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Natural Tooth Pontic Using Self-Cure Adhesive Resin System - A Case Report

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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Case Report

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ABSTRACT

Immediate replacement of periodontally compromised tooth bears a challenging task due to poor abutment support. The use of natural tooth as pontic provides an excellent technique mainly as it helps the patient to cope up from the loss of the tooth. Various bonding agents have been used to bond pontic to the adjacent abutment teeth. In the present case report tri-*n*-butylborane initiated adhesive resin has been used (Super-bond C&B). Replacing missing teeth using either patient's own tooth as pontic can be done by splinting adjacent teeth with adhesive resin.The splinting has an additional advantage of stabilizing adjacent mobile teeth.This case report details the case selection procedure with follow up of case selection, procedure with follow- up of case where natural tooth of the patient was used as pontic to replace a missing anterior tooth. We present a case reprt of 30 years old women with complaint of mobile right central incisor .On clinical examination the mandibular right central incisor showed showed grade III mobility. Both clinical and radiographic examinations indicated extraction of the mandibular right central incisors and because of high aesthetic demands of the patient the decision was made to utilize the crown of the extracted tooth as natural tooth pontic and bond it with adjacent teeth using 4-META/MMA-TBB resin marketed as Super-Bond C&B, (Sun-Medical, Co., Ltd). Natural tooth pontic has been shown to have a successful longevity but it does depend on the dexterity of the oral hygiene maintenance by the patient.

Keywords: Natural tooth pontic; adhesive bonding; tri-n-butylborane.

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1. INTRODUCTION

In today's modern dentistry, the dental professionals are faced with a conundrum while managing anterior teeth with mobility occurring due to advanced bone loss, inflammation and trauma from occlusion [1]. While the latter two can be managed well with conservative techniques, the cases of advanced bone loss in anterior teeth result in ineluctable loss of the tooth resulting in aesthetic, phonetic and masticatory difficulties for the patient. While conventionally, removable temporary acrylic prosthesis or resin bonded bridges were provided as the solution but these alternatives tend to have specific merits and demerits for the patient, while having additional considerations of various factors such as natural tooth preservation, aesthetics, minimal intervention and cost.

A fixed natural self curing resin bridge has quite a few advantages over removable appliances including ease of use, enhanced aesthetics, conservative approach and escapism from the need to become accustomed to removable prosthesis [2]. This could easily allow for the patient's natural crown to be used as pontic for the immediate bridge in a direct chair side procedure without need for any laboratory procedures and additively providing psychological benefit to the patient of retaining their natural tooth.

The natural tooth pontic (NTP) is easily usable when the crown is intact and it offers benefits of exact size, shape and color to the existing dentition. Originally, the use of steel wires, pins or bars was advocated for retention and strength but as these materials had no chemical interaction with composite resin they just resulted in stress concentration and deteriorated over time [3]. 4-META/MMA-TBB Resin, a self curing dental adhesive resin cement based on acrylic resin technology is a recent material widely used for dental adhesive purposes. It was originally introduced in Japan in 1982 as "Orthomite Super-Bond" as an orthodontic bonding system. It has 4-META (4-methacryloxyethyl trimellitate anhydride) as a diffusion promoter and TBB (tri-*n*-butylborane) as a polymerization initiator.

This article describes the technique of replacing a mobile tooth having severe bone loss with 4-META/MMA-TBB Resin bonded bridge utilizing the extracted natural tooth as pontic.

2. CASE REPORT

A 30 years old female patient reported to the Department of periodontics, Himachal Dental College, Sundernagar with the complaint of mobile mandibular right central incisor. The medical history of the patient was not significant. On clinical examination, the mandibular right central incisor showed grade III mobility,with Miller's Class IV gingival recession,and was extruded from the socket while the adjacent teeth also showed severe recession, bone loss and variable degree of mobility (Fig. 1) Both clinical and radiographic examinations indicated extraction of the mandibular right central incisors and because of high aesthetic demands of the patient the decision was made to utilize the crown of the extracted tooth as NTP and bond it with adjacent teeth using 4-META/MMA-TBB Resin marketed as Super-Bond C&B (Sun-Medical, Co., Ltd).

Fig. 1. Pre-operative clinical view

2.1 Technique

After articulation of the treatment plan, full mouth scaling and root planing was done and oral hygiene instructions were reinforced. Extraction of the mandibular right central incisors was done atraumatically under local anesthesia following which it was scaled and polished thoroughly to remove all the deposits (Fig. 2). On the extracted tooth the root resection was then done so that it could rest passively on the edentulous area covering the extraction socket. Following the root resection the pulp was completely removed while the canal was obturated with bonded composite resin and the newly created apical opening of the pulp canal was then cleaned and sealed with glass ionomer cement (Fig. 3). Occlusal evaluation of the NTP

was carried so that after the placement it bears minimal occlusal forces.

Fig. 2. Intra-oral photograph showing extraction socket

Fig. 3. Extracted right central incisor as natural tooth pontic after endodontic procedure

For the preparation of the abutment teeth and the pontic, acid etching agent is first applied to the isolated dry tooth surface till the effervescence is noticed and later rinsed of completely. It has been seen that 4-META/MMA-TBB Resin shows high dentine bond strength in relation to the formation of the hybrid layer superior to those of other adhesive systems [4]. The acid etching agent removes the smear layer from the dentine and hydroxyapatite from the surface dentine creating significantly less decalcification than phosphoric acid. For the mixing of 4-META/MMA-TBB Resin the bulk mix technique was used. Firstly, mixing 4 drops of monomer with 1 drop of catalyst made the “activated liquid” and then the L-type clear polymer powder was added to speed up the polymerization process and allow complete curing. Immediately after mixing it was applied to the abutment tooth and the NTP, which was kept in its position over the extraction socket and held for 7-8 minutes for curing time to be finished. (Fig. 4) Post treatment the patient was advised to avoid heavy biting during the day of cementation. The patient was then trained to use the interdental brush to keep the pontic clean and recalled for subsequent appointment to check the status of the pontic. (Figs. 5,6) The bridge has been functioning satisfactorily for 8 months now.

Fig. 4. Self-curing adhesive resin system (Super-Bond C&B)

Fig. 5. Post-operative buccal view

3. DISCUSSION

With the advent of newer materials in dentistry, it is now possible to manipulate the treatment procedures ideally according to the demands of the patient. The concept of immediate restoration of the extracted tooth especially in the anterior region provides psychological, esthetic and phonetic benefit to the patient, which cannot be overlooked. NTP provides an easy to use and nearly no adaptability period option as compared to the removable partial dentures but it also has

certain limitations as dependence on patient oral hygiene dexterity in addition to limited functional efficiency and also chances of splint breakage. Some studies have shown successful longevity of NTP as replacements for periodontally lost anterior teeth and reported survival rate of 80% after 5 years of function [5,6,7]. The evolution of self-curing dental adhesive resin cement based on acrylic resin technology has now made it a simple chair-side procedure. The transparent or tooth-colored 4-META/MMA-TBB resins are frequently used in patients suffering from chronic periodontitis with tooth mobility in anterior as well as posterior dentition. The dentine hybrid layer which is created by use of 4-META/MMA-TBB has been advocated to resist decalcification and also provide barrier to microorganism and their by product [8]. This formation of dentin hybrid layer was first time reported by Prof. Nobuo Nakabayashi at Tokyo Medical and Dental University [9]. It was only this hybrid layer which was responsible for the strong resin/dentin bond seen and also helped to prevent post-operative sensitivity to the adjacent teeth making it superior to other adhesive systems [10]. The TBB has been reported to have survived for more than three years without any additional splinting requirement and maximum up to eleven years [5]. Pace has reported that under flexural stress TBB resin specimen did not fracture which is advantageous over composite resins [11]. The problem of staining at the resin-enamel superficial interface has been reported but it has shown to be eliminated using rounded steel burs or diamond rotary instruments [12].

Fig. 6. Post-operative intraoral view

Patients' positive psychological response, cost effectiveness and ease of technique makes it a highly useful modality in case of patients undergoing anterior tooth extractions. Nevertheless the requirement for appropriate patient selection, reinforcement of oral hygiene measures and accuracy during placement should always be kept in mind in order to reach ideal goals.

CONSENT

As per international standard or university standard, patient's written consent has been collected and preserved by the author(s).

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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