



Natural Tooth Pontic With New 'Infibra Reinforced Ribbon' --- Reshaping Avulsed Tooth

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Abstract

Anterior teeth are most vulnerable to loss, due to any kinds of accidents harming the orofacial region. Avulsion accounts for 0.5–16% of traumatic injuries in the permanent dentition. Anterior tooth esthetic plays a major role in appearance of a person. Hence, an immediate treatment plan for such traumatic injuries is needed. If an avulsed tooth is intact and the patient brings it with them to the dental office, it is easy to use it as a natural tooth pontic. In our case report, our aim is to show that, the avulsed tooth if preserved can be used in its best fit and form naturally, as an FPD with new InFibra reinforcement ribbon. Not much cases have been published using this reinforced ribbon. This technique offers a conservative, efficient treatment, economically acceptable with psychological benefits for the patient concerned. Moreover, this technique is nonirritating, and noniatrogenic. In the given case, it is used by a direct technique in the mouth as a single visit procedure.

Keywords: InFibra Reinforcement ribbon, polyethylene fibers, natural tooth pontic, avulsed teeth

Introduction

Avulsed tooth if kept extra-orally for longer time cannot be re-implanted. However, it can be modified to act as natural pontic with fiber reinforced composite. There are two common methods of replacement of a missing tooth- a conventional porcelain-fused-metal (PFM) bridge or a resin-bonded fixed partial denture (Maryland bridge).¹ FRC bridges can act as natural tooth FPD. It allows the patient to use their natural tooth as pontic, where the tooth is intact in its form, acting as an optimal pontic w.r.t shape, alignment & provides a better sense of self - acceptance of tooth loss effect.² In our case, the tooth that was avulsed was intact in structure with no crown loss or root loss. This was the main aim of the case, to make the best utilization of the avulsed natural tooth with a newer FRC material –InFibra reinforcement ribbon. FRC –natural tooth pontic

procedure is minimally invasive, and no metal framework under porcelain. Hence, eliminating the esthetic concern on wearing of porcelain.¹ Resin-bonded FPD, could be made by using an artificial plastic tooth or the avulsed tooth or by a composite build up.

It was reported by Goldberg et al. 1998, that flexural moduli of some FRC was seven times that of conventional composite resins³ so, they were considered over conventional composites.

Case

A 15 years old female patient visited the Department of Pediatric and Preventive Dentistry, Kothiwal Dental College And Research Centre, Moradabad, Uttar Pradesh, India with the chief complaint of loss of upper-right front teeth and fracture of tooth with pain in upper left front tooth region.

Report

(FIG 1)



FIG 1- Loss of upper-right front teeth and fracture of tooth with pain in upper-left front tooth region

History revealed that the patient had a sudden fall in bathroom. She reported to the dental department post 24 hours of incident, during this time, tooth was collected from the incident place and kept in a bag of water by the parents. Health and family history were not significant. On extra - oral examination, the face was bilaterally symmetrical with soft tissue injuries on chin and lower lip.(FIG 2)



FIG 2- The face was bilaterally symmetrical with soft tissue injuries on chin and lower lip

Intraoral examination revealed permanent dentition with missing left maxillary lateral incisors #22. Ellis class 3 fracture in #12 Tender on percussion was positive i.r.t 12, bilateral Class I molar relation and fair oral hygiene status. #11, #21 were also checked for vitality.

On assessment, it was clear #22 came out due to fall. Extraoral time was more than 24 hours. Examination of avulsed teeth #22 showed intact crown with closed apex. (FIG 3)



FIG 3- #22 with intact crown, root & closed apex.

The alveolar socket was seen intact and closed irt #22.The diagnosis of avulsion was confirmed.

Treatment options for replacement of missing tooth #22, could be implant, RPD, conventional bridge, acrylic resin tooth, natural teeth pontic .The cost and efficiency of each option were explained. The patient decided to get a natural tooth pontic to replace the avulsed tooth. The treatment of #12 was planned as root canal treatment and composite build up followed

by PFM crown fabrication.The avulsed tooth was kept in saline till the day of procedure. Adjacent teeth were isolated, cleaned with pumice and dried. Natural tooth pontic was also cleaned and dried before manipulation.

The natural pontic in the given case was fixed using InFibra Reinforcement ribbon, BIOLOREN, Italy using direct technique in the oral cavity of patient.

The materials required were (FIG 4)

- a) 37% orthophosphoric etchant gel
- b) Nexcomp Flow, METABIOMED, flowable composite resin
- c) Packable composite A2 shade, NT Premium, COLTENE
- d) Bonding agent, Bond SL, COLTENE
- e) InFibra® Reinforcement ribbon, BIOLOREN, Italy
- f) BS300 Curing light, Waldent



FIG 4- Materials required

The required length of the FRC i.e 3mm (InFibra® Reinforcement ribbon ,BIOLOREN, Italy) fiber strip was predetermined by using dental floss as a template and then cut, using special scissors. The mid third of the distopalatal surface of teeth # 21 and mesiopalatal surface of #23 were prepared for a slot preparation, of dimensions, 2mm width and depth of 1mm. with airtor (FIG 5)



FIG 5- Slot preparation of 2mm width 1mm depth i.r.t #21 and #23

Next step was preparation of crown of natural avulsed tooth was done by sectioning of the crown from the root till cemento-enamel junction to achieve modified ridge-lap shape. Grooves of same dimension as adjacent teeth were made for easy adhesion of InFibra Ribbon connecting #21 and #23. (FIG 6)



FIG 6 - Modifying the midpalatal surface of avulsed #22

Its position was rechecked before bonding, to check for any occlusal or proximal interferences. #22 crown, #23 #21 were then etched with 37% orthophosphoric acid etchant for 15 seconds, bonding agent was applied and cured with curing light. A thin layer of composite resin (flowable composite, NexComp) was made to flow across the abutment teeth and the pontic. The precut InFibra fiber ribbon was thoroughly wetted by using the bonding agent and placed over the composite and cured.(FIG 7). A layer of packable composite was placed over. The modified crown was placed over the reinforced composite ribbon. (FIG 8a,b)



FIG 7- InFibra ribbon of 3mm width was placed at the desired location.



FIG 8a- The sectioned crown was placed on the fiber (palatal view)



FIG 8b- The sectioned crown was placed on the fiber (buccal view)

The occlusal interferences were rechecked in protrusion and lateral excursions. Finishing and polishing was done by using composite finishing discs and stones.

Follow up was done after 2 weeks. (FIG 9), where patient confirmed a good prognosis.



FIG 9- Follow up after 2 weeks.

Discussion

FRC's are modified composite material in which plastic matrix is reinforced by various types of thin fibers namely, glass fibers, kevler fibers, carbon fibers, polyethylene fibers with advanced properties.⁴ The fibers reinforced in composite, make it fracture tough than the conventional composites.⁵ According to Tayab et al. on evaluation, both glass fiber and polyethylene-fiber have good potential for reinforcement.⁶ InFibra which is high molecular weight polyethylene fiber is a modern, long-term solution, in the group of fiber reinforced composites. The InFibra Ribbon System is composed of highly crystallized polyethylene and white longitudinal fibers. These fibers are weaved, setting up a special network of fibers in a specific direction that allows complete imbibition with the majority of composite resin. The reinforcing phase made up of fibers, enhances the mechanical property of composite material while the resin matrix phase combines the fibers giving it, anatomic contour.⁷ Because of the almost invisibility of polyethylene fibers in a resinous matrix and enhanced properties of composite materials, these are the most appropriate and esthetic strengtheners of composite materials.⁸ According to manufacturer's instructions, InFibra Ribbon has elastic modulus 95Gpa, tensile strength 3.0 Gpa, specific weight 0.97 g/cm³, percentage of elongation 2,4%⁹. As such, no studies are done yet to establish these values. In a study by Pekka K Vallittu, fiber reinforced composite FPD's were claimed as a good alternative to cast metal resin-bonded FPD, clinically with a survival rate of 75% after 5 years.¹⁰ According to Rudo et al. covalent bonds formed between the Reinforcing fibers and matrix, minimize the crack propagation.¹¹ However, for a successful case, factors like appropriate patient selection, their motivation levels, plaque control, and precision

during placement of natural tooth pontic are very important.

Conclusion

Natural tooth pontic fixed with InFibra reinforced ribbon is a new approach for fixed partial denture with good prognosis and continues to be promising in tooth replacement.

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