strength. Contaminants and stains were removed using a polishing brush and oil-free, fluoride-free pumice. The teeth were thoroughly rinsed and dried.



Fig. 1a: Before Scaling & Root Planing



Fig. 1b: After Scaling & Root Planing
b) Surface Treatment

After cleaning and polishing, red activator was applied for about 30 seconds using a sponge pledget to treat the tooth surfaces and rinsed off (Figure 2). Activator must be applied for an optimal time. If applied for a shorter duration, the tooth surface will not be adequately modified whereas if the application time is too long, the tooth surface may so severely be modified that it becomes brittle or so deeply demineralized that the 4-META/MMA-TBB monomers cannot penetrate completely through the demineralized dentin. After treatment, the activator must be thoroughly rinsed off.



Fig. 2: Surface treatment

c) Isolation of the Treated Tooth Surfaces

After the appropriate treatment of the adhesive surface, it is important to keep the surface dry. Contamination may occur by saliva, blood, water, oil, or humid breath hence isolation by rubber dam or cotton roll is recommended. In certain cases of hypermobile teeth, placing a rubber dam may be difficult, gingival dam is recommended as an alternative in such cases to avoid contact of adhesive monomer and polymer with the oral soft tissue and avoid flow of adhesive onto adjacent surfaces that are not intended to be bonded.

2. Handling of 4-META/MMA-TBB Adhesive System

Selection of Application Techniques :

Super-Bond C&B can be applied in two ways; one method is the brush-dip technique and the other is the bulk-mix technique.

The brush-dip technique is ideal for successive applications on comparatively small areas, hence the technique of choice for splinting of mobile teeth and the technique used. The brush-dip operation can be repeated for about 5 minutes as long as the activated liquid remains active offering better control and accurate application of the adhesive at the desired inter dental contact points, during the splinting procedure. As the powder/liquid ratio is higher in the brush dip technique than that of bulk-mix technique, the working time of mixed ball is comparatively short and the

curing is faster than in a bulk-mix technique. The curing time in the brush-dip technique is claimed to be 5 to 6 minutes at 37°C²⁶.

Step By Step Procedure

Dispensing the Polymer: Using a clean dispensing dish an appropriate amount of polymer powder was dispensed into the well "P" of the dispensing dish.

Caution: Fresh polymer powder should be dispensed from the jar each time. Do not use old powder left over from other procedures. Do not return leftover powder to the jar, because it may have been contaminated by the activated liquid.

Preparation of the Activated Liquid:

Holding the monomer bottle vertical appropriate number of drops (4drops) were added into the well "L" of the dispensing dish following which the catalyst syringe was held vertical, and 1 drop of monomer was dropped to the same well. The standard ratio of Monomer/ Catalyst S is 4 to 1 or 8 to 1. This mixture was stirred lightly with a brush and this mixture was called "Activated Liquid"

Caution: The mixed Activated Liquid reacts with oxygen, gradually decreasing its activity. The activated liquid should be used quickly, at the latest within 5 min after mixing. If more Activated Liquid is needed, the remaining liquid should be wiped out of the dish, and a fresh mix prepared.

Application of the Activated Liquid

(Fig. 3) In order to attain the highest possible bond strength, dental adhesive must intimately contact all surfaces to be bonded, one coat of the activated liquid (the mixture of the Monomer and Catalyst S) on the tooth surface prior to the application of Super-Bond C&B improves the bond strength. This technique is especially important while splinting using the brush dip technique.



Fig. 3: Application of activated liquid

Brush-dip Procedure: Brush Tip (White) was dipped into the activated Liquid in the well "L". Excessive liquid by was eliminated by touching the brush tip to the edge of the well. While repeating the procedure, it is important to clean up the brush with gauze before it is dipped into the well.

Forming the Ball: Brush is touched to the polymer powder in the well "P". A small ball of powder was picked up on the wet tip of the brush.

Applying the ball The powder ball was brushed onto the pre wet surface of the interdental contact points of mobile teeth being bonded. As soon as the brush touched the desired tooth surface, the powder spread out to create a creamy, homogeneous layer (Fig.4). The procedure was repeated until the

desired surfaces were covered with the cement. After each application, a gauze was used to clean the resin off the brush before dipping it into the liquid again.



Fig. 4: Application of adhesive resin cement using the brush-dip technique

Caution: The brush with the pointed end Brush Tips (White) should be used in the brush-dip technique and these brushes are for onetime use only.

Any adjacent surfaces not intended to be bonded should be protected. Any excess resin should be removed before it sets. After the procedure is completed it is important that the splinted teeth be held immobile till the curing reaction is complete.



Fig. 5 : Post Splint Placement

As the teeth were hyper mobile, the above splint was supplemented with reinforcement using a composite resin retained metallic mesh lingual splint (Fig. 6b). The patient had a missing lower right lateral incisor that needed to be replaced; a resin tooth was bonded using the brush-dip technique, utilizing the Clear Polymer powder (Superbond C & B) for esthetics. The proximal surface of the adjacent teeth was treated with the Red Activator washed and dried. Care was taken that the surface does not become contaminated with breath, saliva, blood, etc. The resin tooth was then bonded in order to enlarge the surfaces to be bonded and the surfaces of the resin tooth that were to be bonded were roughened using abrasive points

and vertical and horizontal grooves were made. The resin tooth was then bonded using the brush-dip technique, utilizing the Clear Polymer powder for esthetics (Fig. 6a).Care was taken not to move the bonded tooth before the cement had cured completely.

Discussion

Long term maintenance of periodontally compromised teeth in which infection control has been achieved and active disease has been eliminated is now a sought after goal of periodontal therapy. In the past few decades, there has been tremendous advancement in the techniques used to splint teeth. With the development of newer materials and more technically sensitive procedures for splinting, more predictable and stable results can now be attained. Direct resin fixation using 4-META/MMA-TBB adhesive system (Super-Bond C&B's brush dip technique) is relatively much easier compared to other traditional techniques for splinting and works well because of the resin's high bond strength and aesthetically satisfactory appearance.



Fig. 6a : Post resin tooth bonding



Fig. 6b : Composite resin retained metallic mesh lingual splint was bonded to supplement the Superbond C & B adhesive splint.

Conclusion

The 4-META/MMA-TBB is a new generation self-curing dental adhesive resin cement based on acrylic resin technology. It offers easy placement, high biocompatibility

with good bond strength, aesthetic results and instant stability, far superior to most other periodontal splint materials available in the market today.

References

- Weinberger BW. An Introduction to the History of Dentistry, Vol.1. St. Louis: C.V. Mosby, 1948; p.75.
- The Glossary of Prosthodontic Terms. 7th Edition. The Journal of Prosthetic Dentistry, January 1999.
- Smith BJ, Setchell D. In: Rowe, AHR, ed. Companion to Dental Studies Vol.3: Clinical Dentistry. Oxford: Blackwell Scientific Publications, 1986; pp.519529.
- Smukler H, Lemmer S. A rationale for the stabilization of mobile teeth in advanced periodontal disease. J Dent Assoc S Afr 30:543-546, 1980.
- Fleszar TJ, Knowles JW, Morrison EC, Burgert FG, Nissle RR, Ramfjord SP. Tooth mobility and periodontal therapy. J Clin Periodontol 1980; 7: 495-505.
- Nyman S, Lindhe J. Persistent tooth hypermobility following completion of periodontal treatment. J Clin Periodontol 1976; 3: 81-93.
- Hirschfeld L, Wasserman B. A Long term survey of tooth loss in 600 treated periodontal patients. J Periodontol 1978; 49: 225-237.
- Pollack RP. An analysis of periodontal therapy for the 65-year-old and older patient. Gerodontology 1986; 2:1 3 5 - 1 3 7.
- Ericsson I, Lindhe J. Lack of significance of increased tooth mobility in experimental periodontitis. J Periodontol 1984; 55: 447-452.
- Bhaskar SN, Orban B. Experimental occlusal trauma. J Periodontol 1955; 26: 270284.
- Glickman I. Inflammation and trauma from occlusion, co-destructive factors in chronic periodontal disease. J Periodontol 1963; 34: 510.
- Glickman I, Smulow JB, Vogel G, Passamoti G. The effect of occlusal forces on healing following mucogingival surgery. J Periodontol 1966; 37: 319325.
- Lindhe J, Ericsson I. The influence of trauma from occlusion on reduced but healthy periodontal tissues in dogs. J Clin Periodontol 1976; 3: 110122.
- Bernal G, Carvajal JC, Muñoz-Viveros CA. Clinical management of mobile teeth. J Contemp Dent Pract 2002 November;(3)4:010-022 .
- Sophie J. Watkins and Kenneth W. Hemmings Dent Update 2000; 27: 278-285.
- Clark JW, Weatherford TW, Mand WV. Wire ligature Acrylic splint. J Periodontol 1969; 40: 371375.
- Klassman B, Zucker HW. Combination wire composite resin intracoronary splinting: Rationale and technique. J Periodontol 1976; 47(8): 481486.
- Polson AM, Billen J. Temporary splinting using ultraviolet-light-polymerised bonding materials. J Am Dent Assoc 1974; 89: 11371141.
- Saravanamuttu R. Post-orthodontic splinting of periodontally involved teeth. Br J Orthodont 1990; 17: 2932.
- Rochette AL. Attachment of a splint to enamel of lower anterior teeth. J Prosthet Dent 1973; 30: 418423.
- Simonsen R, Thompson V, Barrack G. Etched Cast Restorations. Clinical and Laboratory Techniques. Chicago: Quintessence, 1983.
- Tay WM. Classification and assessment of composite retained bridges. Restor Dent 1986; 2: 1518.
- Tay WM. Resin bonded bridges. 1. Materials and methods. Dent Update 1988; 15: 1014.
- Ferezic J. Splinting. Dent Clin North Am. 1987 Jul;31(3):383-93.
- Chacker FM, Serota BH. Provisional Periodontal Prosthesis. Periodontics. 1966 Sep-Oct; 4(5):265-72.
- Super-Bond C & B: Products and practical information Vol 2.1.

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