

Reattachment of the Fractured Anterior Tooth using Ribbond Fiber with Fibrafill Cube - A Case Report

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Abstract: *Aim/Objective: Reattachment of the fractured anterior tooth using Ribbond fiber with Fibrafill Cube. Conclusion: Considering the limitation of this in vivocase report, it can be concluded that reattachment of fractured tooth can be done with invasive approach by placement of ribbond fiber and fibrafill cube without much loss of radicular dentin.*

Keywords: Fibrafill Cube, Ribbond fiber, Flowable composite

1. Introduction

The maxillary incisors are primarily affected by coronal fractures of the anterior teeth because of their position in the arch. The location of the fracture, the size of the broken pieces, the periodontal condition, pulpal involvement, root maturation, biological width invasion, occlusion, and time are all factors that affect how coronal tooth fractures are managed.¹

Crown fractures have been found to account for up to 92% of all severe injuries to the permanent dentition, according to Divakar and Nayak's 2007 paper. Permanent incisor coronal fractures account for 18–22% of all dental hard tissue damage, with enamel and dentin accounting for 28–44% of simple and 11–15% of complex fractures (enamel, dentin, and pulp).²

Dental trauma that affects both primary and permanent teeth frequently take the form of anterior tooth coronal fractures.

It significantly affects a patient's social and psychological well-being.³

The following are some variables that affect how coronal tooth fractures are treated:⁴⁻⁶

- Size of the fracture (biological width, endodontic involvement, alveolar bone fracture).
- The tooth's fracture pattern and ability to be repaired (associated root fracture).
- Traumatic secondary injuries (soft tissue status).
- The existence or absence of a broken tooth fragment and its suitability for usage (fit between fragment and the remaining tooth structure).
- Prognosis, budgets, aesthetics, and occlusion.
- Location and Size

Clinical assessment of # teeth include

1) Periodontal examination

Under local anaesthesia, gentle probing around the periodontal tissues of the broken tooth will help identify the degree of the fracture as well as whether a vertical

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root fracture is present. The process for reattachment will be simple if the fracture line is supragingival. Nevertheless, instead of reattachment, surgical or orthodontic extrusion of the tooth's apical section for replacement with a post retained crown may be required when the fracture location is subgingival or intraosseous.

- 2) Endodontic assessment in addition to clinical examination for pulpal exposure, vitality tests and periapical radiographs should be used to determine the pulp's health and the stage of apex maturation.
- 3) Coronal examination: It can be essential if there are many fragments present.⁷

2. Case Presentation

After an accident two days prior, a 12-year-old boy presented with severe pain and two broken teeth in the region of the upper front teeth. Additionally, the patient displayed a broken-off piece of the tooth. (Fig 1)

An oblique crown fracture was discovered on teeth 21 and 22 on clinical examination. The fracture originated in the middle third of the crown labially and extended transversely until the junction of anatomic crown and anatomic root, just below the cemento-enamel junction subgingival on the palatal aspect. The patient reported experiencing trauma in the upper front area while playing. The depth of the probing was normal, and there was no concomitant soft tissue damage to the teeth. It was determined that the maxillary left central incisor had a complex crown fracture. No medical history was provided. On a radiograph, the root development was complete, and the apex was closed with no periapical radiolucency.

The patient was informed of every available treatment choice. The patient consented to choose the fractured fragment assessment and reattachment surgery. It was gained consent. It was administered a local anaesthetic made of 2% lidocaine and 1: 80,000 adrenaline (XICAINE). The palatal aspect had a subgingival fracture line. It was discovered that the broken fragment was held in place by the palatal gingival tissue after removal. Pulp chamber was involved in the fracture line. Hence, a Crown lengthening treatment was performed for this.

To get rid of any pulpal tissue, the tooth fragment was thoroughly washed with 2% sodium hypochlorite before being placed in normal saline for storage.

Root canals were sealed with gutta-percha and a resin-based sealant utilising the lateral compaction technique after being cleaned, shaped, and the irrigants were sonic activated. The filling's apical 5 mm was left in place to continue maintaining a good seal after the gutta-percha was partially removed. The root canals were etched, washed for 60 seconds, dried with absorbable paper points, and then a ribboned fibre with flowable composite was placed. The ribbon fibre was placed and the flowable composite was cured in accordance with the manufacturer's instructions. Over the ribbon fibre, a fibrafill cube was placed so that only half of the cube was inserted into the root canal.

At the centre of the original crown fragment, a trough was made. The dental crown fragment was then partially etched for 20 seconds with 37% phosphoric acid gel, rinsed for 60 seconds, and dried with absorbable paper points.

On the dental crown fragment, a bonding agent was placed and allowed to cure for 20 seconds. Then, flowable composite resin was put to the original crown piece and the healthy coronal region of the tooth. As directed by the manufacturer, the original fragment was then precisely positioned and photopolymerized.

After examining the occlusion, the patient received postoperative instructions. Immediately following surgery, a radiograph was taken and patient was recalled for follow up after 1 week.

3. Discussion

With positive benefits such original colour matching, contour preservation, contact preservation, and incisal translucency, tooth fragment reattachment is a more conservative, inexpensive, and quick treatment alternative than other methods.⁸

A gap of 2-3 mm must exist between the bone crest and the restoration's apical limit in order to maintain periodontal health.

As metal posts have a higher elastic modulus than dentin, they frequently result in catastrophic root fracture during such treatment techniques. This causes root dentin to experience hazardous, nonhomogeneous stresses.⁹

Recent studies suggested using Fibre post, which better protects the integrity of the root, to solve these drawbacks. Root stress like that on an intact tooth is produced by dentin's lower modulus of elasticity. In addition, glass fibre posts (GFPs) are aesthetically pleasing, biocompatible, and do not discolour at the gingival margin.^{10,11}

Glass fibre posts had the drawback of losing more radicular dentin during post space preparation. Thus, in this instance, ribboned fibre and a fibrafill cube have been used to overcome problems.

A FRC composed of polyethylene fibres is called ribbon. It is a 215-fiber spectrum with an extremely high molecular weight. These fibres offer a strong resistance to stretch and distortion thanks to their extremely high coefficient of elasticity (117 Gpa). Due to its closed stitch design and high flexibility, they also have a very strong traction resistance (3 Gpa). Moreover, bondable reinforcing fibres have an impact strength that is five times greater than that of iron.¹²

Micro hybrid radiopaque, light cured composite with incorporated fibres make up the Fibrafill system. It is a direct restorative substance. Fibrafill cube is comparable to a steel skeleton because it is made of specifically treated inorganic fibres that give composite restorations and damaged hard dental tissues strength.

The design of the Fibrafill system was allegedly inspired by the structural features of an unbroken tooth, per the

manufacturer's instructions. This material's ability to reduce polymerization stress as a result of its optimised composition and inclusion of reinforcing fibres is another distinctive quality.

As a simple and effective method for treating injured anterior teeth, the combination of Ribbond fibres with

Fibrafill cubes as root canal posts and reattachment of an original crown fragment appears to provide outstanding aesthetic and functional results.

Figure Legend:



Figure 1: (a) pre-Operative clinical photograph (b) pre-Operative clinical radiograph, (c) Fractured tooth fragment (d) Placement of Fibrafill cube enclosed with ribbond fiber in root canal after sectional obturation (e) Post Operative clinical photograph (f) Post Operative clinical radiograph.

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