



USE OF RADICULAR POSTS: A SURVEY AMONG DENTAL PRACTITIONERS

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ABSTRACT:

Introduction: Radicular posts are a widely used method for restoring teeth after endodontic treatment, with their application and effectiveness remaining topics of interest and discussion among dental practitioners.

Purpose: To assess the practices, preferences, and clinical reasoning of dental practitioners in Bulgaria regarding the use of radicular posts in the restoration of endodontically treated teeth.

Material/Methods: A cross-sectional survey was conducted in 2024 among 270 dental practitioners with varied clinical experience. The questionnaire evaluated the frequency of use, post type preferences, clinical indications, cementation materials, removal difficulties, and practitioner confidence.

Results: Most respondents (52%) had over 20 years of experience, while 30% had less than 5. The majority (50%) practiced general dentistry. Fiber posts were the preferred esthetic post for 98% of participants, and 88% used prefabricated systems. The ferrule effect was considered important for fracture resistance by 84%. Root fracture (47%) and post debonding (41%) were identified as the most frequent causes of failure. While 67% believed radicular posts improve retention, only 52% thought they reinforce the remaining tooth structure.

Conclusions: Radicular posts continue to be a common clinical solution, especially prefabricated fiber posts. Despite varied opinions, most practitioners recognize their benefits for retention and fracture resistance. These findings highlight the need for ongoing education and clinical studies to optimize post selection and application.

Keywords: CAD/CAM posts, Dental practitioners, Ferrule effect, Fiber posts, Survey,

INTRODUCTION:

Radicular posts play an essential role in the restoration of severely compromised teeth following endodontic treatment. They provide structural stability and improve the retention of restorative materials [1]. Posts are classified based on their material into metal, fiber, and ceramic posts. Metal posts are further divided into cast post-and-core restorations and prefabricated metal posts [2].

Fiber-reinforced posts were first introduced by François Duret [3]. Over time, fiber posts have demonstrated several advantages over metal posts, including superior esthetic appearance, resistance to corrosion, ease of removal when retreatment is required, better occlusal stress distribution, and adhesive properties [4].

Prefabricated metal posts are easy to use, offer high fracture resistance, and require less chair time. However, differences in the modulus of elasticity between metal and dentin can cause stress concentration and increase the risk of root fracture and severe damage. In contrast, prefabricated fiber posts are preferred by many professionals due to their esthetic properties and an elastic modulus similar to that of dentin, which enhances stress distribution and reduces the risk of irreparable damage [3]. Most fiber posts are composed of a resin matrix reinforced with glass, carbon, or quartz fibers. Despite their advantages, fiber posts have lower fracture resistance and a higher risk of debonding after long-term use [4].

The use of intraradicular posts is a common restorative method, especially in complex cases involving significant loss of tooth structure [5]. One of the main factors influencing the effectiveness and durability of posts is the presence of residual coronal walls, which contribute to the ferrule effect and enhance fracture resistance [6, 7]. However, recent studies critically reevaluate this assumption, suggesting that the ferrule effect does not significantly reduce failure rates in restorations with fiber-reinforced composite posts [8]. A systematic review conducted by Martins MD, et al. [1] in 2021 includes data where residual coronal walls are identified as a predictor of tooth survival.

Some scientific studies define residual tooth structure in terms of the number of remaining intact walls [9,

10, 11], while others measure it in millimeters [12].

Metal posts, both cast and prefabricated, have certain clinical limitations that have led to the development of alternative post systems. Among these, fiber posts—made from materials such as carbon, glass, polyethylene, and quartz have gained popularity. With a lower modulus of elasticity, they more closely resemble dentin in their mechanical behavior and stress distribution. This reduces the risk of complications and allows for easier repair of issues such as debonding. Furthermore, fiber posts require less invasive canal preparation [13, 14, 15].

Although the mechanical and physical properties of fiber posts have been well studied in vitro, clinical trials remain crucial for providing reliable information on their performance. In vitro experiments cannot fully replicate intraoral conditions, making long-term clinical studies indispensable for making informed clinical decisions [16].

Despite the extensive scientific data on the properties and clinical outcomes of different types of radicular posts, variations in the practical approaches and preferences of dental practitioners persist. This highlights the need to investigate real clinical practice to assess the application of different types of posts and the factors influencing their selection and effectiveness. The present survey study aims to analyze the post-selection practices of dental practitioners in Bulgaria.

MATERIALS AND METHODS:

An anonymous survey was conducted among 270 dental practitioners between February and March 2024. The structured questionnaire was completed in written form or via an online platform.

Beyond practical aspects, the survey also aimed to examine dentists' theoretical knowledge regarding intraradicular posts, including the mechanical properties

of fiber posts compared to metal posts and the importance of the ferrule effect in restorations. Some questions allowed for multiple answers, acknowledging that clinical practice cannot always be limited to a single option.

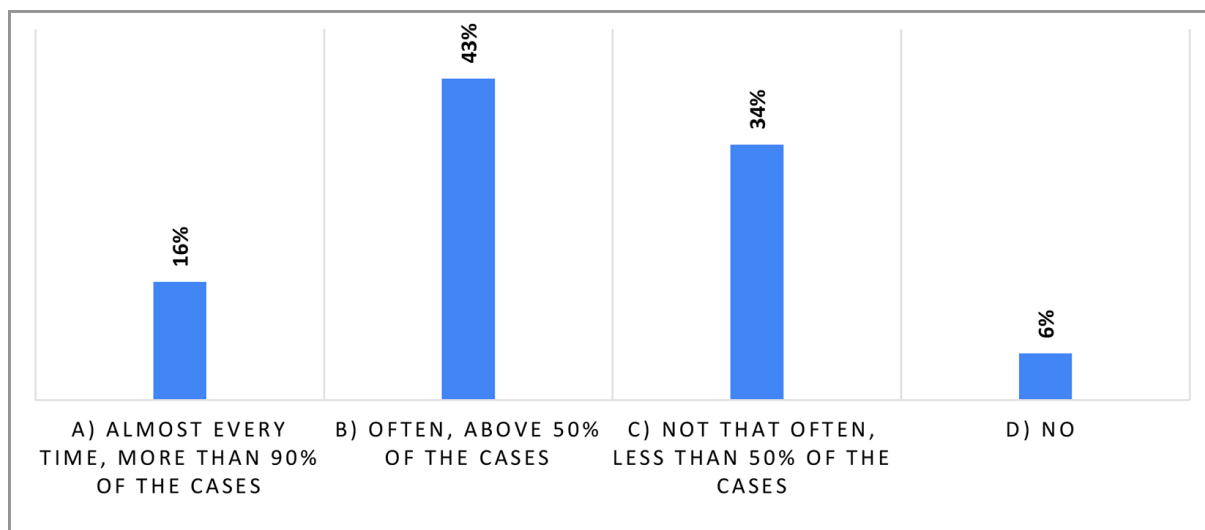
The statistical used in analysis were descriptive statistics, including mean values as a measure of central tendency, absolute (N) values for determining the number of cases, and relative (%) values for determining the percentage of cases. The graphical representation was performed using Excel 2016.

RESULTS:

The results show that most participants (52%) had over 20 years of clinical experience, indicating a high level of professional maturity. Younger practitioners with less than 5 years of experience comprised 30%, followed by those with 6–10 years (6%) and 11–20 years (11%). The majority (50%) practiced general dentistry, while others specialized in endodontics and operative dentistry (16%), prosthodontics (15%), pediatric dentistry (9%), oral surgery (6%), and orthodontics (5%). The questions were qualitative and allowed for single or multiple answers. The survey focused on the role of radicular posts in daily dental practice, including their frequency of use, the preferred types of radicular posts, the tooth groups where posts are most commonly used, and practitioners' confidence levels in post placement.

The findings indicate that 43% of dental practitioners use radicular posts in more than 50% of endodontic restoration cases, suggesting that this method is a routine choice for many dentists. Thirty-four percent of respondents reported using posts relatively infrequently (in fewer than 50% of cases). For 16% of dental practitioners, radicular posts are an essential component of endodontic restorations, and they use them in over 90% of cases (Fig.1).

Fig. 1. Do you use radicular posts in the restoration of teeth after endodontic treatment?



For the second question in the survey, namely, “Do you believe that the retention of the restorative material to the remaining tooth structures is dependent on the radicular post?”, nearly T! of dental practitioners (67%) believe that radicular posts influence the retention of the restorative material to the remaining tooth structures. This clearly indicates that the majority of specialists perceive the post as a key element for stability and strength in restorative procedures.

The remaining S! of dental practitioners believe that retention does not depend on the radicular post. They likely prefer other methods for ensuring retention. A very small proportion of respondents (1%) noted that this depends on the specific clinical case.

Regarding the question, “Do you believe that the reinforcement of the remaining dental tissues is a function of the radicular post?”, slightly more than half of the practitioners (52%) believe that the radicular post plays a role in strengthening the remaining dental tissues, contributing to the structural stability of the tooth and enhancing the long-term durability of restorative procedures.

The remaining 48% of practitioners do not believe that the reinforcement of dental tissues depends on the radicular post. They likely do not consider the post necessary for tooth stability or prefer alternative techniques for strengthening the remaining tissues.

Nearly half of dental practitioners (46%) use Logan posts, making them the most commonly used type of metal intraradicular posts. This may be due to their perceived effectiveness, ease of use, or specific clinical advantages.

Fig. 2. What type of metal intraradicular posts do you use most frequently in your practice?

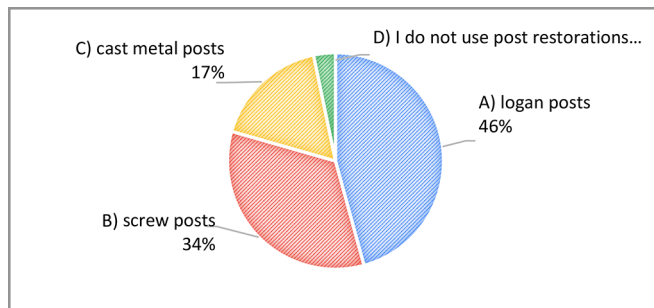
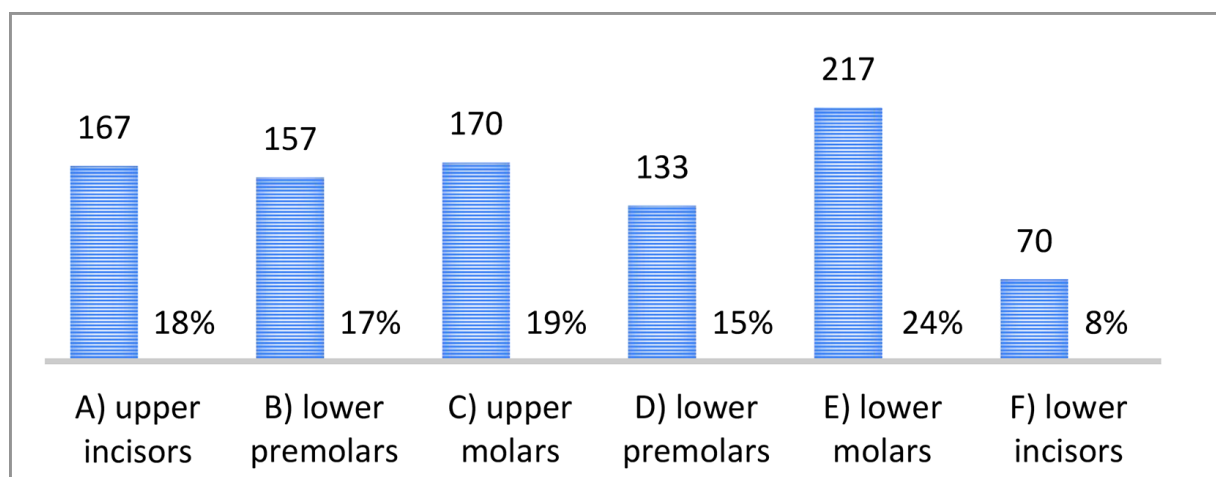
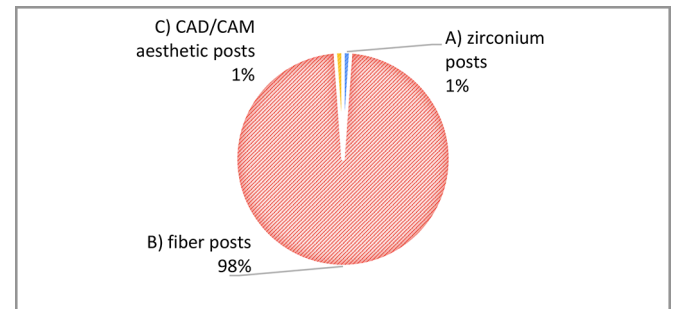


Fig. 4. On which tooth groups do you most frequently place intraradicular posts?



Another large group of practitioners (34%) use screw-retained posts. This represents a significant portion of specialists, suggesting that this type of post is also widely used and may be considered suitable for various clinical situations. Cast metal posts are less popular, with 17% of practitioners using them. A very small percentage of dentists (3%) do not use any intraradicular posts (Fig. 2).

Fig. 3. What type of esthetic intraradicular posts do you use most frequently in your practice?



The most popular choice for esthetic intraradicular posts is fiber posts, used by 98% of dental practitioners. Only 1% of practitioners use zirconia posts, and an equal percentage utilize CAD/CAM esthetic radicular posts (Fig. 3).

For the question in the survey, “What type of radicular posts do you use most frequently based on their manufacturing method?”, a significant majority of dental practitioners (88%) use prefabricated posts.

The remaining 12% of dental practitioners prefer custom-made posts, which are specifically adapted to individual cases and require additional time and resources for fabrication.

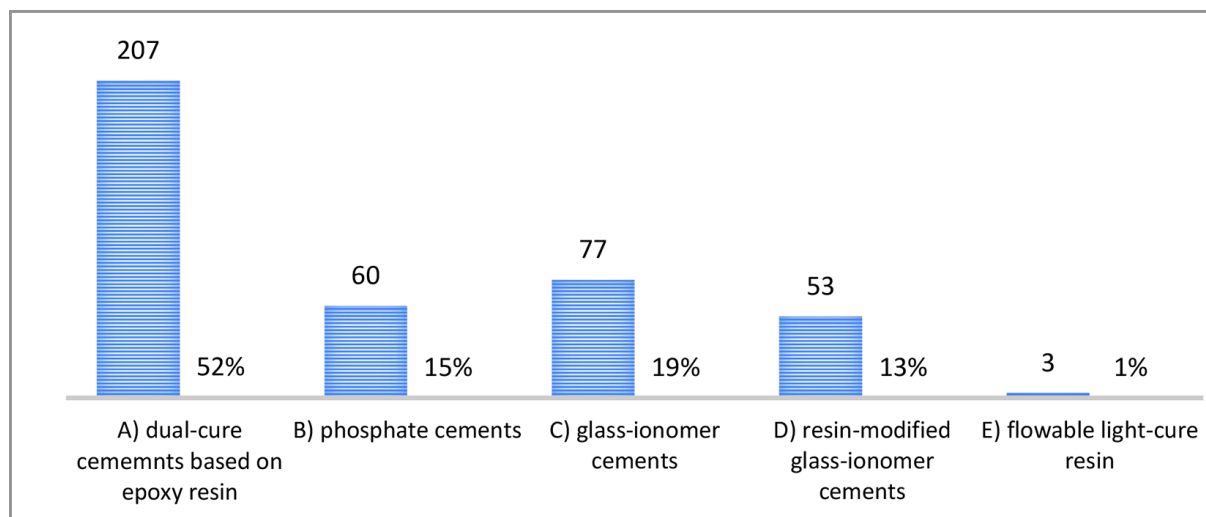
Most dental practitioners (24%) reported that they most frequently place intraradicular posts in lower molars. Since these teeth endure significant masticatory forces, the use of posts in this region is likely intended to provide additional strength and stability to the restorative material. The other molar and premolar groups show similar placement rates, ranging from 15% to 19%.

Upper anterior incisors were indicated by 18% of dental practitioners. These teeth are highly visible and of-

ten subjected to both esthetic and functional loads, which may explain the need for additional reinforcement. The lowest frequency of post placement was observed in lower anterior incisors, as these teeth are generally smaller and subjected to less occlusal stress.

In summary, with the exception of lower anterior incisors, posts are placed relatively evenly across all other tooth groups, with no single group showing a significantly higher prevalence (Fig. 4).

Fig. 5. What type of cementing materials do you use for intraradicular post cementation?



More than half of dental practitioners (52%) use dual-polymerizing resin-based cements, making this the most popular choice. Dual polymerization provides a strong and durable bond, which is particularly suitable for fiber posts, as seen in the previous findings where fiber posts dominate as the preferred choice for esthetic restorations. The next most commonly used types of cement are glass-ionomer cements (19%), which provide good adhesion to dental tissues and release fluoride, aiding in mineralization and contributing to the strength of the restorative material. Other cement types reported include phosphate cements (15%) and resin-modified glass-ionomer cements (13%). Only 1% of dental practitioners indicated using flowable light-cured resin cement (Fig. 5).

To the question “How confident are you in placing radicular posts on a scale from 1 to 10?”, the most confident practitioners (44%) rated their confidence between 8 and 10 on the scale. Almost the same percentage of dentists (45%) assessed their confidence in the moderate range (4–7). Only 11% of practitioners felt low confi-

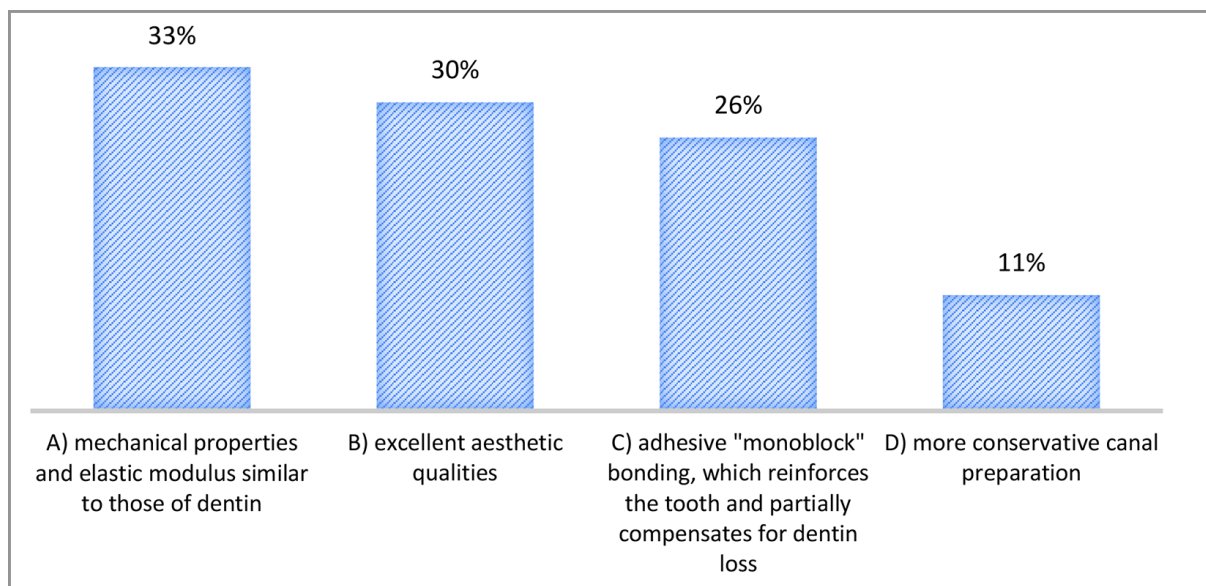
dence (1–3) in placing radicular posts. These dentists may require additional training and experience.

For the tenth question, “Do you consider esthetic fiber posts to be more reliable in terms of strength and adhesive bonding compared to metal posts?”, 41% of practitioners believe that esthetic fiber posts are more reliable in terms of strength and adhesive bonding compared to metal posts. This group likely prefers fiber posts due to their compatibility with esthetic restorations and strong adhesive properties.

Meanwhile, 40% of dental practitioners do not consider fiber posts more reliable than metal posts. They likely favor traditional metal posts due to their proven durability and strength. The remaining 19% of practitioners have no specific opinion on the matter.

In conclusion, opinions on the reliability of esthetic fiber posts are relatively divided. Those who favor fiber posts likely choose them for their esthetic advantages, whereas others prefer the well-established durability of metal posts.

Fig. 6. Which of the following properties of fiber posts is the most significant compared to metal posts?



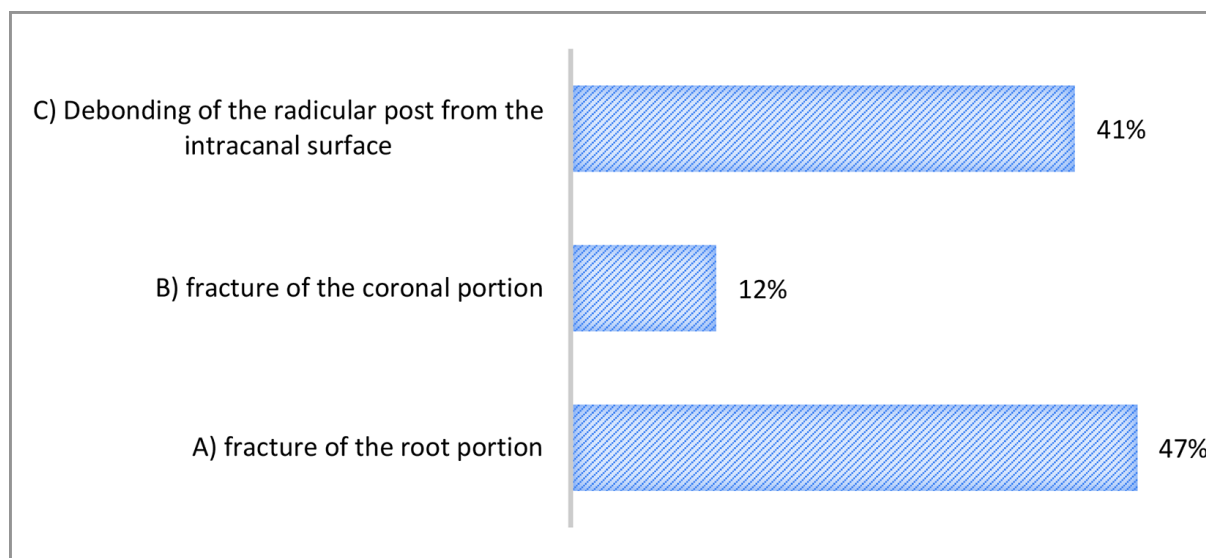
The next most significant property of fiber posts is their esthetic advantages (30%).

The following most significant property (26%) is their adhesive “monoblock” bonding, which enhances tooth structure integrity and helps compensate for dentin loss to some extent.

The least preferred property (11%) is the more conservative canal preparation, which allows for the preservation of more natural tooth structure (Fig. 6).

Regarding the question “Does the ferrule effect increase fracture resistance?”, a large proportion of dental practitioners (84%) believe that the presence of the ferrule effect enhances the fracture resistance of the tooth. This high percentage indicates that the majority of specialists recognize the importance of the ferrule effect in reinforcing tooth structure and preventing fractures. The remaining 16% of dental practitioners believe that the ferrule effect does not contribute to fracture resistance.

Fig. 7. What is the most common cause of failure in radicular post restorations?



The most common cause of failure in radicular post restorations is root fracture, reported by nearly 47% of dental practitioners. The second most frequent issue is debonding of the radicular post from the intraradicular surface, indicated by 41% of respondents. The least reported failure was coronal fracture, occurring in 12% of cases,

though it remains a recognized complication (Fig. 7).

Regarding the question, “Do you encounter difficulties in removing fiber posts?”, 62% of surveyed dental practitioners reported experiencing challenges when removing fiber posts. This procedure appears to be technically demanding and likely requires specialized instru-

ments and techniques to avoid damage to the remaining tooth structure.

The remaining 37% of practitioners stated that they do not experience difficulties in fiber post removal. This group is likely more experienced and uses effective techniques and instruments for safe post removal. 1% of respondents reported that they have never had to remove a fiber post.

DISCUSSION:

The results of the survey highlight the considerable variability in dental practitioners' approaches to selecting and using radicular posts. Fiber posts are highly preferred due to their aesthetic and mechanical advantages, while metal posts remain a relevant choice in various clinical situations. They provide excellent esthetics, high biocompatibility, and mechanical strength, making them the preferred option in daily practice. The limited use of zirconia and CAD/CAM posts may be attributed to their specific application requirements, as well as potential financial and technological constraints (Fig. 3).

The most preferred characteristic of fiber posts is their mechanical properties and elastic modulus, which are close to those of dentin. This was indicated by one-third of dental practitioners. This property is likely preferred because fiber posts with a modulus of elasticity similar to dentin can distribute stress more effectively, reducing the risk of root fractures. (Fig. 6)

For the question in the survey, "What type of radicular posts do you use most frequently based on their manufacturing method?", a significant majority of dental practitioners (88%) use prefabricated posts. This clearly indicates that most clinicians prefer ready-made, standardized posts supplied by manufacturers. Prefabricated posts are likely favored due to their availability, ease of use, and standardized dimensions, which allow for faster and more convenient placement.

However, the challenges related to post removal and root fractures indicate the need for further training and the development of more effective techniques.

In Bulgaria, there is a clear dominance in the use of Logan metal posts. In a similar survey conducted among dentists in Brazil, cast metal posts were used more fre-

quently—by over 25% of respondents. These are mainly applied by dentists without postgraduate qualifications and are recommended for clinical cases with limited residual tooth structure [18].

Another study, published in the British Dental Journal, shows that traditional cast metal posts are still widely used among dentists, despite the proven advantages of non-metal systems such as fiber-reinforced composite posts.

The choice of post often depends more on ease of use and personal clinical experience than on evidence-based guidelines. Postgraduate training significantly influences the diversity in material and system selection, underlining the importance of continuing education to improve clinical decision-making. The differences in preferences between general practitioners and specialists are minimal, but younger dentists tend to follow more modern techniques. The study emphasizes the need for further research with larger sample sizes to analyze the factors influencing post selection [19].

Although more alternative restoration techniques are becoming available and dentists are increasingly willing to experiment with new approaches, post-based restorations continue to be a mainstay in dental practice. At the same time, it is essential that dental professionals update their knowledge and skills regarding new materials and techniques in order to provide a modern and evidence-based approach to treatment. This will ensure that their clinical practices remain effective and aligned with the latest standards. According to the data analysis, clinical experience has a significant influence on practitioners' confidence and frequency of using post restorations [20].

CONCLUSION:

Radicular posts continue to be a common clinical solution, especially prefabricated fiber posts. Despite varied opinions, most practitioners recognize their benefits for retention and fracture resistance. The data highlight the importance of balancing aesthetics, functionality, and durability when selecting materials and methods for restoration. These findings highlight the need for ongoing education and clinical studies to optimize post-selection and application.

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