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GIC as fiber post cementation material: A case report

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Abstract
Treatment prognosis in a traumatically injured tooth depends on the post endodontic restoration. FRC-supported post endodontic restorations have been extensively used due to their superior properties. Despite GIC showing promising results, it is infrequently used for cementation of fiber posts; whereas resin cements are highly preferred for the same. This case report describes a successful management of a complicated crown fractured anterior tooth of a 12-year-old patient by using GIC as the fiber post cementation material.

Keywords: GIC, FRC, post, cementation, zirconia, crown, complicated, fracture

1. Introduction
Traumatic dental injuries have a prevalence of about 4-35% amongst adolescents in India with the maxillary central incisors being the most affected tooth [1]. Treatment of complicated crown fracture involves root canal treatment followed by intracanal post-supported crown reconstruction [2]. Conventionally, resin cements are used for cementation of the Fiber Reinforced Composite (FRC) posts. However, cementation using resin cements is quite technique sensitive and have high chances of bonding failure [3]. The self-adhesive resin cements however are less technique sensitive but are expensive and often require an additional material (silanes) for enhanced retention.[3] In comparison to the resin cements, glass ionomer cement (GIC) is cheaper and less technique sensitive. Also dentin penetrability and push-out bond strength of GIC was found to be similar to self adhesive resin cement and higher than conventional resin cements in ex-vivo studies [4, 5]. But, clinical cases describing GIC as a fiber post cementation material are infrequently reported in the literature. Herewith, a case report is described where a complicated crown fracture in a 12-year-old patient is managed by endodontic treatment followed by GIC cemented intracanal FRC post and zirconia crown.

2. Case report
A 12-year-old female patient reported to the outpatient department with the chief complaint of broken front tooth following a traumatic fall from bicycle 2 months back. Extraoral examination revealed no significant finding. Intraoral examination revealed complicated crown fracture in the permanent maxillary left central incisor (21) which was discolored suggesting non-vital pulp (Fig 1). There was no tenderness on percussion and palpation. Radiographic examination revealed that the fracture involved enamel, dentin, and pulp (Fig 2). A negative result was obtained from electric pulp testing done on the affected tooth. A diagnosis of Ellis Class IV fracture was made. Therefore, a decision was taken to manage the affected tooth with root canal treatment followed by FRC post& core supported zirconia crown.
Anaesthesia and rubber dam isolation of the affected tooth was done. Access cavity was done with round and tapered fissure diamond burs (API) respectively. The necrotic pulp was extirpated with barbed broach (Mani barbed broaches). Working length was determined as 21mm by the radiographic method. The root canal was prepared following standardized technique upto no. 60 k file (Mani-K Files) and was irrigated with 5% NaOCl for 5-10 minutes in between every change of instrument followed by normal saline. The canal was dried with paper points (Waldent) and then obturated with gutta percha (Diadent) (Fig 3).

The root canal was prepared for the post placement by removing the gutta-percha from the coronal two-third of the canal with peeso reamers (Mani Peeso Reamers). The FRC post (Ivoclar Vivadent) (Fig 4) was tried in the canal and adjusted to the desired length. Glass ionomer cement (GIC-GC Gold Label 1 Luting & Lining) cement (Fig 5) was mixed according to the manufacturer's instructions and placed into the canal using lentulo spiral (Mani Lentulo spiral). The post was positioned and cemented into the canal followed by removal of excess cement using a microbrush (Fig 6). The core was prepared using composite. Tooth preparation was done for zirconia crown placement (Fig 7). Upper and lower arch impressions were made followed by fabrication of cast (Fig 8). Tooth shade was checked. The zirconia crown (API) was finally cemented w.r.t. tooth 21 using type 1 GIC (Fig 9 and 10). Patient when recalled after 1 week and 1 month reported satisfaction and increased confidence with the performed treatment.

Fig 1: Pre-operative photograph

Fig 2: Pre-operative radiograph

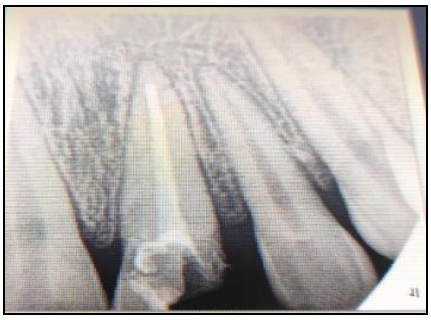

Fig 3: Post endodontic radiograph

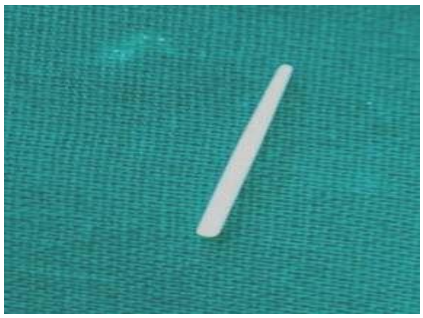

Fig 4: FRC Post

Fig 5: GIC

Fig 6: Post cemented with GIC

Fig 7: Crown preparation

Fig 8: Dental Cast being made

Fig 9: Zirconia crown on cast

Fig 10: Post-operative photograph

3. Discussion

Traumatic dental injuries, most commonly affecting the permanent maxillary central incisors result in the impediment of function, structure, esthetics, and psychosocial confidence of an individual [1]. Endodontic treatment generally needs to be performed in teeth with Ellis Class IV fracture [6] . But, insufficient crown structure generally demands the placement of intracanal post-supported crown restorations [7]. Fiber-reinforced Composite (FRC) posts have been quite popular in this regard owing to better durability, high fatigue resistance, elastic modulus similar to dentin, better translucency, and esthetics [3]. The conventional post cementation materials are resin cements; however regular resin cements have the disadvantages of high technique-sensitivity and bonding failure, the self adhesive resin cements have the disadvantages of high cost, reduced bond strength, and debonding [3, 5]. Bonding failure of the resin cements are mainly attributed to the unfavorable geometric features of the root canal, high C factor, post etching water residue, chemo mechanical pretreatments of the fiber post surface which may disrupt the microstructure of the fiber posts, adhesive failure, and insufficient curing [5].

In this context, glass ionomer cements can be utilized as alternatives to resin cements for fiber post cementation. GICs can interact chemically and micro-mechanically with tooth structure, present-better visco-elastic properties for bond integrity preservation than the stiffer resin cements, post maturation hygroscopic expansion utilizing the residual water source that counters the initial setting shrinkage and allows gap elimination between the post, cement and dentin, and fluoride release [5]. Also GIC does not depend on hybrid layer formation or access to light for adequate bond strength unlike the resin cements [5].

Considering all the above factors, it can be concluded that GIC is effective as a fiber post cementation material.

Zirconia (zirconium dioxide, ZrO_2) due to its favorable features (low corrosion potential, low thermal conductivity, good biologic compatibility, excellent mechanical properties and good radiographic contrast is the the material of choice for crown reconstruction where high functional and esthetic issues are concerned [8, 9].

Therefore, management of a traumatically injured non-vital permanent anterior tooth can be accomplished by endodontic treatment followed by FRC intracanal post cementation with GIC and crown reconstruction with zirconia ceramic.

4. Conclusion

This case report describes an alternative, less preferred approach to fiber post cementation using glass ionomer cement (GIC-Luting and Lining type). Fiber post cementation with GIC is effective, cost-efficient and less technique-sensitive. Therefore, GIC as a fiber post cementation material should be more widely utilized.

5. References

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