

Replacing An Extracted Natural Tooth As A Pontic By Using Fiber-Reinforced Composite: A Case Report

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Abstract

Summary: Losing an anterior tooth could be extremely devastating for the patient and to address the psychological and emotional trauma of the patient, quick replacement is crucial. A contemporary conservative choice is a Fiber-Reinforced composite bridge. The current case report describes the fractured permanent mandibular left lateral incisor which needed to be extracted followed by the replacement of the same natural tooth crown as a pontic using Fiber-reinforced composite (Ribbond). The results were satisfying to the patient, both aesthetically and functionally. Long-term follow-up studies are needed to further evaluate this treatment option in the future.

Keywords: tooth, denture design, composite resins

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1. Introduction

Losing an anterior tooth could be disastrous for the patient. To maintain the facial aesthetics and phonetics and to address the psychological and emotional trauma of the patient, a quick replacement is crucial. Some crucial considerations for replacing a lost tooth are preservation, natural conservation, minimum invasion, aesthetics, and affordability.¹ It can be difficult to replace a single anterior tooth. The most often used choices are implants, fixed partial dentures, and temporary acrylic prostheses.² A contemporary conservative choice is resin-bonded bridges. Strength, durability, and instantaneous convenience have been made possible by the combination of fibre-reinforced composite resin and adhesive processes.³

The development of adhesive dentistry has significantly changed traditional dental ideas in favour of a low-intervention strategy. Fiber-reinforced resin composites (FRCs) have gained increasing popularity in recent years in dentistry.⁴ A biocompatible, aesthetically pleasing, and bondable material with several clinical uses in dentistry is polyethylene fibre (Ribbond). Due to its two most crucial mechanical characteristics—strength and stiffness—it offers various solutions to numerous complicated challenges in restorative dentistry. Due to its broad range of intended uses, it is used in a variety of dental

procedures every day, including endodontic posts, periodontal splints, aesthetic space maintainers, bondable bridges and single bridges, and orthodontic retainers.⁵ Additional benefits include lower cost than traditional bridges, no metal allergies, conservation of tooth structure and a natural feeling. However, there are drawbacks, such as painful occlusal relationships maybe due to over-bulking, difficulty in handling and the existence of inappropriate abutment teeth that inhibit adhesive bonding.⁶ The natural tooth can be used as a pontic because it has the proper size, shape, and colour. Additionally, using one's natural tooth is more acceptable for the patient aesthetically. When the extracted tooth's crown is in good shape, Fiber-Reinforced composite can be easily used to bond the naturally extracted tooth quickly and effectively to the abutments.¹

2. Case Report

A female patient, 28 years of age, reported to the Dental Hospital with the chief complaint of a “mole” on the chin with pus discharge and a highly mobile lower anterior tooth. She gave a history of trauma to her chin while playing volleyball one year back which resulted in indirect trauma to her tooth causing mobility. She went to a dentist who splinted the tooth for some time. After a few months, she developed a “mole” on the chin for which she consulted a dermatologist who guided her to get consulted by a dentist. She didn't complain of any

pain. On extra oral examination, there was a pus discharging oral cutaneous fistula on her chin which she was referring to as a “mole” Figure 1.



Figure 1: Oral-cutaneous fistula seen on patient's chin.

There was no swelling or redness. On palpation, the fistula wasn't painful, but it was discharging pus. On intraoral examination, there was grade III mobility in the Permanent mandibular left lateral incisor. The tooth wasn't carious or discoloured. It was positive on percussion and negative on pulp vitality testing and palpation.

A periapical radiograph was done which showed a horizontal cervical root fracture of tooth number 32 and periapical radiolucency associated with the apex of the said tooth Figure 2. The diagnosis of “pulp necrosis with chronic apical abscess” was made.

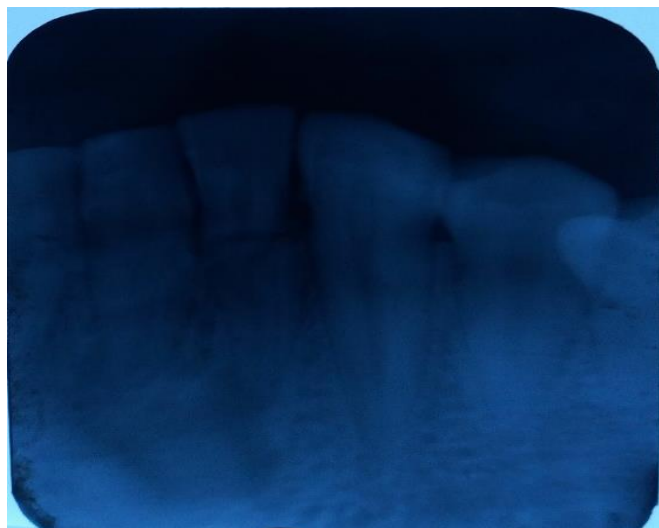


Figure 2: Horizontal cervical root fracture present on tooth number 32.

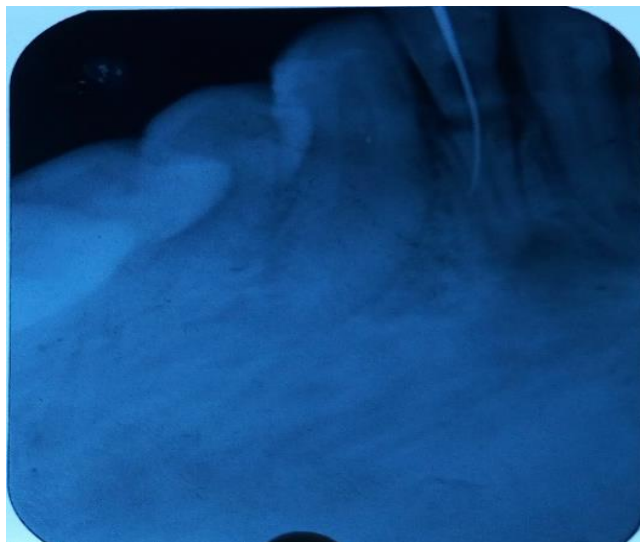


Figure 3: Access through the fracture line couldn't be achieved.

The initial treatment plan was to stabilize the tooth by joining the two broken parts by a post but access to the apical fractured portion couldn't be achieved (Figure 3). The alternate treatment option was to extract the tooth followed by either an implant, fixed partial denture, Maryland bridge, natural tooth pontic bridge with fibre reinforcement ribbon or removable partial denture.

After discussing with the patient, option no. 4 was chosen. Upper and lower impressions were taken with alginate (Cavex CA 37 Normal Set dustfree alginate impression material) and casts were prepared using dental stone (ISI KOPO-HARD CKH-52 dental plaster). The fractured tooth was extracted, and the socket was allowed to heal for 2 weeks (figure 4).



Figure 4: After extraction of fractured tooth no. 32

Meanwhile, the patient's extracted tooth was prepared by giving it a modified ridge lap design and the access opening was cleaned and then closed with composite resin. Modified ridge lap pontic design is important in maintaining oral hygiene and giving a natural emergence profile to the tooth.

The Ribbond strip (Ribbond®-THM Bondable Reinforcement Ribbon) was measured on cast from the right canine to the left canine. After try-in and some occlusal adjustments, the abutments and pontic were roughened with a flame-shaped diamond bur. Rubber dam was applied using the split dam technique. Abutment teeth and pontic were etched with 35% phosphoric acid etchant (Care Etch-37, VERICOM CO, LTD. Korea) for 30 sec, washed and dried for 10 sec. Then bonding agent (Meta P & Bond META BIOMED CO. LTD. Korea) was applied to the prepared teeth with a microbrush and cured for 30 sec. The precut ribbon strip was wetted with the bonding resin while a thin layer of flowable composite resin (Carefil Flow VERICOM CO., LTD. Korea) was applied to the prepared teeth and pontic followed by placing the ribbon strip over the composite and curing (Woodpecker Light Cure (LED-B)). Another layer of composite was placed on the strip to make sure that it was covered by composite and cured. The patient was asked to bite, and occlusal interferences were resolved. Occlusal adjustments were made by asking the patient to move the jaws in protrusive and lateral excursions. The finishing and polishing procedure was done by using composite polishing stones and discs (SHOFU- composite polishing kit CA). Oral hygiene instructions were given (Figure 5)



Figure 5: Showing the outcome of the FRC bridge

The recall visit was after 1 week, the ribbond was intact, the tooth was in function, and no clinical abnormality was noted on post-operative evaluation, moreover, the patient was satisfied with the functioning and esthetics of the pontic.

4. Discussion

To restore aesthetics and function, anterior teeth that have fallen out urgently need to be replaced. The creation of a direct fibre-reinforced composite bridge offers the patient a chair-side, single-visit, minimally invasive, affordable, fixed option.⁷ According to two-year research by Malmstrom et al., the FRC Bridge had an overall success rate of 84.32% and a survival rate of up to 92.7%.^{2,7} Numerous studies have also demonstrated that fibre-reinforced composite bridges work satisfactorily and are on par with fixed partial dentures during a five-year timeframe.⁸ In studies where FRC was used as the connector, the connector did not fracture over a long period which shows the impeccable strength of the material.⁹

The adoption of natural tooth pontic in this instance offered psychological advantages and a flawless cosmetic fit. A modified ridge lap shape with well-polished and smooth convex surfaces was applied to the pontic.¹⁰ This was done to create a very small area of mild contact with the alveolar ridge, allowing maintenance of good oral hygiene and hence preservation of the soft tissue's health.¹¹ Moreover, it improves the pontic's emergence profile. Additionally, the tooth pontic's micro-resiliency permits stimulation of underlying tissue and prevents excessive ridge resorption.¹ Prior chairside tooth replacement attempts used a variety of points like acrylic denture teeth (with or without lingual wire reinforcement), porcelain denture teeth, and resin composites.^{12,13} Utilizing the extracted tooth with the help of Dental adhesive products has an incredible bond strength (14.6–15.8 MPa),¹⁴ allowing dentists to treat patients with less invasive tooth preparation that is highly aesthetic and feels natural to the patient. Even though some studies have revealed that laboratory-made composite materials seem to perform well when compared to conventional materials, the wear resistance of laboratory veneering composites is highly variable.^{6,15} The fracture resistance of composite resins is increased by adding fibre reinforcement. By altering the geometry, fibre content, and fibre orientation, the properties of the composites can be altered.¹⁶ The coating of fibres with resin is one of the variables that affect the mechanical properties of FRCs.^{16,17} The composite resin can be strengthened using a variety of fibre kinds. The mechanical qualities are improved by switching from non-impregnated

polyethylene fibres to resin-impregnated, silanized glass fibres.¹⁸ Glass-fiber fixed partial dentures are appreciated by both dentists and patients because they have aesthetic and financial benefits and are simple to repair.¹⁹

The pontic and abutment teeth need little to no preparation when using FRC bridges. The clinical procedure that has been discussed here is noninvasive and reversible, allowing for a future evaluation of all alternative restorative possibilities. Utilizing the extracted tooth crown in this manner provides a straightforward and affordable treatment alternative for the restoration of a missing anterior tooth. Due to its strength, polyethylene FRC bridges might even be thought of as a permanent solution.²⁰ There aren't many cases of FRC bridges documented in the literature. Reports have revealed that this form of treatment has a success rate of up to 5 years, despite being recommended as a temporary solution. To assess the FRC bridges' long-term success, long-term follow-up studies are required.

This technique requires the presence of natural pontics having good enamel substrate for bonding which could be considered its drawback. Additionally, the method is very operator-dependent and necessitates careful case selection and approach.

5. Conclusion

The management of trauma's aftereffects can be just as difficult as healing the trauma itself. While the extraction site heals, a natural tooth crown pontic can be used as a temporary restoration until a conventional bridge or an implant can be used to replace it. Using the tooth's natural coronal section, the procedure adopted in this instance provides a straightforward and affordable treatment option for replacing a damaged tooth. It can be viewed as a hygienic, non-invasive, and long-term temporary treatment that offers improved aesthetics and functionality without running the danger of limiting growth.

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Contributions:

S.H, A.A - Conception of study

A.A - Experimentation/Study Conduction

D.K, Z.R - Analysis/Interpretation/Discussion

D.K, Z.R - Manuscript Writing

A.A, K.S - Critical Review

S.H, A.A, K.S, A.Z - Facilitation and Material analysis

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