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Comparative analysis of the biomechanical aspects of fiberglass and polyethylene fiber pins (RIBBOND) - literature review

Comparative analysis of the biomechanical aspects of glass fiber and polyethylene fiber (RIBBOND) posts – literature review

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SUMMARY

Restorative dentistry seeks to recover endodontically treated teeth with significant structural loss, ensuring function, aesthetics, and strength. Teeth undergoing endodontic treatment become more fragile, requiring materials to reinforce their integrity. Among the alternatives, fiberglass posts and polyethylene fibers (Ribbond) stand out, which have good biomechanical and aesthetic properties. This study aimed to analyze, through an integrative literature review, the recommendations and therapeutic strategies related to the use of these materials in compromised teeth. The methodology was based on searches in PubMed, SciELO, LILACS, and Google Scholar (2015–2025), using descriptors such as "Fiberglass Posts," "Polyethylene Fiber," and "Biomimetic Materials." The results showed that fiberglass posts have a modulus of elasticity similar to that of dentin, good adhesion, and favorable aesthetics, being indicated for teeth with significant coronal loss. Polyethylene fibers stand out for their flexibility, translucency, and ability to distribute masticatory forces, favoring repairable fractures and preserving the remaining teeth. Techniques such as wallpapering and rollover increase their clinical effectiveness. The choice between the two materials depends on the remaining teeth and the type of functional load. It can be concluded that both represent safe and effective alternatives for the rehabilitation of weakened teeth, allowing for a conservative, functional, and biomimetic approach in contemporary restorative dentistry.

Keywords: fiberglass wires. Polyethylene fibers (Ribbond). Dental rehabilitation.

ABSTRACT

Restorative dentistry aims to recover endodontically treated teeth with extensive structural loss, ensuring function, aesthetics, and mechanical strength. teeth that undergo endodontic treatment become more fragile due to the reduction of dental structure, increasing susceptibility to fractures and requiring techniques and materials that reinforce their integrity. among the most used alternatives are fiberglass posts and polyethylene fibers (ribbond), which exhibit favorable biomechanical and aesthetic properties, providing adequate retention and balanced distribution of masticatory forces.

This study aimed to analyze, through an integrative literature review, the recommendations, clinical indications, and therapeutic strategies related to the use of fiberglass posts and polyethylene fibers in structurally compromised teeth. the adopted methodology consisted of a systematic search in the pubmed, sciELO, lilacs, and google scholar databases, covering the period from 2015 to 2025, using descriptors such as "fiberglass posts," "polyethylene fiber," "ribbond," "composite resins," and "biomimetic materials." original articles and review papers published in Portuguese and English, available in full and directly addressing the topic, were included. Excluding criteria imply studies lacking relevant clinical data, unpublished academic works, abstracts, and books. The selection of studies considered clinical relevance, scientific evidence, and applicability in restorative dentistry.

The results demonstrate that fiberglass posts present an elastic modulus similar to dentin, excellent adhesion, mechanical strength, favorable aesthetics, and ease of application. They are indicated for teeth with extensive coronal loss requiring intraradicular retention. limitations include inadequate adaptation in wide or irregular root canals, excessive resin cement thickness, and adhesive failures,

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which may compromise restoration longevity. polyethylene fibers (ribbon), on the other hand, stand out for their biomimetic behavior, high flexibility, translucency, and ability to evenly distribute masticatory forces, promoting repairable fractures and preserving the remaining dental structure. techniques such as “wallpapering” and “rollover” enhance retention and adhesion, increasing the clinical effectiveness of the material. studies indicate that, in certain situations, ribbon can replace fiberglass posts, achieving satisfactory functional and aesthetic results. The choice between fiberglass posts and polyethylene fibers depends on the amount of remaining dental structure, tooth position, type of functional load, and the clinician's experience. Despite the proven effectiveness of both materials, further longitudinal studies and robust clinical trials are necessary to establish standardized protocols and confirm long-term durability. It is concluded that appropriate material selection, combined with correct technical application, is essential to maximize the strength, longevity, and aesthetics of restorations. Both fiberglass posts and polyethylene fibers represent safe and effective alternatives for the rehabilitation of weakened teeth, enabling a conservative, functional, and biomimetic approach in contemporary restorative dentistry.

Keywords: Fiberglass posts. Polyethylene fibers (Ribbon). Dental rehabilitation.

1. INTRODUCTION

Restorative dentistry seeks to solve the problem that impacts the integrity of the dental structure and still in promoting a good result for a better presentation of the smile (Baratieri et al.,2010).

However, endodontically treated teeth, for whatever reason (coronal destruction, infiltration and/or extensive caries), present biomechanical changes in the resulting force applied in crown-root, which makes it more fragile and more susceptible to fractures after restoration, since its remaining tissue is unable to provide support and retention of the restorative material (Marques et al, 2016). In cases where the coronary remnant is insufficient, we must use devices that increase the strength and retention of the restoration, in addition to maintaining function and aesthetics of the dental element.

The choice to use an intraradicular retention system aims to provide resistance to the remaining tooth and the containment of the restorative material, however, maintenance of the tooth structure is a key factor in ensuring the element's resistance (Pereira et al., 2017).

Most dentists choose to use intra-radicular retainers in restoration of extensively fractured and weakened elements after endodontic treatment, and mainly without coronal remnant, since the function of the intra-radicular retainer is to retain the restorative material. Fiberglass post retainers have currently been the material most used: because it has a modulus of elasticity similar to that of dentin, due to its biomechanical resistance, adequate translucency, aesthetics and ease of use (Silva et al., 2020).

Fiber Polyethylene (FFP) Ribbon is a composite resin reinforcement material that can be used to restore structurally compromised teeth in a biomimetic manner.



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Using polyethylene in FFP Ribbond has the advantage of mimicking the dental structure of very similar to the original, with biomechanical characteristics closer to dental tissue (Bahari et al., 2019).

In recent years, it has been widely used in clinical situations, and is increasingly being there is a great interest in the use of polyethylene fibers, as they provide good retention with clinical success and good fracture resistance and a higher occurrence of repairable fractures. To avoid this type problem, you can use polyethylene fibers (Ribbond), associated with the fiber pin glass or not, as they have good characteristics and intraradicular reinforcement (Alirajpurwala et al.,2022).

For the reinforcement of the remaining tooth damaged by caries, fractures or preparations inadequate, it is interesting and important to comparatively evaluate the indications and advantages and disadvantages or limitations related to the biomechanical aspects of fiberglass posts and polyethylene fiber (Ribbond) in dental restoration, as well as identify the inherent challenges the use of these materials faced by the dentist.

2 THEORETICAL FRAMEWORK

2.1 General Aspects

Permanent teeth with significant loss of structure due to extensive cavities, extensive restorations or trauma, as well as young teeth with weakened roots are subject of interest to restorative dentistry due to the need to maintain the system stomatognathic and its importance for the individual's physical and psychological health (Li et al., 2016).

The emergence of the technique of acid etching of enamel by Buonocore, and the development of composite resins by Bowen, brought great advances in techniques restorative, which have become more effective and conservative. Dental restoration or dentistry restorative is the area of dentistry that focuses on restoration, treatment of caries and other traumas affecting the teeth (Lazari et al., 2018).

The material best suited to endodontically treated teeth with little loss of coronal structure is composite resin, this choice being determined by the material property, especially for its modulus of elasticity and ability to adhere to dentin. However, in teeth in which a considerable part of the clinical crown is still found, the use of prefabricated pins, which may be: metallic or non-metallic, parallel or conical, with a smooth, serrated or threaded surface. Among those mentioned, the most commonly used is the pin fiberglass (Lemos et al.,2016).



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Aiming to provide good load distribution, resistance, longevity and aesthetics

related to compromised teeth, several composites and materials have emerged. These

biomaterials aim to reinforce the structure of compromised elements. Among the

biomaterials used for this purpose, polyethylene fiber (known in the market as

Ribbond) has stood out for its physical and mechanical characteristics associated with favorable aesthetics

(Oliveira et al., 2024).

Consequently, several factors must be analyzed when choosing the restoration of the

dental element, including: use or not of pins, position of the tooth in the dental arch, need

preparation, restorative material used, amount of remaining tooth and possible methods of

fracture. (Bhuva et al., 2021).

2.2 fiberglass pins

Having been on the market for years, fiberglass retainers demonstrate satisfactory resistance to

fracture, lower modulus of elasticity when compared with metal pins, in addition to greater

ease of use. Clinical studies demonstrate the effectiveness of pins, thus being a

alternative for the rehabilitation of dental elements with large losses of structure (Marchionatti

et al., 2017).

A literature review on the failure mechanisms of fiberglass posts was

carried out by Barfeie et al. (2015). After the researchers' analysis, nineteen clinical studies

prospective studies were selected and the main causes of pin failure were highlighted

fiberglass: adhesion failure, root fracture, post fracture, endodontic treatment failure,

secondary caries and periodontal complications. After careful analysis, the authors were able to

demonstrate that adherence failure was cited in 16 of the clinical studies used. Although

further clinical research is needed on the topic and that the risk factors for failure in the use of fiberglass

pins are multiple, the authors demonstrated that there is a need

to improve the component adhesion processes in order to maximize the success of the cases

in which fiber posts are used.

Ramírez-Sebastiá et al. (2015) evaluated the fracture resistance of treated anterior teeth

endodontically and restored with different aesthetic materials, in the absence of retainers and in the

presence of fiberglass posts measuring 5 and 10 mm in length. After treatment

endodontic treatment of 48 human upper incisors, the crowns were removed, leaving a

remaining (ferule) of 2 mm. The roots were randomly divided into six groups according to

with the length of the post and the coronal restoration. All retainers were cemented with the

same resin cement. Then, a compression test was performed on a machine



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universal tests, with the samples positioned at an inclination of 45° and subjected to application of load on the lingual surface, 3 mm below the incisal edge, at a speed of 1 mm/min, until the fracture occurred. Fractures were classified according to their location as repairable (cervical third, pin fracture, crown displacement) and irreparable/catastrophic (fractures below the cervical third). Statistical analysis revealed that the presence of a pin, its length and the material coronal did not significantly influence fracture resistance. The groups restored with retainerless crowns had a higher number of repairable fractures compared to others. Furthermore, when larger retainers (10 mm) were used, the fracture pattern was predominantly irreparable, concluding that shorter aesthetic pins have advantages in relation to the others, under the conditions of the experiment.

Wang et al. (2016) compared the mechanical performance of a fiberglass post reinforced, developed by the authors themselves, with a pin already available on the market that had smaller physical measurements. The pin made was 17 mm long and was subdivided into 3 regions: tip, middle and coronal region with, respectively, 6 mm, 6 mm and 5 mm. The tip region of the pin had a circular cross-section and a 1 mm radius; the middle region of the pin had a circular-oval cross-section with a radius of 1.6 mm; and the coronal region had an oval cross-section measuring 3.2 mm in its longest axis and 1.6 mm in its shortest axis. The pins were cemented into simulated teeth that were manufactured by milling premolars as a model, thus standardizing the samples. After resistance tests cyclic rotation and statistical analysis of the results, the authors were able to conclude that the pin produced showed higher resistance values as well as better adaptation than the pin used in the comparison (less voluminous and longer).

The success of fiberglass posts depends on adequate bonding to the dentin of the remaining tooth. The most common failure associated with fiberglass posts is their detachment mainly due to the adhesive system, leading to loss of adhesion strength to the dentin and consequently detachment (Novais et al., 2016).

The main characteristic that a fiberglass post needs to have is adaptation to the conduit root, as it guarantees resistance to displacement due to good mechanical interlocking between the post and the conduit, not depending solely on the cementation system. The customization of the fiberglass pin with composite resin individualizes the case, leaving it with a shape similar to that of the conduit, which allows for better union (Cruz et al., 2020).

Despite the numerous advantages of PFVs, they can have disadvantages: poor adaptation when inserted into anatomically wider, very conical or non-circular, the thickness of the cement layer increasing the polymerization shrinkage and favoring the formation of bubbles. This fact can influence the adhesive strength presented,



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because having a very thick layer of cement around the pin, its displacement would be higher, as well as the fracture rate resulting from masticatory forces (Silva et al., 2020).

Another disadvantage presented is the lack of radiopacity of some of these pins. fiberglass (Thefts; Baldea; Silaghi-Dumitrescu, 2016).

The ferrule or embrace effect consists of extending the preparation apically, creating an outward-facing edge to which the crown will be adapted. It is important for long-term success.

term when a pin is used. Its construction adds retention, but most importantly, it provides resistance, as it aims to increase the protection of the remaining tooth against tooth fracture.

Therefore, it reduces the tendency of the retainer to transfer forces exclusively along the long axis of the root, minimizing the wedge effect that could lead to vertical root fracture (Reis; Loguercio, 2021).

Jurema et al. (2022), in a literature review and meta-analysis, with the aim of evaluating the fracture resistance of endodontically treated anterior teeth and investigate whether the use of a post fiberglass has no influence on the fracture resistance of these teeth when compared to others alternative restorative treatments. After grouping the studies, 31 studies were maintained, with 17 considered to be at low risk of bias, 10 at medium risk and 4 at high risk of bias. By analyzing these studies, the authors were able to observe that the use of fiber optic pins glass increases the fracture resistance of endodontically treated teeth that have received restorative processes.

Due to the excellent biomechanical and aesthetic properties, ease of execution of the technique, low cost and absence of corrosion, prefabricated fiberglass pins (PFVs) are stand out compared to other intraradicular posts (Lemos et al., 2016; Cruz et al., 2020).

2.3 Polyethylene Fiber (Ribbond)

In 2021, Felipe et al., discussed the use of reinforcing fibers in Dentistry. The fibers have high resistance when grouped in the form of ribbons or cords, they are light and do not oxidize. Its basic purpose is to reinforce large volumes of resin (composite or acrylic), polymer or ceromer. They help to distribute and dissipate the forces in which they were incorporated, reducing and homogenizing stress. If used to make nuclei, they would conduct light from photopolymerizer. The most commonly used fibers today are glass, polyethylene, ceramic and carbon. Glass fibers (e.g., GlasSpan) and polyethylene (e.g., Ribbond, Connect) have similar clinical characteristics and are the most appropriate for use dental, and its translucency favors aesthetics. The direction and architecture of the fibers do not influence the strength of the reinforced structure. According to these authors, the ideal would be



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incorporation of transverse and longitudinal fibers, since the more parallel the arrangement of the fibers in relation to the forces applied to the structure, the greater the absorption and dissipation of forces. Thus, it must be considered that the forces act on the teeth both in the axial direction (parallel to the long axis) and transverse (perpendicular to the long axis).

The first version of Ribbond was created in 1991 by Dr. David Rudo in order to utilize a material that could direct the flaws in the restorations to the material responsible for the restoration and not to the tooth. Therefore, he invented the adhesive reinforcement with tape to avoid costly failures of fracture in resins. Over the years, thinner versions of Ribbond have been developed. Dr. Rudo wanted a strong, durable reinforcement that was also connectable, easy to adapt, and provided predictable long-term clinical outcomes (Rudo, Karbhari, 2015).

Some studies already show that it is possible to have a good result in rehabilitated teeth only with polyethylene fibers (Ribbond), without the use of pins, when the tooth has a splint, or mainly because it is an extremely compromised tooth after having undergone treatments previously invasive. Teeth that have a ferrule have a better prognosis, as they have a greater resistance to fracture since it is more important than just the use of pin for rehabilitation (Magne et al., 2016).

With the development of adhesive systems and new resin composite materials reinforced by fibers, new studies are being released on a “no post” philosophy (Garlapati et al., 2017).

A reinforcing material, (Ribbond), has been commercially available since 1992. This material is composed of pre-impregnated, silanized and plasma-treated polyethylene fibers. Microscopically, Ribbond ribbon features a special pattern of crisscrossed and stitched threads that increase the durability, stability and shear strength of the fabric. The pattern of the tape allows mechanical interlocking of the composite resin in different planes. In this way, fiber has been widely used in restorative dentistry as an alternative to intraradicular retainers, as they can reinforce weakened tooth structure (Zafar et al., 2020).

Fiber-reinforced resin materials are presented as possible substitutes for the use of retainers and other composite resins, as they act as reinforcement and replacement of the dentin, increasing its fracture resistance and flexural modulus (Kaur et al., 2021). This technique, also called “wallpapering technique”, consists of a valuable tool for increased longevity of restoration of structurally vital and non-vital teeth compromised, through the protection of the cavity walls with reinforcing fibers, favoring the prognosis of rehabilitations (Delipere et al., 2017). Thus, in non-vital teeth, the amount of remaining tooth takes on a new importance in treatment, given the



existence of a fiber with biomimetic properties that can be placed as a core of filling before final restoration (Scotti et al., 2020).

As an advantage, its use does not require the removal of additional tooth structure and, therefore, way, eliminates the risk of root perforation. Unlike what happens with pre-manufactured, Ribbond can maintain the tooth's natural resistance after treatment endodontic treatment. Its high price is reported as one of the main disadvantages. Another major The disadvantage of Ribbond, besides the price, is its use as the only retaining material in canals widened. In these cases, thicker layers of cement are created and can lead to failure adhesive. To overcome this disadvantage, a technique called "Rollover", in which the polyethylene tape is rolled over a fiberglass post and cemented inside the canal with resinous and light-curing cement, promoting strong mechanical retention chemical bonding between glass fibers and resin matrix (Alirajpurwala; Zhabuawala; Nadig, 2022).

When choosing the restorative/rehabilitative material, it is of fundamental importance to correct choice of it. When it comes to aesthetics, it is necessary to take into account the optical properties such as translucency, opacity, and fluorescence. In this regard, fibers polyethylene, as it is a transparent material, allows adaptation with different types of resin, generating an ideal, more aesthetic optical characteristic, as it allows the transmission of natural light through composite tooth restoration (Palma et al., 2021).

Aggarwal et al. (2022), can conclude that the insertion of polyethylene fiber (Ribbond) in Class II restorations significantly increases fracture resistance. In addition, horizontal fiber orientation in the pulp and gingival floor of large MOD class II cavities gives the greatest resistance to fracture in the maxillary premolars.

Braga et al. (2023), analyzed in an experimental study the fracture resistance, location of the fracture and the pattern of this fracture in restorable and non-restorable, when using pins fiberglass or polyethylene fibers (Ribond) and concluded that restorations using fiber post and polyethylene fiber used as intraradicular retainers provided similar results in fracture toughness tests, demonstrating that polyethylene fiber used as a retainer can be considered as an option for rehabilitation of treated teeth endodontically.

The main objective for using this material is the redistribution of masticatory forces for a larger stress absorption zone, in order to reduce the impact that could be harmful if not evenly distributed (Linhares et al., 2023).

In addition to providing resistance to bending, stress and the modulus of elasticity of the



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composite resins, Ribbond also provides a great aesthetic role to the restoration, since it becomes barely visible when immersed in a resin matrix. Furthermore, the fibers of this material allow adaptation to the cavity and tooth morphology (Zotti et al., 2023). In this in vitro study with molars upper and lower, identified that restorations with Ribbond associated with the preservation of interaxial dentin resulted in a significant reduction in fractures.

A narrative literature review on the use of ribbond in dentistry contemporary aesthetic and restorative, carried out by Oliveira et al., (2024) identified that the use of this material has been increasingly used in the field of dentistry, in order to guarantee a more mimetic, aesthetic and long-lasting work.

Vartak et al. (2025), in a literature review, investigated the fracture resistance and the mode failure of permanent teeth treated by endodontics restored with polyethylene fiber (Ribbond, Inc.) compared to endodontically treated permanent teeth and restored with other post systems. Concluding that although teeth treated with Ribbond have less fracture resistance when compared to other post and core systems contemporary, they present the most favorable failure mode. This makes them a biomimetic restorative alternative suitable for the rehabilitation of structurally unstable teeth committed.

3. MATERIAL AND METHOD

The methodology applied in the work was a bibliographic survey carried out between the months of February to August 2025. Articles published in the databases in the service of the US National Library of Medicine (PUBMED), Latin American and Caribbean Literature in Health Sciences (LILACS), Scientific Electronic Library Online (SCIELO) and Google Scholar, using the following descriptors: Composite Resins; Ribbond; Fiberglass Pin; Materials Biomimetics. Original articles from the last 10 years, available in full, were included. published in Portuguese and English. And, based on these studies, we present conclusions who can offer valuable perspectives on your chosen topic.

4. RESULTS AND DISCUSSION

It is important to understand that restorative dentistry seeks to reconstruct the tooth or part of it. In this context, it is highlighted that the biomimetic approach has great applicability in Dentistry, especially in the restoration of weakened teeth such as shape and material



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specific, enabling the biomechanical recovery of the original tooth through restoration.

This, in turn, in many cases, requires devices that increase retention, support and resistance to restorative materials. The fiberglass post and polyethylene fiber (Ribbond) are among the most commonly used additional mechanisms in restorative dentistry (Nacarato et al., 2021).

According to this review, Lemos et al. (2016) highlights the advantage of the module elasticity similar to dentin, good adhesion, aesthetics and minimal risk of fracture. Corroborating these points, (Marchionatti et al., 2017; Cruz *et al.*, 2020; Silva *et al.*, 2020; Jurema, 2022), consider Fiberglass Pins as the best alternative for rehabilitation of endodontically treated teeth with extensive coronal loss, when well indicated. This is due to the fact that these pins have numerous advantages: excellent properties aesthetics, ease of technique execution, low cost, conservative technique, high resistance to corrosion, high adhesive bond strength, excellent biomechanical properties and biocompatibility.

The purpose of PFVs is to promote retention and stability of materials restoratives, thus improving the retention of the final restoration and, consequently, satisfactorily distributing the stresses imposed on the tooth. In this way, its main indication is aimed at the aesthetic and functional rehabilitation of endodontically treated teeth with considerable structural losses, they claim (Marchionatti et al., 2017; Wang *et al.*, 2016; Silva et al., 2020; Cruz *et al.*, 2020; Silva *et al.*, 2020; Jurema *et al.*, 2022).

Some limitations or disadvantages of using fiberglass pins have been verified in studies such as poor adaptation due to anatomical variations of the root canals (Silva *et al.*, 2020; Wang et al. 2016), problems with adhesion to the inner walls of root canals (Barfeie *et al.*, 2015).

Studies by Oliveira et al. (2024) reveal that Ribbond presents characteristics such as excellent biocompatibility, good malleability and ability to have the resin color composite to which it is related, providing high resistance and quality to replace the structure denture of structurally compromised teeth.

It presents superior mechanical and adhesive properties, providing versatility for treatment of teeth with weakened dental structure because the fibers of this material have good adaptation to the cavity and the morphology of the tooth, and its effectiveness is directly linked to the quality of the adhesive process and the presence of dental structure (Zotti et al., 2023).

Although they are not such new materials, the use of polyethylene fiber tape is little widespread and still little incorporated into daily clinical practice. However, it is extremely important seek to understand the micro and macro physical-mechanical functioning of the substrate when faced with stress tension, to know when to use this material (Palma et al., 2021).

The literature shows that teeth restored with polyethylene fibers present superior fracture resistance when compared to restorations with fiberglass posts. This occurs because Ribbond promotes a better distribution of occlusal forces, absorbing energy and interrupting crack propagation (Paryani et al., 2023).

Studies such as those by Scoti et al. (2020), Braga et al. (2023) and Vartak et al. (2025) show that polyethylene fiber has superior mechanical and adhesive properties and can replace fiberglass posts, in certain contexts, while preserving tooth structure. However, as pointed out by Santos et al. (2024), several treatment failures can be attributed to the lack technical knowledge of professionals and inadequate execution of adhesive protocols and application technique to avoid additional stresses that could compromise fracture resistance. In this way, the marriage between the choice of complementary materials and the application technique is essential to maximize the benefits of polyethylene fibers in dental practice.

AUTHOR / YEAR	ADVANTAGE		DISADVANTAGE / LIMITATION	
	FIBER PIN GLASS	FIBER OF POLYETHYLENE (RIBBOND)	FIBER PIN GLASS	FIBER OF POLYETHYLENE (RIBBOND)
Barfeie et al., 2015	Improves retention and stability of restorations	X	Problems related to adhesion between cement and fiberglass post	X
Lemos et al., 2016	Dentin-like modulus of elasticity, good adhesiveness, aesthetics and minimal risk of fracture	X	Risk of root fracture	X
Wang et al., 2016	Improves retention and stability and distribution of forces between remaining dental and restoration	X	Poor adaptation when inserted into anatomically wider, very conical or non-circular root canals	X

Marchionati et al., 2017	Dentin-like modulus of elasticity, good adhesiveness, aesthetics and minimal risk of fracture	X	The risk of root fracture was not altered by the modulus of elasticity, but the displacement of the restoration was greater in the group with the lowest modulus of elasticity.	X
Silva et al., 2020	Dentin-like elastic properties; Biocompatibility and dental tissues; Less wear of the remainder during preparation; Good chemical adhesion -Mechanics; Avoid the darkening of the remaining area after treatment; Can be performed in a single session; Possibility of customization.	X	Poor adaptation when inserted into anatomically wider, very conical or non-circular root canals, the thickness of the cement layer increasing polymerization contraction and favoring the formation of bubbles.	X
Cruz et al., 2020	Excellent biomechanical and aesthetic properties, ease of technique execution, low cost and absence of corrosion	X	Root weakening due to canal preparation	X
Scoti et al., 2020	X	superior mechanical and adhesive properties	X	Need for sufficient dental structure, higher cost
Palma et al., 2021	X	Optical properties such as translucency, opacity and fluorescence	X	Requires technical knowledge and professional skill
Alirajpurwal; Zhabuawal	X	does not require removal of additional tooth structure	X	High price and use as the only material

a; Nadig, 2022				retainer in enlarged canals
Jurema et al., 2022	Dentin-like modulus of elasticity and reduced risk of fracture.	X	Geometry of root canals and the need for intra-canal preparation contributing to weakening of the remainder.	X
Zotti et al., 2023	X	superior mechanical and adhesive properties and good adaptation	X	Effectiveness is directly linked to the quality of the adhesive process and the tooth structure
Paryani et al., 2023	X	Greater fracture resistance and better distribution of occlusal forces	X	Need for sufficient dental structure
Oliveira et al., 2024	X	Biocompatibility, good malleability and superior adhesive and mechanical properties	X	Need for sufficient dental structure
Vartak et al., 2025	Greater fracture resistance	In case of a more favorable fracture, the repair	In case of fracture, less favorable to repair	Lower fracture resistance

Source: Own Authorship

AUTHOR / YEAR	CHALLENGES	
	FIBERGLASS PIN	POLYETHYLENE FIBER (RIBBOND)
Barfeie et al., 2015	Problems related to adhesion of the post to the inner walls of the root canals	X
Ramírez-Sebastiá et al., 2015	When long pins present a fracture, it was classified as irreparable	
Novais et al., 2016	Displacement of the fiberglass post caused by problems in the adhesion between the post and the dentin of the root remnant	X
Wang et al., 2016/ Cruz et al., 2020 / Silva et al., 2020	Need for pin anatomization to improve mechanical engagement	X

Reis, Loguercio 2021	Need for embracing (ferula effect) between the post and the coronary remnant to increase retention and fracture resistance	X
Deliperi et al., 2017/Kaur et al., 2021/ Scoti et al., 2020	X	Wallpaper technique to strengthen axial walls
Alirajpurwal; Zhabuawala; Nadig, 2022	X	In enlarged channels the technique "Rollover", where the polyethylene tape is rolled over a fiberglass post and cemented inside the canal with resinous and light-curing cement

Source: Own Authorship

FINAL CONSIDERATIONS

The literature reports that dental fractures occur in the vast majority of cases due to loss structural resulting from extensive carious lesion and, perhaps, previous endodontic treatment. The pins fiberglass and polyethylene fiber (Ribbond) have the following advantages: good properties mechanical and adhesive properties, biocompatibility and aesthetics being recommended in restorative treatment of teeth with weakened structure.

Fiberglass posts are best suited for post-treatment teeth treatment. endodontic with extensive coronal loss, giving the restoration greater retention and stability, providing intraradicular anchorage. Polyethylene fiber tape (Ribbond) is indicated as a less invasive form of treatment, where structural reinforcement occurs in the walls of the remaining tooth, without the need for intraradicular retention.

Some challenges inherent to fiberglass posts were the channel geometry and the adhesion care. With polyethylene fiber (Ribbond), additional techniques such as "Wallpaper" and "Rollover", and adherence care are highlighted as challenging agents for some dental surgeons.

Thus, we conclude that both materials are excellent therapeutic choices for treatment of weakened teeth, and we need more studies that observe their longitudinal shape characteristics.

REFERENCES

AGGARWAL, MDS; XÁ, Arpit; KAPOOR, Sonali. *Effect of orientation and placement of*



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*fibers in the fracture resistance of large mesio-occluso-distal class II cavities in pre-
upper molars: an in vitro study.* Journal of Conservative Dentistry, v. 25, n. 2, p. 122-
127, Mar./Apr. 2022.

ALIRAJPURWALA, Tasneem; ZHABUAWALA, Murtuza; NADIG, Roopa R. *Corono-
root reinforcement with minimal invasion: a novel case report.* Journal of Conservative
Dentistry: JCD, v. 25, no. 1, p. 101, 2022.

BARFEIE, A.; THOMAS, MB; WATTS, A.; REES, J. *Failure mechanisms of fiber posts: a
literature review.* European Journal of Prosthodontics and Restorative Dentistry, v. 23, no. 3, p. 115-
127, 2015.

BHUYA, B.; GIOVARRUSCIO, M.; RAHIM, N.; BITTER, K.; MANNOCCI, F. *The
restoration of root filled teeth: a review of the clinical literature.* International Endodontic Journal,
v. 54, no. 4, p. 509–535, 2021. DOI: 10.1111/iej.13438.

BRAGA, MR; MESSIAS, DC; MACEDO, LM; SILVA-SOUSA, YC; GABRIEL, AE
*Evaluation of fracture resistance of restored and endodontically treated teeth with different
intraradicular retainers.* Research, Society and Development, vol. 12, no. 4, p. e0112441336, 2023.

CRUZ, JHA et al. *Rehabilitation using fiberglass posts: case reports.* Journal of
Medicine and Health Promotion, Patos, v. 5, no. 3, p. 57-65, Jul./Sept. 2020.

DELIPERI, S.; ALLEMAN, D.; RUDO, D. *Stress-reduced direct composites for the restoration
of structurally compromised teeth: fiber design according to the “wallpapering” technique.*
Operative Dentistry, vol. 42, no. 3, p. 233–243, 2017.

FELIPPE, LA et al. *Reinforcement fibers for dental use – fundamentals and applications
clinics.* APCD Journal, v. 55, n. 4, Jul./Aug. 2021.

FURTOS, G.; BALDEA, B.; SILAGHI-DUMITRESCU, L. *Development of new radiopaque
glass fiber posts.* Materials Science & Engineering C: Materials for Biological Applications, v. 59,
p. 855-862, 2016.

GARLAPATI, TG; KRITHIKADATTA, J.; NATANASABAPATHY, V. *Fracture resistance
of endodontically treated teeth restored with short fiber composite used as a core material – an in*

Year V, v.2 2025 | submission: October 16, 2025 | accepted: October 18, 2025 | publication: October 20, 2025
vitro study. Journal of Prosthodontic Research, vol. 61, no. 4, p. 464–470, 2017.

JUREMA, ALB; FILGUEIRAS, AT; SANTOS, K.A.; BRESCIANI, E.; CANEPPELE, TMF *Effect of intraradicular fiber post on the fracture resistance of endodontically treated and restored anterior teeth: a systematic review and meta-analysis*. Journal of Prosthetic Dentistry, vol. 128, n. 1, p. 13-24, Jul. 2022.

KAUR, B. et al. *Comparative evaluation of fracture resistance of endodontically treated teeth restored with different core build-up materials: an in vitro study*. International Journal of Clinical Pediatric Dentistry, vol. 14, no. 1, p. 51–58, 2021.

LAZARI, PC et al. *Survival of extensively damaged endodontically treated incisors restored with different types of posts-and-core foundation restoration material*. Journal of Prosthetics Dentistry, vol. 119, p. 769-776, May 2018. DOI: 10.1016/j.prosdent.2017.05.012.

LEMOS, CAA et al. *Influence of diameter and intraradicular post in the stress distribution: finite element analysis*. UNESP Journal of Dentistry, v. 45, n. 3, p. 171-176, 2016.

LI, MHM; BERNABÉ, E. *Tooth wear and quality of life among adults in the United Kingdom*. Journal of Dentistry, vol. 55, p. 48-53, Dec. 2016. DOI: 10.1016/j.jdent.2016.09.013.

MAGNE, P. et al. *Composite resin core buildups with and without post for the restoration of endodontically treated molars without ferrule*. Operative Dentistry, vol. 41, no. 1, p. 64-75, 2016.

MARCHIONATTI, AME et al. *Influence of elastic modulus of intraradicular posts on the fracture load of roots restored with full crowns*. Revista de Odontologia da UNESP, v. 46, n. 4, p. 232–237, 2017.

NACARATO, P. *Biomimetic dentistry*. 2021.

NOVAIS, VR et al. *Correlation between the mechanical properties and structural characteristics of different fiber posts systems*. Brazilian Dental Journal, 2016.

OLIVEIRA, VS de et al. *The use of polyethylene fiber tape (RIBBOND) in dentistry contemporary aesthetic and rehabilitation: literature review*. In: *Science, care and health:*



Year V, v.2 2025 | submission: October 16, 2025 | accepted: October 18, 2025 | publication: October 20, 2025
contextualizing knowledge. São Paulo: Digital Scientific Publisher, 2024.

PALMA, A. et al. *Biomimetic approaches for endodontically treated teeth: a review of literature.* Brazilian Journal of Development, Curitiba, v. 7, no. 10, Oct. 2021.

PARYANI, M. et al. *Biomimetic rehabilitation of extensively compromised teeth.* Journal Focus, 2023.

RAMÍREZ-SEBASTIÀ, A. et al. *Adhesive restoration of anterior endodontically treated teeth: influence of post length on fracture strength.* Clinical Oral Investigations, vol. 18, no. 2, p. 545-554, March 2015.

REIS, A.; LOGUERCIO, A.D. *Direct restorative dental materials: from the fundamentals to clinical application.* 2nd ed. Rio de Janeiro: Guanabara Koogan, 2021.

RUDO, DN; KARBHARI, ME *Physical behaviors of fiber reinforcement as applied to tooth stabilization.* Dental Clinics of North America, vol. 43, n. 1, p. 7-35, Jan. 2015.

SANTOS, AM; ALVES, LA; SANTOS, LGG *Analysis of factors affecting fracture of fiberglass posts in dental restorations: a brief literature review.* FT Journal, v. 28, ed. 139, Oct. 2024.

SCOTTI, N. et al. *3D interfacial gap and fracture resistance of endodontically treated premolars restored with fiber-reinforced composites.* The Journal of Adhesive Dentistry, vol. 22, no. 2, p. 215–224, 2020.

SILVA, MAL et al. *Aesthetic and functional rehabilitation with fiberglass post.* Brazilian Journal of Health Review, Curitiba, v. 3, no. 6, p. 17259-17267, 2020.

VARTAK, MA et al. *Fracture resistance and failure modes of endodontically-treated permanent teeth restored with Ribbond posts vs other post systems: a systematic review and meta-analysis of in vitro studies.* Restorative Dentistry & Endodontics, 2025.

WANG, HW; CHANG, YH; LIN, CL *Mechanical resistance evaluation of a novel anatomical short glass fiber reinforced post in artificial endodontically treated premolar under*



Year V, v.2 2025 | submission: October 16, 2025 | accepted: October 18, 2025 | publication: October 20, 2025

rotational/lateral fracture fatigue testing. Dental Materials Journal, 2016.

ZAFAR, MS et al. *Biomimetic aspects of restorative dentistry biomaterials.* Biomimetics, vol. 5, no.

3, p. 34, 2020.

ZOTTI, F. et al. *Increasing the fracture strength of MOD restorations with Ribbond fibers.* Journal

of Clinical and Experimental Dentistry, 2024.