A Novel Method for Managing Flared Root Canal with Anatomic Post and Core: A Case Report

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ABSTRACT

The compromised tooth structure after endodontic treatment necessitates the use of post and core for structural durability. Management of the flared root canal is still a tough obstacle for the clinicians. Reinforcing the root canal space with the customised anatomic post thus regains the lost structure within the canal and aids in establishing a great strength and stability to the tooth structure. The report of this case scenario aims on clinical technique of fabricating anatomic post with glass - fibre posts and composite resin on a central and lateral incisor.

Keywords: anatomic post, canal rehabilitation, flared root canal, pre-fabricated post, resin composite.

I. INTRODUCTION

The rehabilitation of root canal treated tooth is still an obstacle to face for clinicians specifically when there is commendable loss of tooth structure [1]. There are multiple reasons for an endodontically treated teeth to have diminished root strength. Some of them include, internal resorption, over instrumentation, tooth decay, immature development, restoration that require aggressive preparation of post space, and tooth fractures [2].

For customising the post, traditional cast post is considered to be the appropriate choice as they closely adapt to the canal walls, ensures enhanced fit and great retention. But, according to literature evidence, these posts present with high elastic modulus leading to fracture of the root, due to greater stiffness, inhomogeneity between metal and dentin [3]. A bulky metal post in the dentin has high tendency to ledge the dentin wall while functioning and hence cause a failure of the restoration within a shorter period of time.

In the present scenario, the usage of pre-fabricated fibre post is drastically increased in the field of restorative dentistry because it is more aesthetic, biologically compatible and can be bonded to the composite with an ease. Also, the elastic modulus of glass fibre post matches with that to the dentin, which in turn reduces the chances of catastrophic fractures as they show flexion along with the tooth during function and provide favourable stress distribution.

The usage of prefabricated fibre post in the flared canals increased the usage of luting cement, which lead to the formation of voids and reducing the strength of the monobloc created within the flared root canal which causes an early debonding of the prosthesis [1].

The present case report depicts the clinical technique in fabrication of anatomic post and core on a central and lateral incisor with flared canals, for a successful restoration.

II. CASE REPORT

A female patient aged around 25 years, visited the institution with the primary complaint of broken upper front teeth. Patient briefed history of usage of faulty prosthesis in that region without any root canal treatment history.
Radiographic examination revealed a flared root canal with 3-4 mm of tooth structure present supracrestally. After clinical and radiographic evaluation, a decision was made to treat the teeth with root canal therapy and followed by restoring the lost tooth structure with the anatomic post and core (Fig. 1).

After gaining the access into the canal, 5.25% sodium hypochlorite was irrigated eventually and followed by establishing a proper working length. Cleaning and shaping of the canals were performed with the hand files (K files) up to size 80, as the canal was flared. Then the obturation was completed with the lateral condensation technique.

In the following visit the crown lengthening was done with a diode laser (Indielase, 980 nm) to gain 2 mm of the margin around the teeth for the final crown placement (Fig. 2).

Peeso reamers were used to prepare the post space (MANI, Japan) (Fig. 3). A size 4 glass fiber post was selected and checked for the fit and it was noted as poorly fitting in the canal. Henceforth it was decided to fabricate an anatomic post. The canals were lined with Glycerine based oil. Silane (Ultradent, USA) was applied on the intended fibre posts for a minute. Following this, a nano hybrid composite resin (Filtek Z250 universal) was adapted to the post which was then loosely placed in the canal to replicate the canal anatomy. Initial light curing for 20 seconds was done inside the canal and followed by an additional extra oral curing for 20 seconds (Fig. 4).

Finally, the post was checked for the fit inside the canal clinically and radiographically and the canal was prepared for the final luting (Fig. 5). The canal was thoroughly washed with 17% EDTA for 1 minute to remove the smear layer and followed by rinsing and drying the canal. The prepared anatomic post was then etched with 37% phosphoric acid (Total etch, Ivoclar Vivadent) for 15 seconds and also, the teeth were selectively etched with the 37% phosphoric acid followed by rinsing and drying. A single step self-etch adhesive system (Futurabond DC) was thoroughly coated in the canal and excess was removed with the paper points. This was followed by light curing for 20 seconds. The post surface and the canal were then layered with a dual cure, flowable post luting and core build-up cement (Rebilda DC, Voco Germany) and the prepared post was seated into the canal with slight pressure. The core buildup was done with the excess cement used for luting and all the margins were light cured for 20 seconds.

The crown preparation was completed after cementation of the anatomic post (Fig. 6). An addition silicone impression (Aquisil, Dentsply USA) was recorded, and Layered zirconia joint crowns were fabricated and cemented (Fig. 7).

Fig. 1. Preoperative aspect.
Fig. 2. Crown lengthening with diode laser.
Fig. 3. Radiographic image of the prepared post space.
Fig. 4. Fabricated Anatomic Posts by layering composite on the glass fibre post.
Here the patient presented with a wide and flared canal with thin radicular dentin thickness, with leathery consistency of dentin. Due to the questionable prognosis of the teeth, a cast post would prove to have catastrophic failure of the tooth. The elastic modulus of custom made cast post which is high to that of dentin would create wedging effect on the remaining radicular dentin. The radicular dentin thickness was around 0.6 to 0.8mm rendering it unsuitable for cast post [1]. According to Duret et al. [5] a fibre post with low modulus of elasticity would transmit the forces throughout the dentin and are more conservative. However due the flared nature of the canal space the post would loosely fit to the radicular space [5]. This further requires the application of a thick layer of cement around the post that would further predispose to adhesive failures [2].

Boudrias et al. [6] described the use of fibre post lined with composite resin to duplicate the essential anatomy of the canal space. This method of refining the dowel effectively decreases the cement thickness in the flared space, thereby compacting the shrinkage stresses due to polymerization. It further helps in the intimate adaptation to the radicular dentin, better bonding and reducing the number of visits. Belli et al. [7] studied the flare root canal systems and stress distribution on different restoration techniques. They concluded that roots reinforced with single post with increased cement thickness led to the accumulation of stresses on the remaining dentin. However anatomic post maintained stress inside the post body and less stress into the training dentin.

Amin et al. [8] found that teeth restored with glass fibre post relined with composite resin showed higher values for fracture strength compared to the groups that used glass fibre reinforced post with a thick layer of luting cement. The better performance of the anatomical post can be due to the higher hydraulic pressure that these posts exert on the cement against the radicular dentinal walls, thereby causing better adaptation between the post, cement, and dentin interface. Due to the pronounced high pressure, there is reduced blister formation in the cement, thereby decreasing the sites that initiates flaw. Also, studies prove better penetration into the dentinal tubules with increased resin tags and adhesive lateral branches.

In this case report we used Filtek Z 250 Universal Restorative composite (3M) an aesthetic, light-cured composite designed for its use as both direct and indirect restorations both anteriorly as well as posteriorly. The material was incrementally placed on the post, sculpted inside the canal, and then cured outside. At times tack cure of the resin was also done. This double curing reduced the stresses inside the anatomical post system.

### IV. Conclusion

The clinical procedure of anatomic posts can be employed when there is a compromised tooth structure in the coronal region as well as thin dentin wall in the radicular region with oval shaped canals. This method helps in regaining the lost portion which aids in both aesthetical and functional aspects.

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