

# Long Term Interim Fixed Partial Denture Using 4-META as Bonding Agent-A Case Report

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## Abstract

Super-Bond C&B™ (4- methacryloxyethyl trimellitate anhydride and tri-n-butylborane) is being used extensively in all fields of dentistry today with a wide range of clinical applications . It offers advantages of immediate replacement of teeth along with strong adhesion which can adequately resist different functional stresses generated in the oral cavity .The present case report demonstrates the use of this adhesive cement in the field of fixed prosthodontics as a long term interim prosthesis to bond an acrylic tooth with the adjacent teeth in case of lack of proper abutment support.

**Keywords :** adhesive resin system, periodontal health, interim fixed prosthesis , Super-bond ( 4 META-TBB )

## Introduction

**D**irect bonded fixed partial denture prosthesis can be used for an interim period until the definitive prosthesis is planned. This incorporates the use of an acrylic or composite pontic which is mostly used in cases where an anterior tooth is missing and replacement is essential in a limited period of time considering the esthetics of the patient.<sup>1</sup>

Super-bond C&B™ is a self-curing adhesive resin cement using 4-META (4-methacryloxyethyl trimellitate anhydride as a diffusion promoter and TBB (tri -n-butylborane) as a polymerization initiator. TBB also contributes to post polymerization phase when compared to other chemical and photo initiators.<sup>2</sup>

When it cures, it consists of linear polymers of methyl-methacrylate without the organic fillers. The resin structure has a lower modulus of flexibility and greater fracture toughness when compared to composite resin cements.<sup>3</sup> This property makes the cement slightly flexible after curing thereby creating a more tenacious bond with higher resistance to masticatory load. The bond strength of Super -Bond C&B™ is also appreciable when compared to other resin cements.<sup>4</sup>

## Case Report

A 48 year old female patient reported to the outpatient department of Prosthodontics of Sardar Patel Post Graduate Institute of

Dental and Medical Sciences complaining of missing lower front tooth since 2 month.

Intraoral examination revealed that the periodontal condition and the condition of the abutment teeth contraindicated the fabrication of definitive fixed denture prosthesis.

Hence the usage of an acrylic tooth in the edentulous span was thought upon bonding it with the adjacent teeth using an adhesive system (Super-Bond C&B™).



Fig. 1 Preoperative Intra-oral view

## Components of The Super-Bond C&B kit

Component	Constituent
Catalyst S	TBB, acetone
Monomer	MMA, 4-META
Polymer	Clear-PMMA
Red activator	Phosphoric acid
Green Activator	Citric Acid , Ferric Chloride



## Manipulation

- 1) A resin tooth of the correct shade was selected and tried in the edentulous space. For a good bond the acrylic tooth should have an extensive contact with the abutments.
- 2) The surface of the resin tooth was roughened with abrasive points in order to create more surface area for a stable adhesion. Immediately before bonding, Super-bond's activated liquid was applied. The activated liquid was prepared by mixing 4 drops of monomer and 1 drop of catalyst S.
- 3) The abutment surfaces were cleaned and treated with the Red Activator, washed and dried completely. Proper isolation procedures were followed.
- 4) The activated liquid was applied on the

- proximal surfaces of the abutment teeth.
- 5) Application of Super-bond using the brush dip technique -the clear polymer powder and the activated liquid was applied on the acrylic tooth and held in the edentulous space, until complete setting.
- 6) Occlusal adjustment and initial finishing and polishing with fine grit diamond points were done.
- 7) Final polishing with pumice and disks was done after 24 hours.
- 8) Post-operative and oral hygiene instructions were given to the patient.
- 9) The patient was kept under observation during the recall period for 6 months during which she reported great satisfaction with esthetics and function.

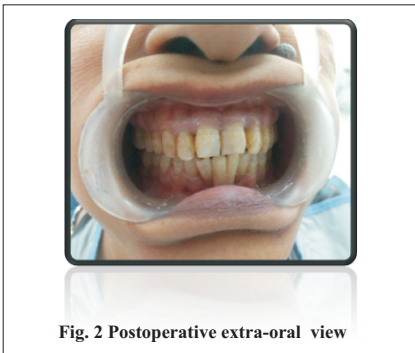


Fig. 2 Postoperative extra-oral view

## Discussion

Haggen, 1949 was the first person to develop an adhesive system capable of bonding acrylic resin to the tooth structure. It composed of glycerophosphoric acid dimethacrylate (GPDM) and sulfuric acid as catalyst.

Buonocore in 1952 developed BisGMA as an adhesive system.

Masuhara et al 1963, developed a Methyl Methacrylate resin adhesive system for bonding with wet dentin. The Tributylborane (TBB) initiator, facilitated

resin bonding to collagen through covalent bonds and formed hybrid layer in presence of saliva.

A self-curing resin adhesive resin 4 - META/MMA-TBB resin consisting of 4 META, MMA, PMMA and TBB was marketed as SuperBond-C & B™ (Sun Medical, Moriyama Japan ) and Amalgambond™ Plus by Parkell, USA. In Japan MMA/TBB resin was marketed as Orthomite in 1971 for direct bonding of orthodontic brackets.

The use of dentin conditioner contains 10% citric acid and 3% ferric chloride along with primers such as ferric chloride, ferrous and cupric ions or heme protein derivatives improved the bond strength of MMA/TBB resin to dentin. The conditioner facilitates diffusion of monomers into free demineralized dentin surface, graft polymerization of PMMA on dentin collagen and rapid initiation of polymerization at the resin –dentin interface (Taira Y, Imai Y, 2014).

Sen D et al, 2000, in an in-vitro study evaluated the tensile bond strength of sandblasted high noble, noble, base metal alloys bonded to etched enamel by two different bonding agents. Panavia Ex (bisGMA) and SuperBond (4-META/TBB). Both systems exhibited comparable tensile bond strength highest being with base metal alloys and lowest with high noble alloys.

Super-Bond C&B™ has a low modulus of elasticity. When loaded it displays high plastic deformation and simply changes shape. The cement remains slightly flexible after curing resisting more occlusal load. Its water sorption and solubility is similar to any other resin cement and lower when compared to conventional inorganic cements.

Tanoue, Tanaka – 2015 reported a 20 year old follow up story that was rehabilitated using the Super-Bond C&B™

The patient in the present clinical report with a compromised periodontal support of the abutment tooth was rendered treatment in a single sitting with a fixed prosthesis bonded to the adjacent teeth. The use of Super Bond -C&B™ is however technique sensitive.

- A) Controlling the temperature of the Powder, Liquid and catalyst in order to optimize working time.
- B) Preparing the adhesive mixture while the activated liquid is still active.
- C) Treating the Abutment and the Pontic surfaces with the activated liquid.
- D) Applying the adhesive mixture to the surfaces before the polymerization reaction advances.
- E) Positioning the surface and holding them immobile until the curing cycle is complete.

## Conclusion

Rehabilitation of patients with missing teeth with fixed prosthesis, offers definite advantages of comfort, esthetics, superior function and better psychological acceptance. Fixed prosthesis becomes difficult in case of periodontally compromised abutments. The present case report demonstrates rehabilitation of a patient having missing mandibular anterior teeth with a long term interim fixed prosthesis where an acrylic pontic was bonded to the abutment teeth using Super -C&B MMA/TBB adhesive system.

## References

- 1) Tanoue N, Tanaka T: A Direct Bonded Fixed Partial Dental Prosthesis: A Clinical Report. Journal of prosthetic dentistry, 113(1); 8-11, 2015.
- 2) Imai Y. et. al. Characteristic of TBB Initiator Used In The MMA-based adhesive Resin. IADR, June 2001 #1846
- 3) Ai et. al. Effect of the Adhesive layer thickness on the fracture toughness of dental adhesive resins. Dental material journal, 19(2); 153-163, 2000.
- 4) Taira Yohsuke, and Imai Yohji : Review of Methylmethacrylate (MMA) / tributylborate (TBB) initiated resin adhesive to dentin. Dent. Mat. Journal 2014; 33(3): 291-304.