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An Interim Prosthetic Rescue with Natural Tooth Pontic – A Case Series

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Author's contributions

This work was carried out in collaboration among all authors. Author NC designed the methodology, wrote the protocol and wrote the first draft of the manuscript. Authors AS and FF assisted while conducting the study and did the follow up recordings. Author AS and FF managed the literature searches. All authors read and approved the final manuscript.

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Case Report

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ABSTRACT

Sudden loss of an anterior tooth cripples a person functionally and emotionally. Esthetic demands, functional needs, treatment sequencing, timeliness and affordability are some primary concerns that must be addressed in such a scenario. A patient would generally want a cosmetic and functional prosthetic replacement at the earliest. Providing the most appropriate interim prosthesis for a given patient is challenging. In this case series we describe a clinical technique being an immediate provisional option utilizing a resin bonded, wire retained natural tooth as a pontic to restore the edentulous space until the final restoration. Using the patient's own natural tooth offers the benefit of retaining original anatomy, being economical and fulfills functional and psychological requirements of the patient to an extent. It was seen that the natural tooth pontic served as a satisfactory interim restoration. The same natural tooth pontic can be used as a provisional prosthesis during two stage implant procedure as well.

Keywords: Esthetic; functional; prosthesis; interim; natural tooth pontic; provisional.

1. INTRODUCTION

Sudden loss of an anterior tooth as a result of either trauma, root resorption, periodontal disease, or even due to an endodontic failure is truly an esthetically crippling situation for a person. It may present with psychological implications and can affect his social well being

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and render him conscious of his appearance in public. Irrespective of the availability of permanent treatment options, patients usually refuse delayed replacement and desire an immediate alternative solution in the post-extraction phase with the primary aim to restore esthetics. Definitive treatment options include single tooth implants, removable temporary acrylic prosthesis like RPDs, resin bonded bridges like the conventional FPDs, all of which require multiple visits to achieve desirable results [1]. Understanding the patient's cosmetic demands, functional needs, and affordability becomes imperative in order to deliver the best possible treatment. If the tooth or tooth crown is still intact and the patient brings it with them to the dental office, it is the easiest to use it as a natural tooth pontic (NTP), joining it to the adjacent teeth with an adhesive composite resin reinforced on a stainless steel wire or fiber splint.

The immediate bonding of a natural tooth to adjacent elements presents a low-cost alternative for direct tooth replacement; this technique enables the original tooth anatomy to be replaced, providing acceptable function and esthetics at the same time. Use of patients own tooth as a pontic represents a conservative restorative solution without any laboratory procedures. However use of natural tooth as a pontic is not new technique; it was described 35 years earlier [2]. Despite the above mentioned advantages, it does not seem to be widespread in daily practice due suspected longetivity of this treatment option. But this less invasive approach, in esthetic restorations is gaining popularity due to the development of newer restorative dental materials among adhesives and resin composites and the accumulating evidence of their strong bonding effectiveness adds to the durability quotient. Various long term research studies have portrayed promising results post usage of a NTP by means of a combined application of metal or the newly advent fiber-reinforced materials and adhesive technologies [3-9]. Dimaczek B et al. showed NTP to be a reliable long-term provisional fixed tooth replacement which offers acceptable functional and esthetic outcomes [10].

This technique is well-suited for patients who require an immediate replacement of a hopeless tooth in the esthetic zone and are not candidates for immediate implant therapy. Moreover, the positive psychological value to the patient in using his or her own tooth gives an edge to this treatment option. Selection criteria for this treatment approach would include a) patient who requires an extraction in an esthetic area and desires an immediate replacement b) absence of para-functional habits, c) having a favorable and non traumatic occlusion d) for attaining suitable soft tissue contour before implant placement d) Cost considerations and e) those contraindicated for FPD [11].

This clinical case series is a discussion of 3 patients who had an atraumatic extraction done with respect to a periodontally compromised tooth, followed by the fabrication of a NPT for immediate replacement. This case series presents the use of an unsalvageable natural tooth as a pontic and splinting them to the abutment teeth using a multi-flex SS wire and composite resin.

2. CASE PRESENTATION

3 male patients aged between 35 - 50 years, reported to the Department of Periodontics, M.R. Ambedkar Dental College & Hospital, with the chief complaint of loosening of front tooth. On clinical examination, the patients were diagnosed with Chronic localized periodontitis with respect to the grade three mobile tooth. Correlating the compromised periodontal status, radiographic findings (Fig. 1b) and clinical appearance of the tooth, extraction of the periodontally compromised anterior tooth was advised. Replacement options for the resultant edentulous space were discussed with the patients. The patients preferred a fixed prosthesis rather than a removable one. Due to compromised hard and soft tissue contour and financial constraints, immediate implant supported prosthesis was not a feasible replacement option. Therefore, an immediate chair-side SS wire retained resin bonded fixed partial denture, using the patients own natural tooth crown as a pontic with an ovate contact surface was decided as the treatment of choice until final permanent restoration. The patients were explained about the possible limitations and outcomes of the procedure. An informed consent was duly obtained from the patients.

2.1 Pretreatment Analysis

Length of the NTP required was pre-determined on a study cast of the patient. A periodontal probe was used to measure the gingival level to the incisal edge (of the adjacent tooth) plus 3mm, so that it could be extended into the alveolar socket to shape it to the gingivo-proximal tissue

level and preserve the papilla and also to compensate for the gingival shrinkage during the healing phase of the extraction site, thereby rendering an acceptable emergence profile. The required length of wire was determined on the cast in such a way that it extended to the two adjacent teeth on either side.

2.2 Clinical Procedure

i) **Tooth extraction:** The respective tooth was extracted atraumatically under local anesthesia. The periotome was used to gradually sever the PDL around the teeth (Fig. 1c) and then the luxated teeth were simply removed from the socket with forceps. The extracted teeth were immersed in normal saline and the remaining soft tissue removed from the surface. Pressure was applied with gauze to the extraction site for 10 minutes to arrest bleeding. (Fig. 1d , 2b, 3b)

ii) **Root removal & pontic contouring:** The sectioning of the tooth was done in a horizontal plane at the level 4mm apical to the cementoenamel junction with diamond abrasive discs. The apical opening of the pulp canal was cleaned, pulp extirpated and sealed with composite resin *(3M ESPE, Filtek™ Z350)*, and stored in normal saline till replacement. An ovate pontic was designed to facilitate cleaning and to render a favorable emergence profile. A smooth convex surface was then achieved at the apical area of the NTP with diamond finishing instruments. Two grooves 3- 4 mm in width were made mesio-distally on the palatal/lingual surface of the crown using a straight fissure bur (Fig. 3c). The first groove at the junction of the incisal and middle third and the second groove at the junction of the middle and cervical third was made.

iii) **Assembly and trial of fabricated prosthesis:** Two 0.001˝stainless steel orthodontic ligature wires of the predetermined length were taken and braided. The braided wire was used to stabilize the pontic in the extraction socket. The wire was embedded into the prepared grooves with the light cure flowable composite (Z350; 3M ESPE®) (Fig. 1e). Trial of the crown was done in the desired anatomic position and the wire to be fixed onto the adjacent teeth was adapted passively to their lingual surface with the help of an orthodontic plier.

iv) **Pontic attachment (acid etch/bonding procedure):** The adjoining abutments were subjected to etching (Ultra-Etch, Ultradent, South Jordan, UT, USA) (Fig. 2c) and bonding (Single Bond, 3M ESPE, USA). The well contoured pontic was then placed in the socket and its final position was determined with reference to the adjacent and opposing teeth. Splinting to two adjoining abutment teeth on either side were carried out with bulk fill composite resin *(3M ESPE, Filtek™ Z350)*. This proposed technique improves the stability and longetivity of the prosthesis.

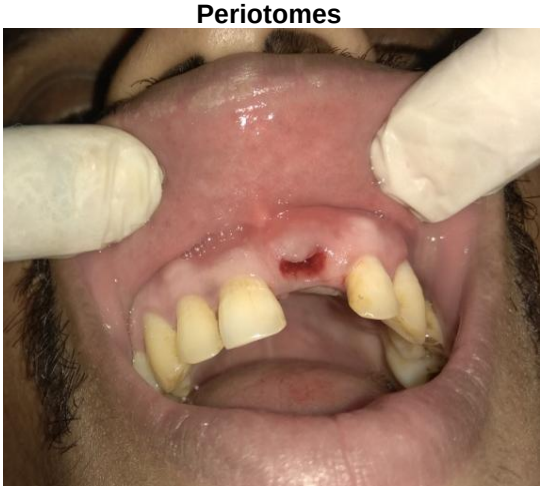
v) **Verification of occlusal relationship:** Following final finishing and polishing of composite resin, occlusal interferences were rechecked in protrusion and lateral excursions. This was followed by finishing and polishing using composite finishing discs and stones. Patients were reinforced with appropriate oral hygiene measures. Strict instructions to avoid heavy biting forces in the treated site were given.

This will serve as a provisional restoration, to help maintain gingival architecture for the final prosthesis, while simultaneously meeting the esthetic demands of the patient to an extent. The patients were recalled after 1 month, to assess the health of the soft tissues in and around the extraction socket and at 6 months to assess the stability of the prosthesis (Fig. 1g, 2e).

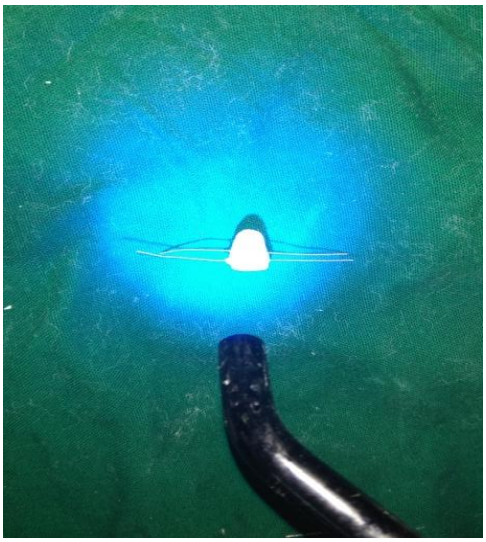
a) Pre Extraction

b) Pre- Op Radiograph

c) Atraumatic Extraction Using Periotomes



d) Post Extraction



e) Chair Side Fabrication Of NTP; Pontic Reinforced With SS Wire And Composite Resin

f) Immediate Postop View

g) Review At 6 Months Postop

Fig. 1. Case 1 – NTP wrt 21

a) Preoperative View

b) Post Extraction

c) Acid Etching Of Contoured And Prepared Natural Tooth Pontic

d) Immediate Postop View

e) Review At 6 Months Postop

Fig. 2. Case 2 – NTP wrt 11

a) Preoperative View

b) Post Extraction

c) Pontic contoured and lingual grooves prepared

d) Post NTP Placement

Fig. 3. Case 3 – NTP wrt 32

3. DISCUSSION

In the present era, wherein social media has become the principle component of our daily lives, we see a growing esthetic demand among patients who are well informed and aware about the various aspects of dentistry. Chronic periodontitis patients commonly exhibit dramatic bone loss around their lower and at times upper anteriors, and ultimately extraction is indicated due to terminal periodontal breakdown or unsuccessful treatment. Immediate replacement is often demanded by patients due to esthetic reasons.

The soaring emergence of dental implant supported restorations has paved way to a more conservative approach to a single-tooth replacement, with improved psychological health, occlusal awareness, increased stability, retention, phonetics and improved function, in comparison to the conventional fixed partial dentures that require aggressive tooth reduction of abutment teeth during the preparation with a high risk of pulp exposure or a removable partial denture which may jeopardize the periodontal health of adjacent teeth [12].

Post extraction healing and maturation of the bone occur with three-dimensional remodeling even after three months of healing [13]. The clinically growing demand for adequate alveolar housing for implant placement necessitates performing hard and soft tissue augmentation procedures which would prolong the treatment duration. Immediate implant placement on the other hand is a very case specific protocol. However, some patients may not agree to this therapeutic option, either due to monetary reasons or due to fear of surgery. Systemic problems may also relatively contraindicate the surgery [14].

The NTP technique could be a suitable alternative in such clinical scenario because it is commonly opted and highly appreciated by the patients for being a single visit technique, not involving any laboratory work and temporization. Additionally, preparation of the supporting teeth can be avoided and is highly cost-effective. Another major advantage is the psychological benefit to the patient of retaining the patient's own natural tooth crown and thereby satisfying the patients esthetics needs to an extent [15].

This case series showcases this simple, economical and practical option to temporarily restore the edentulous space after extraction of a periodontally compromised tooth by replacing it with the patient's own tooth in the form of SS wire retained resin bonded NTP that is fabricated

chair side in the same visit. The micro- resiliency and ovate design of the pontic with a well-polished and smooth, convex surface stimulates underlying tissue, avoids excessive post extraction ridge resorption and contours the soft tissue architecture. The periodontal tissues of the abutment teeth remained unaffected; absence of attachment loss and stable probing depths was noted at the end of 6 months. This particular shape of pontic also helps to give the illusion of the replaced tooth emerging from the gingiva like a natural tooth. Also, the ease of usage and almost no adaptability period as it is with the removable partial denture makes it a patient-friendly modality. NTP being a reversible technique provides sufficient time to the patient and the clinician to evaluate other definitive restorative options. Also, there will not be any deleterious effect on the periodontium of the supporting dentition in any way by this prosthesis. Quirynen et al in 1999 reported, after his long term evaluation (5 years) of composite bonded NTPs, that the abutment teeth demonstrated stable probing depths and negligible loss of attachment (0.1 mm/year) [16]. According to Sconnenschein et al., the probing depth of splinted mandibular teeth decreased from 3.39 mm to 2.12 mm and remained stable over the 3-year observation period, with the application of a strict supportive periodontal therapy; no splinted tooth was lost within the first 3 years after splinting [17].

Kermanshah H et al. and Stumpel LJ et al. have reported long term success (6 years) of this technique in compromised restorative situations [18] Also Quirynen et al in his prospective study, replaced periodontally compromised lower anterior teeth with pontics using natural and acrylic teeth, have reported similar long term results with favorable satisfaction ratings [16].

Limitations include relying on patient's motivation and manual dexterity to maintain oral hygiene around the pontic, limited functional efficiency and chances of splint breakage. The predominant location of de-bonding with resin bonded FPDs is between the luting cement and the framework of the denture [19]. In the present case series, good adhesion was ensured by incorporating two palatal/lingual grooves and splinting the NTP to two adjacent teeth on either side instead of just one groove and one additional tooth on either side. The proposed new technique provides optimum stability of the pontic around all axes of rotation, greater durability and enhanced retention, which may not be obtained with a single groove and an esthetically acceptable replacement option. The longetivity of bonded casted bridges is another commonly reported disadvantage so this technique should be considered as an interim prosthesis. Creugers and Vant Hof reported in their meta- analysis an overall survival rate of 75% for 3-4 unit resin boded bridges after 4 years of function [20]. Quireyen et al who used stainless steel mesh to reinforce the resin bonded bridge, reported an 80% survival rate of these composite restorations after 5 years of function. Higher satisfaction ratings were obtained from these patients when compared to the patients rehabilitated with implant supported overdentures [16].

Replacement with NTP is technically demanding and cannot be used for every patient. Some key factors to be considered include i) Patients bite, ii) Any interfering para-functional habits, iii) Inadequate occlusal clearance iv) Inability to maintain isolation of field during bonding procedures, v) Primary dentition [21-23]. Despite such restrictions, this technique of using NTP, has been tried and tested by various researchers earlier and have shown very satisfying results [16-17]. Even in this case series, a 6-month follow-up demonstrated good clinical success.

No Post-op complications were reported. However, efforts in preserving the gingival papilla by immediately placing an ovate pontic in the extraction area was not achieved in three of the patients, most likely due to preexisting periodontitis. Even though this data is obtained from a limited number of patients, this case series highlights that NTP has been successfully used as a temporary restoration until implant placement and the same NTP can be used as a provisional prosthesis during the two stage implant procedure.

4. CONCLUSION

The described technique uses patients own natural tooth as a pontic to render an immediate, esthetic and minimally invasive method for the replacement until future definitive therapy. This technique serves as a boon, in order to save the patient from the entire psychological and emotional trauma that he might undergo due an anterior tooth loss in the most economical way.

However, additional studies are necessary to provide more clinical data to draw further conclusions regarding this therapeutic approach. Patient selection, the level of motivation, plaque

control and precision during the fabrication and placement of NTP should be given due consideration to achieve optimum results.

CONSENT

An informed consent was duly obtained from the patients.

ETHICAL APPROVAL

All authors hereby declare that all experiments have been examined and approved by the ethical committee of M R Ambedkar dental college and Hospital and have therefore been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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