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(CASE REPORT)

# Aesthetic Rehabilitation of mutilated anterior teeth with 2 years follow up – A Case Report

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## Abstract

The presented case is unique by managing mutilated mandibular incisors with two canals, using EverStick post. A 14-year-old female patient *complaint of mild intermittent pain in lower front tooth region since* 10 days. Clinical examination revealed distoproximal caries in the lower left central incisor (tooth #31) and mesioproximal caries in the lower left lateral incisor (tooth #32). The teeth were tender to percussion. No relevant medical history was elicited. A diagnosis of *symptomatic irreversible pulpitis with symptomatic apical periodontitis* in relation to tooth #31 and 32 was made. Treatment plan was fabricated as rehabilitation of the teeth with post and crown. On 2 year follow-up adequate radiographic healing has been observed, highlighting their efficacy in achieving reliable and aesthetically pleasing outcomes in endodontic procedures. EverStick posts provided reinforcement to the weakened structure of mutilated teeth with variable canal anatomy. EverStick posts have proven effective in achieving long-term success, with notable improvements in restored teeth's durability and survival rates, thereby enhancing the overall prognosis.

**Keywords:** Case report; Everstick post; Mandibular anterior; Rehabilitation; Two canals.

## 1. Introduction

A fundamental requirement for efficient RCT is possessing comprehensive expertise about both the typical canal anatomy and its potential variance.1 Following the understanding, restoration of an endodontically treated tooth is essential for determining its long-term prognosis and is a critical factor in treatment planning. 2 Enhancing aesthetics holds particular significance for anterior teeth, as dentofacial attractiveness significantly impacts an individual's psycho-social well-being.3 Due to trauma, caries, endodontic access preparations, and past restorations, a tooth that has undergone root canal treatment often exhibits substantial loss of coronal structure.4 In such cases posts ensure the tooth's functionality and structural integrity. The main function of a post is to retain the core and spread occlusal forces throughout the tooth structure. The effectuality of a post is determined by various components, such as length, diameter, the thickness of remaining dentin, and how well the post fits within the tooth.5

Everstick Posts ideally possess elasticity comparable to dentin, aiming to diminish stress concentration at the interface, thus promoting even force distribution and minimizing the risk of radicular fractures. Glass fiber-reinforced posts exhibit greater flexibility compared to carbon fiber posts due to their less rigid fibers. This flexibility, closer to that of dentin, contributes to their enhanced adaptability within the root canal. The E-glass fiber or EverStick post is constructed from resin-impregnated unpolymerized glass fibers, offering advantages over conventional glass and carbon fiber posts in terms of tooth preparation. Other advantages include superior bonding capability, increased flexibility, improved flexural strength, and superior aesthetic results.6

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Aesthetic considerations in dentistry are subjective, with harmony being more than a matter of strict mathematical proportions. While facial and smile guidelines are valuable, it's crucial to recognize and incorporate each patient's unique characteristics. In dental aesthetics, the primary goals include achieving pleasing tooth proportions individually and in relation to each other, as well as creating a harmonious tooth arrangement that complements the patient's gingiva, lips, and facial features.[7]

During endodontic procedures, certain root canals may remain undetected due to inadequate knowledge of root canal morphology or insufficient investigation for accessory canals. The accurate detection and thorough obturation of these accessory canals are critical in substantially improving the prognosis of endodontic therapy.8 Typically, mandibular anterior teeth feature a single root and canal around 60-65%. However, some of these teeth may exhibit variations with two roots or two canals.9 A prior study done by Verma et al in 2017 revealed that the occurrence of two canals in mandibular central and lateral incisors is reported to be 30-36 %.10

In this case report, we presented the successful rehabilitation of a mandibular incisor with two canals using EverStick post. Through meticulous treatment planning and the utilization of advanced materials, we aimed to highlight the efficacy of EverStick posts in achieving durable and aesthetically pleasing outcomes in endodontic procedures. This approach underscores the significance of evidence-based practice in modern endodontics.

## 2. Case discussion

A 14-year-old female patient reported to the department of Conservative Dentistry and Endodontics with the chief complaint of mild intermittent pain in relation to lower front tooth region since 10 days. On taking the history, the pain was sudden in onset, mild, intermittent, and aggravates on consuming beverages. No relevant medical history was elicited

Clinical examination revealed interproximal caries in lower left central and lateral incisor (tooth # 31,32). Cold Vitality testing of teeth 31 and 32 elicited an intense lingering pain. The teeth were tender to percussion. There was no mobility and the periodontal probing all around the tooth was found to be well within the physiological limits.

A preoperative IOPA revealed mesio-proximal caries involving the pulp space with periapical radiolucency and a fast break in root canal suggestive of an unusual anatomic configuration of the root canals. From the clinical and radiographic findings, a diagnosis of symptomatic irreversible pulpitis with symptomatic apical periodontitis in relation to tooth #31,32 was established (according to glossary of endodontic terms by AAE – March 2020), and a treatment plan of RCT followed by rehabilitation with everstick post (GC Europe, Leuven, Belgium) and core with a a full coverage restoration was suggested to the patient.

Informed consent was obtained from the patient. In the first visit, local anesthesia was administered to the mandibular left central and lateral incisors using 1.8mL of 2% lidocaine with 1:80,000 epinephrine [Lignox 2% ADR INJ, Indoco Remedies Ltd. (Warren ,Pharma), Mumbai, MH, India] via inferior alveolar nerve block technique. Under rubber dam isolation and magnification (6x) the caries were excavated using large BR#31 round bur ( Mani, Inc., Utsunomiya, Japan) followed by a pre endodontic build-up of the distal and the mesial wall using resin based restorative composite ( Spectrum Composite, Dentsply , Weybridge, Surrey, United Kingdom).

Tooth was isolated with rubber dam and under dental operating microscope(DOM) (Leica M320) access opening was initiated with an endodontic access bur #2. (Dentsply Maillefer, Tulsa, Oklahoma, USA). While examining the pulpal floor using a DG16 endo explorer (Hu-Friedy, Chicago, Illinois, USA), a catch was detected lingually in the pulp chamber; an additional root canal orifice was located lingually in the pulp chamber (Figure1). Coronal flaring was done using the Pro Taper SX rotary file (Dentsply Maillefer, Tulsa, Oklahoma, USA) to establish straight-line access. The patency was confirmed with the SS hand 10k file (Mani, Japan) Working length was determined using an apex locator (Root ZX Mini; J Morita, Japan). The presence of 2 canals was confirmed by same lingual opposite buccal rule in IOPAR of # teeth 31and 32 (Figure 2 & 3). The cleaning and shaping was done with the 20k SS hand files (Mani, Japan), followed by rotary instrumentation up to 20-4% in both the canals. Subsequently, the canals were irrigated with 2.5% sodium hypochlorite (NaOCl) (Prime Dental Products, India), saline solution, and lastly, 17% ethylenediaminetetraacetic acid (EDTA) (DeSmear, India).

**Figure 1** Orifice location

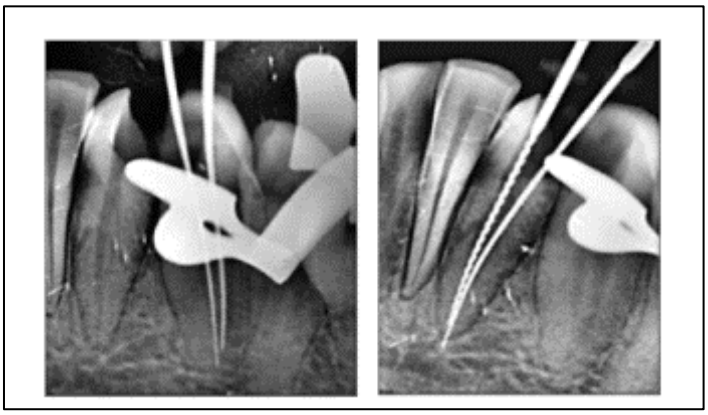


**Figure 2 & 3** Working length determination

The master cone radiograph was confirmed and checked for tugback (Figure 4 & 5). The root canals were dried with paper points and obturated with lateral condensation technique using AH Plus sealer (De Trey; Dentsply, Konstanz, Germany) (Figure 6). The diagnostic impression with cast was made for reference (Figure 7). The post space was prepared in the straight lingual canal using #2 peeso reamers (Mani, India), conforming to the root canal anatomy, leaving 5mm of gutta-percha apically (Figure 8). This was followed by the placement and cementation of an EverStick post using a dual-cure resin (MulticCore Flow, Ivoclar Vivadent Schaan Liechtenstein) as per the manufacturer's guidelines (Figure 9). Following this core build up using resin-based restorative composite material. Tooth preparation was performed for all-ceramic crown and impression was recorded which was followed by the cementation of the crown (Figure 10). 2 year follow up radiograph shows adequate periapical healing of teeth # 31 and 32 (Figure 11).

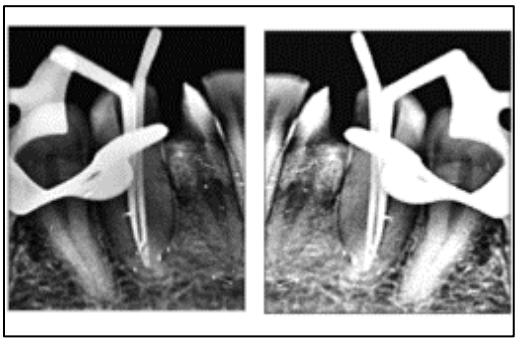
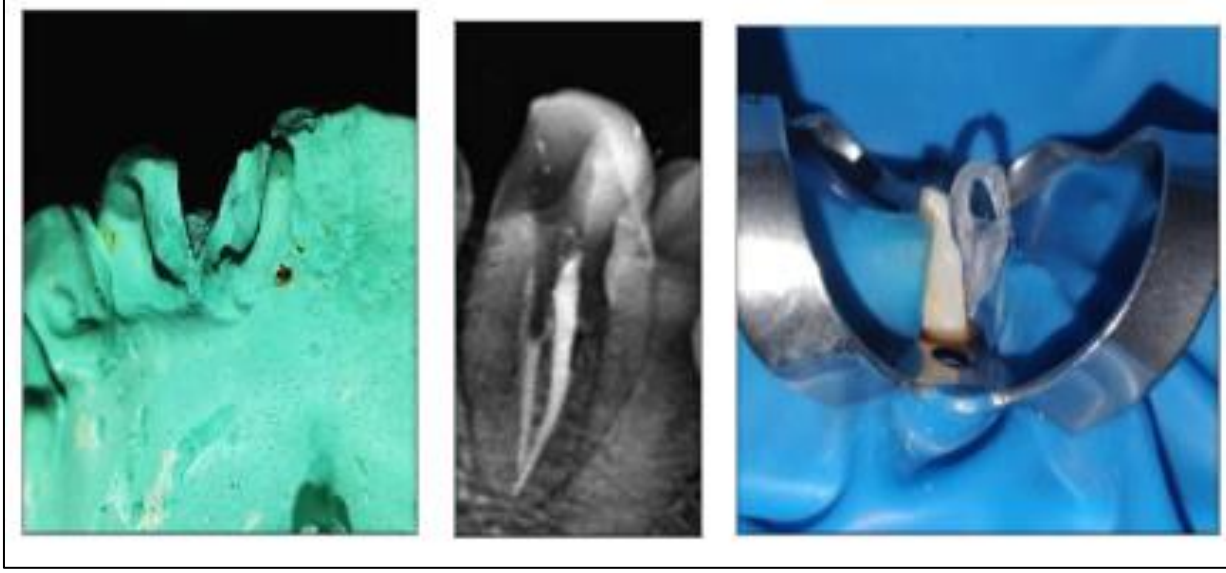


**Figure 4 and 5** Master cone determination

**Figure 6** Obturation



| **Figure 7** Diagnostic cast | **Figure 8 P**ost space prepared | **Figure 9 E**verstick post placement |
|---|---|---|

**Figure 10** All ceramic crown cementation

**Figure 11** 2 years follow up

## 3. Discussion

In certain cases, mandibular incisors exhibit dissimilarity in their pulp system, deviating from the typical pattern. In 1974, Vertucci reported that 25% cases had 2 canals in mandibular lateral incisors.11 Individuals of East Asian origin were found to have less prevalence and a high prevalence in European origin of second canal in mandibular incisors according to Walker in 1988.12 In 1997, Miyashita et al. discovered that 12.4% cases had 2 canals in extracted mandibular incisors; however, 2 apical foramina was seen in 3% cases only.13 A study in 2006 by Al-Qudah and Awawdeh found that 26.2% of mandibular anterior teeth exhibited a 2nd canal.14 In 2011, Boruah et al. conducted an evaluation of the morphological characteristics of mandibular incisor root canals in the north-eastern population of India. Their findings indicated that 36% of the samples had 2 canals, with none of the samples (0%) demonstrating a configuration of type IV.15 Hence, there is always a possibility of the presence of a 2nd canal.

What distinguishes this case is the placement of a fiber post in one of the canals of mandibular incisors with two canals.

- 1)The challenge lies in the limited remaining dentinal structure of the root between the canals after endodontic treatment, making the preparation of a post space challenging.
- 2)There is a constant risk of root fracture vertically or the merging of the 2 canals due to the excess dentin removal between them.1

3)Stresses arise from the forces exerted during mastication on a structure. These stress concentrations have the potential to induce material failure by causing crack formation, thereby increasing the susceptibility to fatigue failure.16

Researchers have assessed a range of post materials, including cast, glass, polyethylene woven, and carbon, among others. The consensus from these evaluations is that Fiber-Reinforced Composite (FRC) posts represent a promising alternative to traditional, rigid root canal post materials. This preference is attributed to their modulus of elasticity, which closely resembles that of dentin. This similarity helps diminish the risk of root fracture, emphasizing the potential benefits of FRC posts in enhancing the structural integrity of treated teeth.17

The Everstick post is an adaptable glass fiber post infused with resin and featuring an uncured, interpenetrating polymer network resin matrix. It can be cured to fit the specific shape of the root canal.. Notably, this method stands out as the resin-impregnated, unpolymerized glass fiber post that closely acclimatise to the root canal's anatomy and achieves substantial flexural strength. Furthermore, by completely filling the root canal system with glass fibers, it offers maximal support to the crown structure, and on curing these fiber-reinforced posts demonstrate significant tensile strength and an elastic modulus akin to dentin. This characteristic enables even distribution of occlusal stress throughout the root structure, thereby minimizing the risk of root fracture .18

## 4. Conclusion

In conclusion, the treatment of mandibular anterior teeth using Fiber-Reinforced Composite (FRC) posts[ Everstick posts], presents a promising and contemporary approach. The flexibility and adaptability of FRC posts to the root canal's morphology, combined with their ability to achieve high flexural strength after curing, making them a valuable choice in enhancing the structural integrity of treated teeth. Embracing FRC posts in the treatment of mandibular anterior teeth not only addresses structural concerns but also contributes to the longevity and success of restorative interventions.

## Compliance with ethical standards

### *Disclosure of conflict of interest*

No conflict of interest to be disclosed.

### *Statement of ethical approval*

Informed consent was obtained from the patient for the publication of this case report and any accompanying clinical images. The report follows the principles outlined in the Declaration of Helsinki..

### *Statement of informed consent*

"Informed consent was obtained from all individual participants included in the study.

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