The Natural Tooth Pontic:

A case report

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• Summary

The loss and replacement of anterior maxillary teeth poses several challenges. In patients not preferring/indicated for implant surgery, when minimal tooth reduction is desired, a wire-reinforced composite fixed-partial denture may be used as a conservative alternative to a conventional fixed-partial denture for replacement of a single missing tooth. This article describes a clinical technique and six months follow-up. The patient presented with a missing maxillary central incisor due to localized juvenile periodontitis.

■ ملخص:

في هذا البحث شرح لحالة تم تعويض لسن طبيعية مفقودة وإرجاعها في نفس مكانها الطبيعي باستعمال الحشوات البيضاء اللاصقة بمساعدة معدن لتثبيت السن المخلوعة بالأسنان الطبيعية الملاصقة لها. هذه الخطوات كانت بعد الاتفاق مع المريضة التى تعاني مرض السكري واستبعاد زراعة سن صناعية مكان السن الطبيعية بعد خلعها بسبب التهابات في اللثة.

• Introduction

The rehabilitation of esthetics in patients with reduced periodontal tissue support is not an easy task in dentistry. Destruction of the supporting tissue can be so advanced in some teeth that extraction seems to be the only treatment option.

In patients with hopeless prognosis of anterior teeth is still a strong desire to save them for esthetics. When extracting a maxillary anterior tooth, one of the major concerns is its immediate esthetic replacement. For esthetic reasons, delayed replacement is unacceptable in some cases. Nevertheless, immediate dental replacement in this esthetic zone is not simple procedure,

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This case report describes a restorative procedure for immediate tooth replacement using a natural tooth pontic and wire-reinforced composite following extraction in an area of severe localized bone loss.

especially when the adjacent teeth are caries free and have good esthetics with periodontal involved .

Replacement using a provisional removable appliance is not often satisfactory. Similarly, crown preparation of adjacent intact teeth is considered by many practitioners to be radical treatment. Dental Implant supported prostheses often not be the best solution due to severe localized soft and hard tissue loss (Danan *et al*., 2003). Furthermore, many patients fear the required surgery or ridge reconstruction and some consider the treatment very costly (Danan *et al*., 2003).

A wire or fiber-reinforced composite fixed (FRC) prostheses are an alternative to traditional fixed restoration treatment in certain cases.

Chair-side tooth replacement is an excellent application for wire-reinforced composite (WRC) technology. Previous attempts at chair-side tooth replacement involved the use of pontics derived from extracted teeth, acrylic resin denture teeth with or without lingual wire reinforcements (Ibsen *et al*., 1974: Davila *et al*., 1987) and resin composite. A chair-side FRC prosthesis offers a fast, without or minimally invasive approach for tooth replacement that combines all of the benefits of the FRC material for an esthetic, functional and acceptable result (Stopla K, 1975; Strasslar A 1995). A denture tooth or a natural tooth in the case of extraction of a periodontally-involved incisor can be used as a pontic.

Selection criteria for this tooth replacement approach includes (Freilich *et al*., 2000):

- A patient who desires an immediate, minimally invasive approach.
- A patient who requires an extraction in an esthetic area and desires an immediate replacement.
- Abutment teeth with a questionable long-term prognosis.
- A non-bruxing patient.
- Cost considerations.

Chauhan (2004) treated 21 patients over six years using a natural tooth pontic in a fiber-reinforced composite fixed partial denture. Two patients had the natural tooth pontic debond. This was because of ongoing para-functional habits. Auplish (2000) described the immediate replacement of a lateral incisor using fiber-reinforced composite with the natural tooth as the pontic, the follow up was satisfactory outcomes.

The aim of the current case report was to describe a clinical case in which wire-reinforced bridge (WRC) was fabricated using the natural tooth as a pontic for immediate replacement of a central permanent incisor following extraction in middle age patient.

• Case report

A 38-year old woman with known case of controlled diabetes mellitus complaining of improper esthetic because of maligned right upper central incisors. On intra oral examination revealed that mobile central incisors tooth grade IV, with deep pocket and a slight gingival recession, associated with juvenile periodontitis.

She was referred to a private clinic to seek a fixed treatment to replace her mobile tooth. Slight labial soft tissue recession observed in spite of a deep pocket being present with slight bone loss showed on a radiographs (for illustration only) (Figure 1).

Extraction of the tooth was indicated due to progressive bone loss and probable further damage to the adjacent teeth. Significant gingival and papillary recession following tooth extraction was predicted. The patient was unwilling to lose her tooth and was concerned about esthetics immediately after extraction.

Figure 1: Preoperative view

In this case report, the occlusion was with in normal and no signs and symptoms of para-functional habits were observed. The right central incisor the left lateral incisor were caries-free. Mobility or esthetic problems on both abutment teeth were not observed in this case.

The patient was not willing to use a removable partial denture. An implant supported prosthesis could not be placed due undetermined prognosis of

periodontal disease, medical condition and economic aspects. A fixed-partial denture was not indicated because of the required extensive tooth preparation and probable damage to pulp tissue and due to patient unwanted.Therefore, an immediate chair-side wire or fiber-reinforced composite bridge using a natural tooth pontic was the treatment of choice after explaining all the options in very detail.

Soft and hard tissue recession following removal of an anterior tooth presents a unique restorative challenge and may lead to bad esthetic, open gingival embrasures (black triangle) in a fixed prosthesis.

The length of the left central incisor (natural pontic) was determined by measuring the gingival level to the incisal edge plus 3 mm, so it could be extended into the alveolar socket to shape the gingiva-proximal tissue level and preserve the papilla.

After anesthetizing, the tooth was extracted (Figure 2). A piece of sterile gauze was gently packed into the extraction site to prevent bleeding. The root was cut from the determined length and rechecked to fit into extracted socket in patients mouth. The apical end of the root was formed into an ovate pontic design with finishing diamond burs. The canal opening was then restored with a resin composite (3M ESPE). In order to prevent gingival irritation a high, smooth surface area was then achieved at the apical area of the natural tooth pontic with diamond finishing instruments (D&Z) and polishing rubber points. Putty silicone mix as an index was made after placing the natural pontic in its normal position.

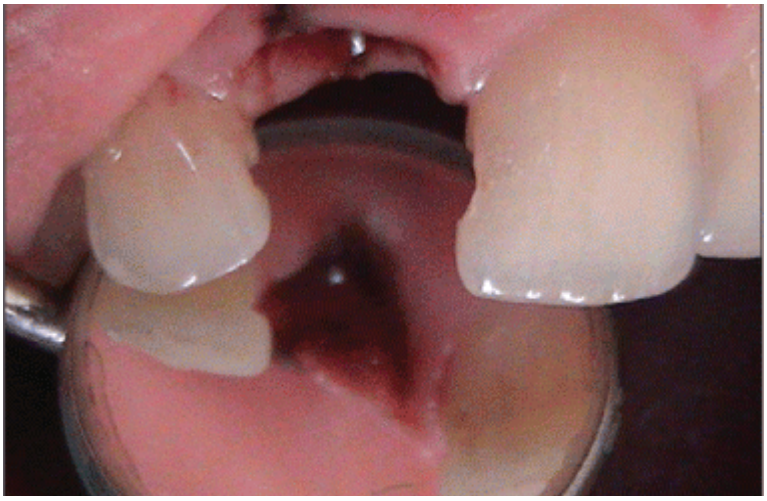

Figure 2: extraction site (for illustration only)

The pontic was positioned into the extracted site and positioning indexes were marked on the pontic and adjacent teeth for achieving an accurate alignment of the pontic. A Stainless steel wire (0.016mm, Ortho Arch wire, ISO 9001) of two pieces was prepared of required length, one piece placed at the incisal one third of crown level of the natural tooth and the other wire piece placed at root crown junction. The wires cross the palatal surface of pontic from one distal side of left central incisor abutment to distal surface of another abutment left lateral incisor. Cut the needed wire length by ortho-cutter, serration made with help of fissure burs at the predetermined length for composite retention.

The etchant gel (Ultra-Etch, Ultra-dent, South Jordan, UT, USA) was applied to the palatal surface of the prepared natural pontic and adjacent abutment teeth, slightly beyond the margin onto the proximal surface. The etchant was left undisturbed for 30 seconds. After rinsing and gently air drying. The adhesive bonding agent (Single Bond, 3MESPE) was applied to all the natural tooth pontic surfaces according to the manufacturer›s directions. Once applied, the adhesive was polymerized for 20 seconds from each direction using a halogen light-curing unit (Optilux 70, Coltène- Whaledent, Cuyahoga Falls, OH, USA).

Both abutment teeth were then isolated with cotton rolls during the remaining portion of the procedure, etched as procedure done to natural tooth pontic for 30 seconds, rinse with water and air drying. The adhesive bonding agent (Single Bond, 3MESPE) was applied and cured on palatal surfaces of both abutment.

Use of the bonding agent (Margin Bond, Coltène-Whaledent) and flowable composite (Filtek Flow, 3M ESPE) for 15 minutes. During this time, it was protected from early polymerization by artificial and natural light.

The pontic was then placed into the predetermined position and the extended wires were positioned. The flowable and hybrid composite were placed into the prepared abutments prior to placement of pontic. The wires were condensed through the resin composite with a plastic instrument and polymerized for 40 seconds from each direction. More resin composite was added to cover the palatal surfaces of abutment and completely cover the wires. Slight composite resin extended into proximal surfaces of both abutments and pontic for more seal and retention of composite resin material as in Figure 3.

Figure 3: Final result

Occlusal and incisal adjustment were then made using articulating paper and diamond finishing burs (D&Z) and surfaces polished with rubber polishing points (Ivoclar-Vivadent).

The patient was instructed to keep his restoration clean and free from plaque. The six months, one year follow- up showed no adverse effects or failure, patient was satisfied, except for some gingival recession, which was expected.

- **Discussion**

Various therapeutic solutions can be used to replace a single missing tooth. For many years, metal-ceramic fixed partial dentures (FPDs) have been the treatment of choice. However, the metallic framework is less than esthetically pleasing (Kolbeck *et al*., 2002). Moreover, to provide the FPD with retention and stability, aggressive tooth reduction is necessary during the preparation of abutment teeth with a high risk of pulp exposure.

The development of implant-supported restorations provide more conservative approach to a single-tooth replacement (Goodacre *et al*., 2003). However, some patients reject this therapeutic option, either because of the higher cost or for fear of surgery. Systemic problems may also contraindicate surgery.

Resin-bonded fixed-partial dentures (FPDs) with metal frameworks are considered to be a practical and conservative approach, but no documentation of long-term success, especially for the replacement of posterior teeth, could be identified.

The most common type of failure with resin-bonded FPDs is debonding of the wire/cast metal framework from the luting cement (Creugers *et al*., 1997); however, debonding of the luting cement from the enamel surface has also been reported (Hussey *et al*., 1991), teeth have some degree of mobility under function, which causes repeated tensile and compressive stresses at the interface between the metal framework and the composite luting cement. Repeated stress can predispose fatigue failures of the adhesive joint. By selecting a proper material that has a lower modulus of elasticity than that of cast metal alloy, stress at the interface can be diminished. A group of materials whose modulus of elasticity can be tailored to specific needs is fiber-reinforced composite (FRC) or wire reinforced composite (WRC) (Eshlemen *et al*.,1984).

Few reports on the successful use of FRC,WRC restorations in peer-reviewed literature include clinical reports (Jain *et al*., 2002) and a study with short-term follow-up. The primary type of failures identified were either bulk fracture at the connector or the pontic area, debonding of the veneering composite or wire debond or exposure (Vallittue *et al*.,2000).

In dental applications, such as fixed prostheses, splints and posts, FRC are usually subjected to flexure or bending in clinical service. Freliich *et al*., (2000) while clinical performance is the final determinant of success.

Although reinforced composite materials seem to provide excellent esthetics, some authors do not recommend composite materials for permanent restoration (Behr *et al*., 2003, Bohlsen *et al*., 2003) because of unstable esthetics, increased wear and liability to plaque accumulation.

In the current study, the risk of discoloration, loss of super-facial gloss and increased wear was not much applicable due to use of natural tooth as a pontic.

A six-year follow-up demonstrated good clinical success. Complications, such as postoperative sensitivity, caries, debonding and fracture at the connector area and discoloration, were not observed, this results coincides with the current observation after six months (need more time) follow up. Also, there was no high plaque accumulation, and gingival inflammation and bleeding was not observed during clinical evaluation. It should be mentioned that the patient strictly observed the oral hygiene instructions, and polishing of the restored surfaces was performed during periodic recall visits. The abutment teeth were conserved, keeping the technique relatively reversible, and the procedure could be completed chair-side, thereby avoiding laboratory costs.

- **Conclusion**

The described technique using a patient's natural tooth as a pontic in a resin composite-reinforced wire framework is a conservative, esthetic and cost-effective

method for the replacement of incisors. This technique enables the original tooth anatomy to be replaced, together with functionality and esthetics, while preserving tooth structure. This technique in combination with recent uses of adhesive material techniques, appears to be an effective fixed restorative option. However, appropriate patient selection, their motivation levels, plaque control and precision during placement should be kept in mind to achieve the desired objective. However, additional studies are necessary to provide more clinical data from which to draw further conclusions regarding this therapeutic approach.

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