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Case Report

Esthetic restoration of mutilated primary anterior teeth using ribbond – Report of two cases

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ABSTRACT

Early childhood caries is one of the most common and severe oral health problems among the children. It is associated with aesthetic and functional problems that can interfere in the personality and behavioural development of the child. Severe ECC in children leads to extensive breakdown of the tooth structure requiring placement of a intracanal post or retainer before restoration of the tooth. The present case series describes two cases of 4 and 5 year old children with severely decayed maxillary anterior teeth that were restored using Ribbond as a post material followed by resin-composite strip crowns.

1. Introduction

Early childhood caries is one of the most common and severe oral health problem among the children.The American Academy of Pediatric Dentistry (AAPD) defines early childhood caries (ECC) as the presence of one or more decayed (non-cavitated or cavitated), missing (due to caries), or filled tooth surfaces in any primary tooth in a child 71 months of age or younger. The Academy also specifies that, in children younger than 3 years of age, any sign of smooth-surface caries is indicative of severe early childhood caries (S-ECC).[1] The early loss of primary anterior teeth may result in reduced masticatory efficiency, loss of vertical dimension, development of parafunctional habits (tongue thrusting, speech problems), esthetic and functional problems such as malocclusion, space loss and psychologic problems that can interfere in the personality and behavioural development of the child.[2,3]

There has been a paradigm shift in the attitude of parents wherein a good portion of the society is more determined to maintain the primary teeth in the oral cavity of their children for as long as they should naturally last. However, severe ECC in children leads to extensive breakdown of the tooth structure that cannot be restored conventionally. Thus placement of a intracanal post or retainer becomes necessary before restoration of the tooth.[4] Posts may be constructed of a variety of materials, including metal screw posts, Ni-Cr coil spring posts, short composite posts, biologic posts which are procured from a tooth bank and short wire posts (omega or gamma loop).However, the difference in elastic modulus of dentin and that of these post materials may be a source of stress causing root fractures.

Ribbond (Ribbond Inc., Seattle WA) is an ultra high strength polyethylene fiber commercially available since 1992. This material is composed of pre-impregnated, silanized, plasma treated, leno-woven, ultra high molecular weight polyethylene fibres.[5] The elastic modulusof this material is close to that of dentin. This helps to reduce the incidence of root fractures.

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The present case series describes two cases of 4 and 5 year old children with severely decayed maxillary anterior teeth that were restored using Ribbond as a post material followed by resin-composite strip crowns.

2. Case Series

2.1. Case 1

A 4 year old boy was referred to the Department of Pediatric and Preventive Dentistry at JSS Dental College and Hospital, JSSAHER, Mysuru, Karnataka with a history of pain and swelling in the upper anterior region. The child's medical history was not relevant. Clinical and radiographic examinations revealed severe breakdown of the upper incisors. The child's parents were adamant on saving the tooth.Endodontic treatment followed by esthetic rehabilitation was determined as the treatment plan. Since the teeth were severely decayed esthetic rehabilitation using Ribbond as a post material followed by restoration using resin-composite strip crowns was planned. The parents were informed about the treatment plan and a written consent was obtained. The treatment was implemented in two phases- phase 1: Endodontic treatment and phase 2: Esthetic rehabilitation.

Fig. 1: Preoperative frontal view (Case 1)

2.1.1. Phase 1: Endodontic treatment

The patient was anesthesized using 2% lignocaine gel for topical anesthesia followed by local infiltration using Lignocaine with vasoconstrictor (1: 80000). Access opening was done using No. 4 round bur and the working length of the canal was determined using a No. 15 K-file. Canals were prepared up to a No. 30 K-fileand were obturated with a calcium hydroxide–iodoform paste (Metapex; Meta Biomed Co., Cheongiu City, Korea)followed by restoration with a temporary cement.

2.1.2. Phase 2: Esthetic rehabilitation

The temporary cement was removed and space was created for the intracanal post by removing Metapex from the

Fig. 2: Placement ofRibbond post (Case 1)

Fig. 3: Ribbond post cured (Case 1)

Fig. 4: Postoperative frontal view (Case 1)

Fig. 5: Preoperative frontal view

Fig. 6: Postoperative frontal view

coronal portion of the root canals (3 mm). A Williams probe was used to confirmthis length. A thin layer of GIC was placed inside the canals to isolate the obturating material.

A 2 mm wide Ribbond fibre was cut to a length of 10mm. Care was taken not to contaminate the Ribbondfiber.

Root canal walls were prepared to receive the Ribbond post by etching with 37% phosphoric acidfor 15 seconds, washed for 30 seconds and dried. A bonding agent was applied using a microbrush and gently air dried to evaporate the solvent and cured.

The Ribbond was placed on a paper pad and was coated with a thin layer of bonding agent. It was protected from exposure to light until ready for use. Following this the length of the fibre was folded over itself and the inserted in the canal so as to maximise the reinforcement of the canal with the fiber. Ribbond was stabilised with flowable composite() keeping 2 mm of the fiber above cemento-enamel junction and then cured. Utmost care was taken to make sure not to leave any voids in the root canal space. The coronal restoration was completed using resin-compositestrip crowns (Strip Crown Form- Pedo; 3M/ESPE).

After the restoration was completed, the patient and his parents wereinstructed on proper dietary and oral hygiene habits as well as the importance of regular follow up.

2.2. Case 2

A similar case of a 5 year old child with parents adamant to save his front tooth reported to Dept of Pediatric and Preventive Dentistry. Clinical and radiographic examinations revealed severelydecayed 51 and 52 with minimal tooth structure requiring endodontic treatment followed by intracanal post placement and restoration with composite-resin strip crowns.Whereas, 61 and 62 could be restored directly with composite-resin strip crowns post endodontic treatment.

Treatment was carried out in 2 phases similar to the above case. In phase 1 endodontic treatment was carried out for all upper incisors. In phase 2 Ribbond post was placed in 51 and 52 as explained in the previous case report followed by restoration with composite-resin strip crowns. 61 and 62 were directly restored with composite-resinstrip crowns. Post operative instructions were given.

Both these patients are on regular follow up since 3months.

3. Discussion

The early loss of primary anterior teeth not only reduces masticatory efficiency and causes speech problems but also has a psychological impact on children due to poor esthetics. In the past, the only treatment optionfor severely decayed teeth was to extract them. However,numerous techniques and materials are available currently.[6] Therefore, if the importance of preserving primaryteeth is explained to the parents well, it will lead to more number of primary teeth being restored rather than extracted. In the present cases also, the parents were motivated to save the teeth, although they were so critically broken down. As the coronal tooth structure was compromised a post and core was required to enhance distribution of stress and improve retention of the restoration.[7]

Prefabricated metal posts were used in the past. However, it did not take into account the individual shape of the root canals and also caused esthetic concerns owing to their colour.Composite posts on the other hand offered reasonable esthetics. Nevertheless they were associated with inherent polymerization shrinkage that could result incompromised retention. Another alternative was to use wire loops withdifferent shapes like alpha, omega, gamma, and delta, as posts for primary teeth. However, wire curved in different shapes and bonded within the root canals caused stresses in the dentin.A post that has modulus of elasticity similar to that of dentin will equally distribute stress over a broad surface thereby preventing root fracture.

In recent years, various types of fiber reinforcement with an elastic modulus close to that of dentin have come into widespread use one of them being Ribbond.[8] Sirimai et al., reported that the polyethylene fiberwas effective in reducing the incidence of vertical root fractures and the failure thresholds were significantly lower than that of conventional cast posts.[9]

Ribbond is a colourless and translucent material that allows aesthetic restorationswhich can be cured with light-

cured composites.The material has a three dimensional structure due to the leno weave. Leno-weave is a special pattern of cross linked, locked-stitched threadswhich increase the durability, stability and shear strength of the fabric.[10] The open and lace-like architecture of the leno-woven ribbon allows it to adapt closely to the contours of the teeth and dental arch.

Ribbond, as an intracanal post offers a solution that is both esthetic and simple, because its relatively easy to manipulate andrestorations can be completed without a laboratory phase.Also there is no metal component involved which needs to be masked while building the core and crown with composite.

In constructing the short posts, regardless of the type of post used, primary teeth should only be filled to approximately one-third of the root length to avoid interference in the eruption of permanent tooth.[3,11] Ribbondis placed to fill only the cervical one-third of the canals contrary to other posts that require longer length for retention. According to Memarpour et al., Ribbond posts with composite restorations in primary teeth showedexcellent clinical performance.[12] Considering these advantages Ribbond was used as a material of choice for these cases.

Many clinicians prefer resin-bonded composite strip crowns to restore primary incisors, owing to its superior esthetics and the ease of repair.[13] Enhanced bonding between Ribbond and resin- bonded composite strip crowns creates a single block of the post, core, and crown. This favours transmission of occlusal forces and increases resistance against debonding of the entire unit. Thus, resin-bonded composite strip crowns were used for esthetic rehabilitation of the teeth in the present cases.

4. Conclusion

It is impossible to overstate the importance of keeping primary anterior teeth until their natural exfoliation time. Ribbond can be used as a short post to restore severely deteriorated primary anterior teeth, as seen in the case series presented above. It could be a viable alternative to conventional treatments. However, clinical studies are needed to assess the long-term success of Ribbond usage in paediatric dentistry.

5. Source of Funding

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6. Conflict of Interest

None.

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