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A Novel Approach to Strengthening Endodontically Treated Teeth: Horizontal Fiber Post Technique – Case Report

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Abstract: Tooth fractures are a common complication after endodontic therapy, often surpassing reinfection in frequency. Complete coverage restorations remain the standard for reinforcement; however, their delay, especially in remote areas, increases fracture risk. Recent in vitro studies and case reports suggest that horizontally placed bucco-lingual glass fiber posts, significantly enhance fracture resistance. This technique is clinically feasible, cost-effective, and eliminates dependence on laboratory support. The present case report describes the application of this method, highlighting its potential as a gold standard interim approach. Prospective clinical trials are required to validate long-term outcomes. This method aims to improve the structural integrity of restored teeth, providing long-term durability and support to the coronal portion, which is often weakened post-treatment.

Keywords*: Fracture Resistance, Horizontal Post, Rib Bond, Reinforcement.*

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I. INTRODUCTION

Endodontic treatment is often required when the dental pulp becomes infected, either due to caries in the hard tissues or following tooth preparation for prosthetic restorations such as crowns [1]. Teeth that have undergone root canal therapy (endodontically treated teeth, ETTs) are more prone to biomechanical failure than vital teeth. This increased susceptibility arises from the loss of tooth structure during access cavity preparation, which compromises cusp integrity, increases cusp deflection under functional loading, and consequently elevates the risk of fracture [2].

Several restorative strategies have been proposed to rehabilitate ETTs [3]. These include the placement of posts and cores [4], full- or partial-coverage crowns [5], and direct restorations such as composite resin or amalgam fillings [6].

Recently, the incorporation of horizontal posts in ETTs has emerged as a novel restorative concept, with encouraging outcomes reported in both in vitro and clinical studies. Evidence supports its effectiveness in enhancing fracture resistance and providing biomechanical stability [7–9].

This case report presents a restorative technique designed to reinforce structurally compromised teeth. The approach involves the placement of horizontal fiberglass posts in a bucco–lingual orientation within a glass fiber–reinforced composite resin foundation following root canal therapy.

Horizontal posts are generally fabricated from fiber-reinforced composite (FRC) due to their favorable elastic modulus, which closely approximates that of dentin. This property allows the post to flex under occlusal forces, dissipating stress and reducing the risk of catastrophic fractures. Unlike rigid metal posts, which tend to create stress concentrations at the post–dentin interface, FRC posts provide superior biomechanical compatibility [10].

II. CASE REPORT

At the initial visit, local anaesthesia was administered with 1.7 mL of 2% lignocaine containing 1: 80,000

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epinephrine. Once rubber dam isolation was achieved, the access cavity was prepared, exposing the mesiobuccally, distobuccally, and palatal orifices. The working lengths were established using an electronic apex locator and confirmed radiographically.

Cleaning and shaping were performed with ProTaper rotary NiTi instruments following the crown-down technique. Cleaning was enhanced by irrigating the canals with 3% sodium hypochlorite followed intermittently by 17% EDTA. A calcium hydroxide dressing was placed as the intracranial medicament, and the cavity was provisionally sealed with Teflon tape and a temporary restorative material.

At the second appointment, the provisional filling was eliminated, and the intracanal medicament was flushed away using 3% sodium hypochlorite. The canals were then reinstrumented and obturated with the single-cone technique using a resin-based sealer (Fig. 1).

For coronal reinforcement, two horizontal slots were prepared across the buccal and lingual walls with a tapered fissure bur (Fig. 2). The pulp chamber was etched, bonded, and filled with flow able composite around the orifices and pulpal floor. Two prefabricated fiber posts were inserted bucco–lingual and luted with dual-cure composite resin (Fig. 3). Any excess post material extending beyond the buccal and lingual surfaces was carefully trimmed (Fig. 4). The restoration was then polished and finished, and its integrity was confirmed with a postoperative radiograph (Fig. 5).

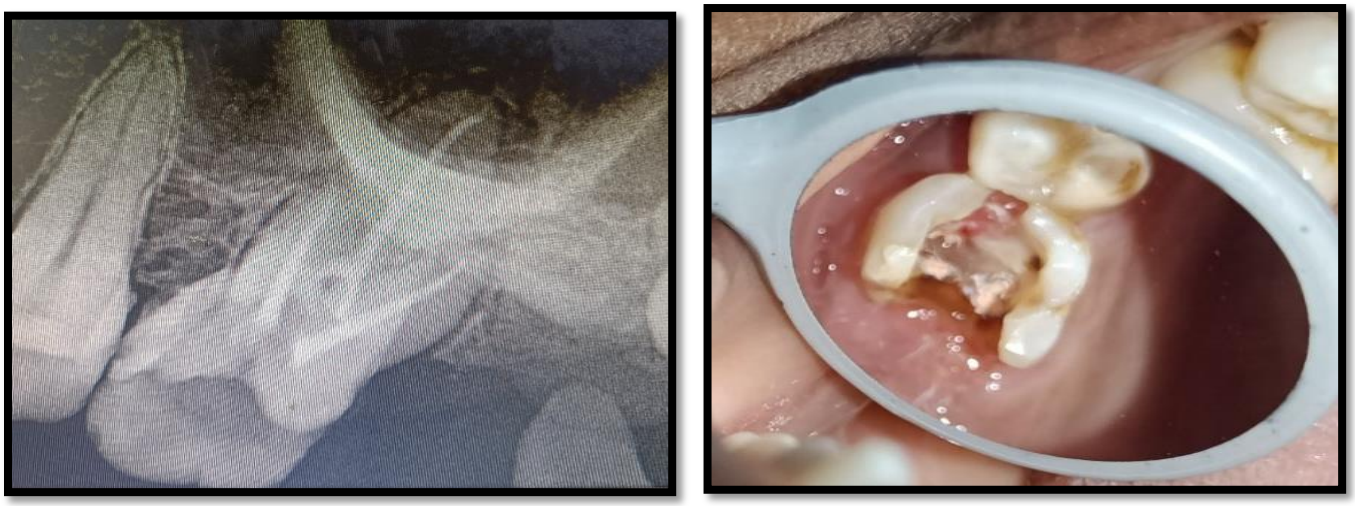

Fig 1 Post Obturation (Radiograph And Intraoral)

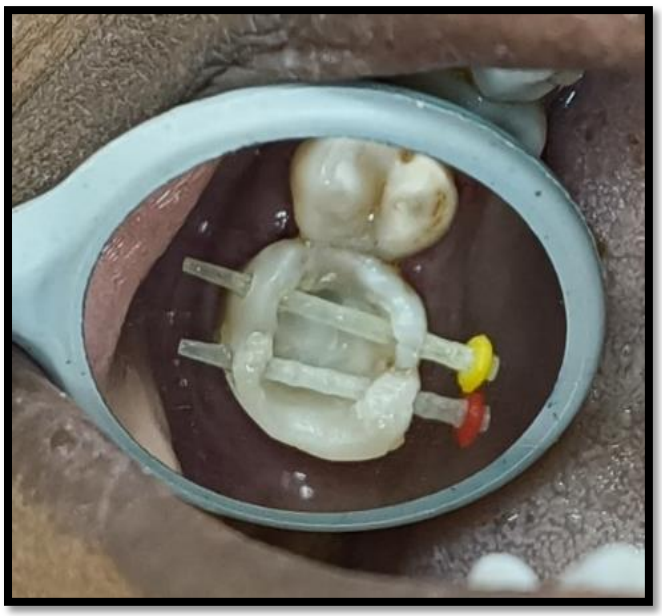

Fig 2 Trial Fitting of Fiber Post Prior to Cementation

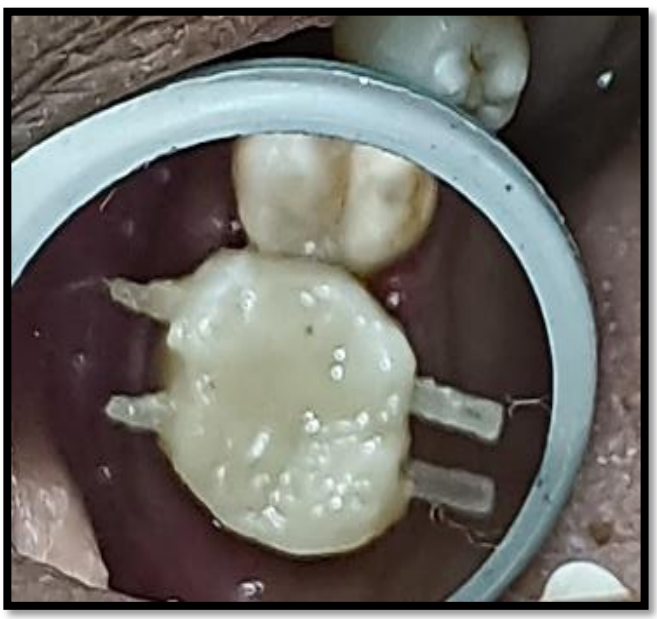

Fig 3 Luting of the Fiber Post and Build Up

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Fig 4 Resection of the Protruding Portion of Post.

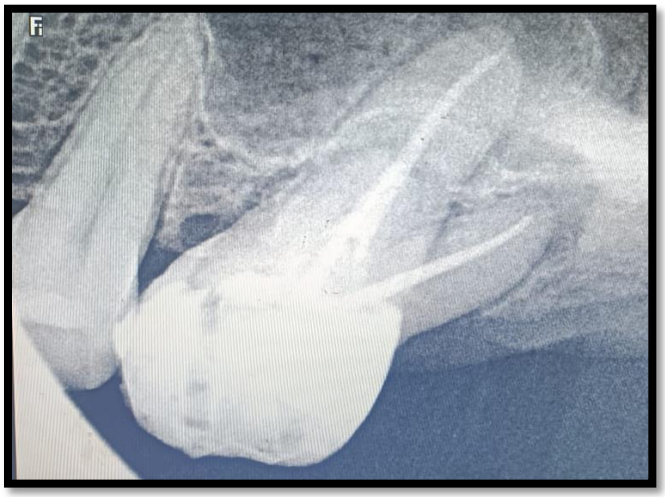

Fig 5 Radiograph Taken After Luting of Fiber Post

III. DISCUSSION

The structural integrity of endodontically treated teeth (ETT) is significantly compromised due to the removal of infected pulp tissue and loss of tooth structure during access cavity preparation and subsequent procedures.

Tooth structure loss is especially pronounced in MOD (mesio-occluso-distal) cavities, where both marginal ridges are compromised. This leads to cuspal deflection, micro leakage, and a higher risk of fracture under functional loads. Studies further demonstrate that teeth with MOD cavities are especially susceptible to structural failure. The loss of a single marginal ridge reduces tooth strength by 46%, whereas the loss of both marginal ridges decreases strength by 63% [11]. Tensile stress is concentrated along the pulpal line angles, reaching levels approximately ten times higher than in other regions of the tooth. The resultant fracture typically propagates downward and outward at an angle of 40° to 50° from the base of the prepared cavity toward the gingival margin on either the buccal or lingual surface [12].

Grandini et al. [13] reported that restoring endodontically treated teeth with fiber posts and resin composites is a viable short-term approach that helps preserve the remaining tooth structure. This technique also minimizes cuspal deflection, a key contributor to fractures in weakened molars.

Karzoun et al. [14], in an independent in vitro investigation demonstrated the fracture resistance of endodontically treated premolars restored using various methods and subjected to loading with a universal testing machine (Instron Corp, Canton, MA). They found that incorporating a composite resin core with a single horizontal fiberglass post extending bucco-lingually approximately doubled the fracture resistance compared to using composite resin alone.

Bromberg et al. [15], in a comparable in vitro study on molars, investigated teeth with mesio-occluso-distal cavities that had undergone root canal treatment and were restored using various filling techniques. When subjected to universal testing machine evaluation, specimens reinforced with two horizontal fiberglass posts within composite resin restorations exhibited nearly 60% higher fracture resistance than those lacking such reinforcement. [16]. According to Beltrão et al. [17] and Favero et al. [18], the incorporation of horizontal posts improved the mechanical behavior of treated teeth. The findings of Beltrão et al. [17] revealed that a single horizontal post placed in molars substantially enhanced their fracture resistance.

Similarly, Mergulhão et al. [19] demonstrated that the majority of restorations (80%) restored with horizontal fiber posts exhibited repairable fractures situated coronally to the simulated bone level. By contrast, only 30% of teeth restored with conventional composite resin without horizontal posts were repairable, whereas 70% sustained catastrophic, non-repairable fractures.

The horizontal post technique is a conservative and innovative way to reinforce endodontically treated teeth, particularly those with large MOD cavity preparations [20].

Unlike vertical posts, which are placed within the root canal system, horizontal posts are positioned transversely across the cavity between the buccal and lingual cusps, functioning as a trans coronal connector or “splint” to reinforce the remaining cusps.

IV. CONCLUSION

This technique mimics the natural function of marginal ridges, which resist the wedging forces generated during mastication. By re-establishing a physical link between the cusps, horizontal posts reduce micro leakage, minimize marginal gap formation, and decrease the incidence of restorative failure over time. Furthermore, the intercoronal positioning of the horizontal post allows for reinforcement without the invasive removal of radicular dentin, preserving valuable tooth structure

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REFERENCES

[1]. Fennis WM, Kuijs RH, Kreulen CM, et al. A survey of cusp fractures in a population of general dental practices. Int J Prosthodont 2002; 15:559–63.

[2]. Mannocci F, Qualtrough AJ, Worthington HV, et al. Randomized clinical comparison of endodontically treated teeth restored with amalgam or with fiber posts and resin composite: five-year results. Oper Dent 2005; 30:9–15

[3]. Butz F, Lennon AM, Heydecke G, et al. Survival rate and fracture strength of endodontically treated maxillary incisors with moderate defects restored with different post-and-core systems: an in vitro study. Int J Prosthodont 2001;14: 58–64.

[4]. Mangold JT, Kern M. Influence of glass-fiber posts on the fracture resistance and failure pattern of endodontically treated premolars with varying substance loss: an in vitro study. J Prosthet Dent 2011; 105:387–93.

[5]. Hemmings KW, King PA, Setchell DJ. Resistance to torsional forces of various post and core designs. J Prosthet Dent 1991; 66:325–9.

[6]. Stavropoulou AF, Koidis PT. A systematic review of single crowns on endodontically treated teeth. J Dent 2007; 35:761–7.

[7]. Shafiei F, Tavangar MS, Ghahramani Y, Fattah Z. Fracture resistance of endodontically treated maxillary premolars restored by siloranebased composite with or without fiber or nano-ionomer. *J Adv Prosthodont*. 2014;6(3):200–6.

[8]. Pereira J, Mcdonald A, Petrie A, Knowles JC. Effect of cavity design on tooth surface strain. *J Prosthet Dent*. 13;110(5):369–75. doi: 10.1016/j.prosdent.2013.08.004.

[9]. Reeh ES, Messer HH, Douglas WH. Reduction in tooth stiffness as a result of endodontic and restorative procedures. *J Endod*. 1989;15(11):512–6.

[10]. Mangoush, E., Saker, S., Deeb, J. G., Salami, A., & Sadr, A. (2019). Cuspal deflection in root canal treated teeth: A systematic review. International Endodontic Journal, 52(12), 1680-1695.

[11]. Zhi-Yue L, Yu-Xing Z. Effects of post-core design and ferrule on fracture resistance of endodontically treated maxillary central incisors. The Journal of Prosthetic Dentistry. 2003 Apr;89(4):368–73.

[12]. Bell J.G, Smith M.C, de Pont J.J. Cuspal failures of MOD restored frteeth . Aust Dent J 27(5):283-287, 1982

[13]. Grandini S, Goracci C, Tay FR, Grandini R, Ferrari M Clinical evaluation of the use of fiber posts and direct resin restorations for endodontically treated teeth. Int J Prosthodont. 2005;18(5):399-404.

[14]. Karzoun W, Abdulkarim A, Samran A, Kern M. Fracture Strength of Endodontically Treated Maxillary Premolars Supported by a Horizontal Glass Fiber Post: An In Vitro Study. American association of Endodontics. 2015.

[15]. Bromberg CR, Alves CB, Stona D. Fracture resistance of endodontically treated molars restored with horizontal fiberglass posts or indirect techniques. J Am Dent Assoc 147:952–8; 2016.

[16]. Albuquerque Rde C, Polleto LT, Fontana RH, Cimini CA. Stress analysis of an upper central incisor restored with different posts. J Oral Rehabil 2003;30:936-43.

[17]. Beltrao MC, Spohr AM, Oshima HM, et al. Fracture strength of endodontically treated molars transfixed horizontally by a fiber glass post. Am J Dent 2009; 22:9–13.

[18]. Favero FJ, De Melo TA, Stona D, et al. Strengthening effect of horizontally placed fiberglass posts in endodontically-treated teeth restored with direct resin composite. Am J Dent 2015; 28:143–9.

[19]. Mergulhão V, de Mendonça L, de Albuquerque M, Braz R. Fracture Resistance of Endodontically Treated Maxillary Premolars Restored with Different Methods. Operative Dentistry. 2019 Jan 1;44(1): E1–11.

[20]. Freilich MA, Meiers JC, Duncan JP, Eckrote KA, Goldberg AJ. Clinical evaluation of fiber-reinforced fixed bridges. J Am Dent Assoc 2002; 133:1524-34; quiz 40-1.