

Preference for Postendodontic Restoration for Fractured Anterior Teeth: A Questionnaire-based Cross-sectional Study among Dentists in Maharashtra, India

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ABSTRACT

Introduction: One of the common dilemmas faced by today's clinicians is the management of structurally and aesthetically compromised endodontically treated teeth due to various treatment options available. There is no one factor which is the sole determinant for treatment planning. And there are various parameters contributing to the long-term success of a postendodontic restoration, especially in a fractured anterior tooth.

Aim: This study is aimed to investigate the preference for postendodontic restoration for fractured anterior teeth with respect to the tooth structure and aesthetics.

Materials and Methods: This cross-sectional study was conducted in the Department of Conservative Dentistry and Endodontics, Government Dental College and Hospital, Nagpur, Maharashtra, India, from August 2021 to December 2021 among 150 clinicians in Maharashtra. A validated questionnaire containing 17 close-ended questions was given to the participants which ascertained their treatment choices, the importance of preserving the tooth structure, aesthetics and the consideration given to the physical properties while choosing the material and planning the treatment.

Data obtained from the survey were statistically analysed by the Chi-square test.

Results: The mean age of the participants was 30.25±9.08 years. Among the 150 participants, postgraduates were 60 (40%) followed by general dentists 38 (25.3%), endodontists 36 (24%) and other specialists 16 (10.7%). Out of total, 82 (54.7%) preferred composites when more than 50% of the tooth structure remained. Crowns increased the longevity of the tooth according to 50 (83.3%) postgraduates. Among them, 28 (77.8%) endodontists opted for IPS Emax crowns over zirconia veneer for better aesthetics, 71 (47.3%) preferred glass fibre posts and 113 (75.3%) preferred ideal ferrule for better fracture resistance. Reattachment of the fragment was also a preferred option in all groups.

Conclusion: A 77.8% of the endodontists preferred IPS Emax crowns while 71.1% of the general dentists preferred zirconia veneers. Good awareness was seen among endodontists regarding method, patient preferences and aesthetics, very good awareness in materials and excellent awareness in treatment choices. More awareness is needed among general dentists, postgraduates, and other specialists in terms of treatment methods.

Keywords: Aesthetics, Composite resin, Dental restoration, Post and core, Tooth fracture

INTRODUCTION

The goal of endodontic and restorative therapy is to restore the normal function and occlusion of the tooth and maintain the stability of the dental arch apart from creating a bacteria-free environment in the root canals [1]. Endodontic treatment is largely performed on teeth significantly affected by caries, multiple restorations, or fractures. Such teeth are further weakened by the endodontic procedure to provide optimal access and by restorative procedures necessary to rebuild the tooth [2].

Loss of inherent dentinal fluid, intracanal medicaments and irrigants used during the root canal treatment, and prolonged use of calcium hydroxide renders the dentin more brittle and prone to fracture by altering its physical properties [3,4,5]. Additionally, non vital teeth lose their proprioception and are less adapted at perceiving increased load. It is, therefore, accepted that endodontically treated teeth are weaker and have a lower lifetime prognosis [3].

Studies have reported that endodontic treatment failure is mainly due to restoration failure rather than the endodontic treatment itself [6,7]. The fractured tooth should follow a proper treatment plan for endodontic and restorative therapy. Coronal microleakage is considered one of the major causes of endodontic failure, thus emphasising the necessity for a proper postendodontic restoration [8]. Heling I et al., stated that a combination of poor endodontic treatment and good permanent restoration yielded a success rate

of 67.7%, while the success rate was only 18.1% for the vice-versa scenario [7].

The fracture of an Endodontically Treated Tooth (ETT) may range from a simple cusp fracture to a catastrophic root fracture requiring extraction. The loss of marginal ridge(s) has been shown to reduce cuspal stiffness [9]. In a recent study, the micro-computed tomographic analysis showed a significant reduction in tooth stiffness when an access cavity preparation was done along with postpreparation [10].

One of the most common dilemmas faced by today's clinicians is the management of structurally and aesthetically compromised endodontically treated teeth [5]. As a result, the clinician is left with the overwhelming task to read and synthesise this information into a logical and evidence-based approach to dental treatment. Recent innovations in material sciences and clinical techniques have expanded the number of treatment options available for ETT [3].

Also, there is limited information available on the right treatment protocol for different anterior teeth fractures. Aesthetics is not the only factor which would increase the longevity of the fractured tooth. Important factors like the strength of the tooth, physical properties of the restorative material, age of the patient, etc. should be considered while treatment planning, without which the failure rates of the ETT are going to be high concerning the restorative material or the tooth [1].

Although there are many studies assessing the clinician’s decisions, there is a need for studies comparing the choices of postgraduates and other specialists with that of general dentists and endodontists to determine the areas of consideration which each group of clinicians need to work on [3,6,8]. The decisions of the endodontists were considered as a comparison tool due to their expertise and skill in treating the various clinical scenarios of fractured anterior teeth, apart from their specialisation. With this background, the present study was undertaken to determine the treatment choices for the longevity of endodontically treated fractured anterior teeth in terms of preferred method, materials, and aesthetics during postendodontic restoration. This study also determines the role of other factors like treatment protocol and patients’ preferences while providing a proper and successful postendodontic restoration.

MATERIALS AND METHODS

This is a cross-sectional study conducted in the Department of Conservative Dentistry and Endodontics, Government Dental College and Hospital, Nagpur, Maharashtra, India, among the 150 clinicians in Maharashtra from August 2021 to December 2021. The cross-sectional survey was reviewed and approved by the Institutional Ethics committee with certificate number IEC/04/03 on 15/06/2021. The participants were selected based on voluntary sampling.

Inclusion criteria: Postgraduates, general dentists, endodontists, and other dental specialists like prosthodontists, orthodontists, periodontists, pedodontists, etc., working in private or government setups in Maharashtra, who were willing to participate in the study were included.

Exclusion criteria: Clinicians not willing to participate and who were not practising in the included geographical location were excluded.

Sample size calculation: With reference to the study by Akbar I, ‘p’ being the proportion of the responses to the question that the ferrule effect increases the fracture resistance of ETT, the sample size was calculated to be 126 [6]. Thus, a total sample size of 150 was taken to compensate for the 20% non response rate. A total of 150 participants, who had given their consent were considered in this cross-sectional study. All the participants had signed a written informed consent before the start of the study which was conducted as per the ethical standards presented in the Declaration of Helsinki which was revised in 2013.

Questionnaire

A questionnaire containing 17 close-ended questions was face validated by three endodontists who had assessed the questions, discussed them, and suggested modifications [Table/Fig-1] [3,6,8]. The questionnaire was subjected to content validity testing in the form of a content validity index. It was given to five endodontists, and they were asked to rate the same.

Content validity: S-CVI/Ave (Scale-level Content Validity Index based on the average method): 0.96; S-CVI/Ave (Scale-level Content Validity Index based on proportion relevance): 0.96; and S-CVI/ UA (scale-level content validity index based on the universal agreement method): 0.862.

S. No.	Question	Options
	General Information about the participant	
1.	You are:	A. General dentist B. Endodontist C. Other specialist D. Postgraduate
2.	Years of practice in dentistry (Years of practice outside institution, i.e., in private clinic/consultant. Part time practice can also be included)	(Open ended question)
3.	Age	(Open ended question)

	Questionnaire	
1.	Which restorative material do you use for endodontically treated anterior teeth without discolouration when more than 50% of tooth structure is remaining?	A. Composite restoration B. Partial Coverage (Laminate veneer) C. Full coverage crown D. Prefabricated post and core with full coverage crown
2.	Which restorative material do you use for endodontically treated anterior teeth without discoloration when there is 50% or less of tooth structure remaining?	A. Composite restoration B. Partial Coverage (Laminate veneer) C. Full coverage crown D. Prefabricated post and core with full coverage crown
3.	Should the anterior tooth with post and core be crowned?	A. Yes B. No C. Don't know
4.	Which core material do you prefer?	A. Glass ionomer cement B. Composite C. Amalgam
5.	In restoring an endodontically treated anterior tooth without placing a crown, which composite do you prefer?	A. Nano filled B. Microhybrid C. Microfilled D. Others (Specify)
6.	Does placing a rubber dam help in better shade selection of the composite?	A. Yes B. No C. Maybe
7.	When do you finish and polish the composite restoration for better results?	A. Immediate B. 1 day C. 7 days D. Others
8.	What is the reason for placing a crown over an endodontically treated anterior tooth without post and core?	A. Improves the longevity of the tooth B. Aesthetics C. Patient wanted a crown over the restoration
9.	Have you encountered patients who do not prefer crown or veneer over the composite restoration? If yes,	A. More than 75% of the patients B. 50-75% of the patients C. 25-50 % of the patients D. Less than 25% of the patients E. I have not encountered any.
10.	Do you take patient's opinion while choosing the composite shade?	A. Always B. Sometimes C. No
11.	Do you take patient's opinion while choosing the shade for postendodontic crown?	A. Always B. Sometimes C. No
12.	Do you prefer a veneer over the composite restoration, instead of a crown?	A. Yes B. No C. Maybe
13.	Which indirect restorative material do you prefer for better aesthetics?	A. IPS E max crown B. Zirconia veneers C. Others (Specify)
14.	In your opinion, which of the following increases the fracture resistance of endodontically treated anterior teeth?	A. Glass fibre post B. Cast metal post C. Prefabricated Zirconia post D. Prefabricated Titanium post
15.	Do you prepare an ideal ferrule for anterior teeth?	A. Yes B. No C. Don't know
16.	Why do you prepare an ideal ferrule for anterior teeth?	A. Increases the fracture resistance B. Better aesthetics C. Both A and B D. Don't know
17.	What is your opinion about reattachment of fragment of anterior teeth?	A. Better aesthetics than composite and/or crown B. Cost effective C. I do not prefer reattachment of the fragment. D. Both A and B

[Table/Fig-1]: A validated questionnaire used for the survey.

Test-retest reliability was tested using Kappa statistics. The questionnaire was given to a group of 20 participants on two different occasions and their scores were analysed. The measurement of agreement (kappa statistics) between the two responses was 0.952 which showed almost perfect agreement. This validated questionnaire was then circulated among the included participants.

The 17 questions were divided into five categories based on the objectives of this survey- method based (three questions), material aspect (three questions), aesthetics (three questions), treatment choices (five questions) and patient's preferences (two questions). Question 9 was not included in the categorisation as the responses were subjective.

The survey consisted of two part- Demographic data of the participant and study-related questions. Demographic data included their specialisation field in dentistry and years of practice, as clinical experience and skill influence the decision-making abilities of the dentist who is rendering the service. The survey also included various questions which ascertained their treatment choices, the importance of preserving the tooth structure, aesthetics and the consideration given to the physical properties of the restorative material and the tooth. The results obtained from the 150 participants were then statistically analysed.

A grading was given to each group based on the percentage of respondents whose answers matched the current available evidence [11]. For an answer which matches with the literature, if <34% had answered correctly, then the awareness was

- very poor- 34%-51%
- fair, 52-57%
- good, 58-75%
- very good \geq 76% excellent awareness in the respective areas.

This grading was given to all four groups of participants for each of the 16 questions.

The overall grade for a particular category of the question was given as the average of the questions belonging to that area of interest.

STATISTICAL ANALYSIS

The data obtained from the respondents was entered in a Microsoft Excel sheet and statistically analysed using Statistical Package for the Social Sciences version 20.0. The level of significance was kept at 5%. Demographic details and responses to each question were presented using descriptive statistics. Comparison between different dental professional groups was performed using the Chi-square test.

RESULTS

The mean age of the participants was 30.25 \pm 9.08 years with the average years of practice being 5.57 years \pm 8.15 months. The socio-demographic data showed that most of the participants were postgraduates i.e., 60 (40%) followed by general dentists 38 (25.3%), endodontists 36 (24%) and other specialists 16 (10.7%).

[Table/Fig-2] shows the preferences for postendodontic restoration for fractured anterior teeth among the various groups of clinicians. While restoring an endodontically treated anterior tooth without discolouration when more than 50% of the tooth structure is

Questions	Responses	N				Total N (%)	p-value
		Post graduates (n=60)	General dentists (n=38)	Endodontists (n=36)	Other specialist (n=16)		
1. Which restorative material do you use for endodontically treated anterior teeth without discoloration when more than 50% of tooth structure is remaining?	A. Composite restoration B. Partial Coverage (Laminate veneer) C. Full coverage crown D. Prefabricated post and core+full coverage crown	41 (27.33%) 0 15 (10%) 4 (2.66%)	13 (8.66%) 5 (3.33%) 17 (11.33%) 3 (2%)	23 (15.33%) 4 (2.66%) 8 (5.33%) 1 (0.66%)	5 (3.33%) 2 (1.33%) 8 (5.33%) 1 (0.66%)	82 (54.7) 11 (7.3) 48 (32.0) 9 (6.0)	0.013
2. Which restorative material do you use for endodontically treated anterior teeth without discoloration when there is 50% or less of tooth structure remaining?	A. Composite restoration B. Partial Coverage (Laminate veneer) C. Full coverage crown D. Prefabricated post and core+full coverage crown.	8 (5.33%) 4 (2.66%) 22 (14.66%) 26 (17.33%)	5 (3.33%) 3 (2%) 14 (9.33%) 16 (10.66%)	1 (0.66%) 4 (2.66%) 11 (7.33%) 20 (13.33%)	0 1 (0.66%) 11 (7.33%) 4 (2.66%)	14 (9.3) 12 (8) 58 (38.7) 66 (44)	0.197
3. Should the anterior tooth with post and core be crowned?	A. Yes B. No C. Don't know	50 (33.33%) 7 (4.66%) 3 (2%)	36 (24%) 1 (0.66%) 1 (0.66%)	31 (20.66%) 3 (2%) 2 (1.33%)	16 (10.66%) 0 0	133 (88.7) 11 (7.3) 6 (4.0)	0.458
4. Which core material do you prefer?	A. Glass ionomer cement B. Composite C. Amalgam	9 (6%) 51 (34%) 0	13 (8.66%) 25 (16.66%) 0	2 (1.33%) 34 (22.66%) 0	0 15 (10%) 1 (0.7%)	24 (16.0) 125 (83.3) 1 (0.7)	0.001
5. In restoring an endodontically treated anterior tooth without placing a crown, which composite do you prefer?	A. Nanofilled B. Microhybrid C. Microfilled D. Others	27 (18%) 16 (10.66%) 16 (10.66%) 1 (0.7%)	15 (10%) 12 (8%) 11 (7.33%) 0	15 (10%) 18 (12%) 2 (1.33%) 1 (0.7%)	8 (5.33%) 7 (4.66%) 1 (0.66%) 0	65 (43.3) 53 (35.3) 30 (20.0) 2 (1.4)	0.146
6. Does placing a rubber dam help in better shade selection of the composite?	A. Yes B. No C. Maybe	23 (15.33%) 26 (17.33%) 11 (7.33%)	10 (6.66%) 18 (12%) 10 (6.66%)	4 (2.66%) 28 (18.66%) 4 (2.66%)	7 (4.66%) 6 (4%) 3 (2%)	44 (29.3) 78 (52.0) 28 (18.7)	0.016
7. When do you finish and polish the composite restoration for better results?	A. Immediate B. 1 day C. 7 days D. Others	33 (22%) 23 (15.33%) 4 (2.66%) 0	21 (14%) 11 (7.33%) 5 (3.33%) 1 (0.7%)	22 (14.66%) 12 (8%) 2 (1.33%) 0	12 (8%) 3 (2%) 1 (0.66%) 0	88 (58.7) 49 (32.6) 12 (8.0) 1 (0.7)	0.600
8. What is the reason for placing a crown over an endodontically treated anterior tooth without post and core?	A. Improves longevity of the tooth B. Aesthetics C. Patient wanted a crown over the restoration	50 (33.33%) 7 (4.66%) 3 (2%)	28 (18.66%) 8 (5.33%) 2 (1.33%)	18 (12%) 14 (9.33%) 4 (2.66%)	12 (8%) 4 (2.66%) 0	108 (72.0) 33 (22.0) 9 (6.0)	0.031
9. Have you encountered patients who do not prefer crown or veneer over the composite restoration? If yes,	A. More than 75% of the patients B. 50-75% of the patients C. 25-50% of the patients D. Less than 25% of the patients. E. I have not come across any	5 (3.33%) 12 (8%) 18 (12%) 22 (14.66%) 3 (2%)	3 (2%) 9 (6%) 9 (6%) 8 (5.33%) 9 (6%)	5 (3.33%) 7 (4.66%) 9 (6%) 10 (6.66%) 5 (3.33%)	1 (0.66%) 1 (0.66%) 6 (4%) 4 (2.66%) 4 (2.66%)	14 (9.3) 29 (19.3) 42 (28.0) 44 (29.3) 21 (14.0)	0.340
10. Do you take patient's opinion while choosing the composite shade?	A. Always B. Sometimes C. Never	28 (18.66%) 22 (14.66%) 10 (6.66%)	22 (14.66%) 13 (8.66%) 3 (2%)	18 (12%) 11 (7.33%) 7 (4.66%)	10 (6.66%) 5 (3.33%) 1 (0.66%)	78 (52.0) 51 (34.0) 21 (14.0)	0.676

11. Do you take patient's opinion while choosing the shade for postendodontic crown?	A. Always B. Sometimes C. Never	32 (21.33%) 17 (11.33%) 11 (7.33%)	22 (14.66%) 15 (10%) 1 (0.66%)	22 (14.66%) 9 (6%) 5 (3.33%)	15 (10%) 1 (0.66%) 0	91 (60.7) 42 (28.0) 17 (11.3)	0.019
12. Do you prefer a veneer over the composite restoration, instead of a crown?	A. Yes B. No C. May be	20 (13.33%) 20 (13.33%) 20 (13.33%)	9 (6%) 16 (10.66%) 13 (8.66%)	15 (10%) 13 (8.66%) 8 (5.33%)	4 (2.66%) 9 (6%) 3 (2%)	48 (32.0) 58 (38.7) 44 (29.3)	0.433
13. Which indirect restorative material do you prefer for better aesthetics?	A. IPS E max crown B. Zirconia veneers C. Others	31 (20.66%) 28 (18.66%) 1 (0.7%) (Emax veneers or crowns)	11 (7.3%) 27 (18%) 0	28 (18.66%) 7 (4.66%) 1 (0.7%) (PFM)	14 (9.33%) 2 (1.33%) 0	84 (56.0) 64 (42.6) 2 (1.4)	0.001
14. In your opinion, which of the following increases the fracture resistance of endodontically treated anterior teeth?	A. Glass fibre post B. Cast metal post C. Prefabricated Zirconia post D. Prefabricated Titanium post	26 (17.33%) 20 (13.33%) 11 (7.33%) 3 (2%)	10 (6.66%) 12 (8%) 14 (9.33%) 2 (1.33%)	26 (17.33%) 4 (2.66%) 6 (4%) 0	9 (6%) 4 (2.66%) 1 (0.66%) 2 (1.33%)	71 (47.3) 40 (26.7) 32 (21.3) 7 (4.7)	0.005
15. Do you prepare an ideal ferrule for anterior teeth?	A. Yes B. No C. Don't know	42 (28%) 5 (3.33%) 13 (8.66%)	25 (16.66%) 1 (0.66%) 12 (8%)	35 (23.33%) 1 (0.66%) 0	11 (7.33%) 1 (0.66%) 4 (2.66%)	113 (75.3) 8 (5.3) 29 (19.3)	0.017
16. Why do you prepare an ideal ferrule for anterior teeth?	A. Increases the fracture resistance B. Better aesthetics C. Both A and B D. Don't know	22 (14.66%) 1 (0.66%) 29 (19.33%) 8 (5.33%)	8 (5.33%) 1 (0.66%) 20 (13.33%) 9 (6%)	16 (10.66%) 0 18 (12%) 2 (1.33%)	3 (2%) 0 10 (6.66%) 3 (2%)	49 (32.7) 2 (1.3) 77 (51.3) 22 (14.7)	0.313
17. What is your opinion about reattachment of fragment of anterior teeth?	A. Better aesthetics than composite and/or crown B. Cost effective C. I do not prefer reattachment of the fragment D. Both A and B	13 (8.66%) 2 (1.33%) 14 (9.33%) 31 (20.66%)	5 (3.33%) 1 (0.66%) 12 (8%) 20 (13.33%)	4 (2.66%) 6 (4%) 8 (5.33%) 18 (12%)	1 (0.66%) 1 (0.66%) 9 (6%) 5 (3.33%)	23 (15.3) 10 (6.7) 43 (28.7) 74 (49.3)	0.049

[Table/Fig-2]: Questionnaire showing the preferences for postendodontic restoration for fractured anterior teeth among the various groups of clinicians.

remaining, composites is preferred majorly 82 (54.7%) followed by full coverage crowns.

When less than 50% of coronal tooth structure is remaining, prefabricated post and core with full coverage crowns was preferred 66 (44%). The preferred core material was composites followed by glass ionomer cement.

A 78 (52%) of the participants stated that a rubber dam does not help in better composite shade selection. Finishing the composite restorations immediately (58.7%) yielded better aesthetics and longevity. The most common reason 108 (72%) for placing a crown over an ETT without post and core was to improve the longevity of the tooth. Although according to endodontists, a prosthesis improves the longevity 18 (50%) and aesthetics 14 (38.9%).

Most of the endodontists preferred IPS Emax crowns 28 (77.8%) while most of the general dentists preferred zirconia veneers 27 (71.1%), (p-value=0.001). The fracture resistance of endodontically treated anterior teeth was increased by glass fibre posts, 72.2%, (p-value of 0.005). Around 113 (75.3%) of participants preferred preparing an ideal ferrule, primarily because it increased the fracture resistance and secondarily the aesthetic appearance of the tooth. Reattachment remained a promising treatment option in fractured anterior teeth 107 (71.3%) (p-value=0.049).

Upon grading the level of awareness among the different groups of respondents, it was found that the endodontists had good awareness regarding method, patient preferences and aesthetics, very good awareness in materials and excellent awareness in treatment choices. This level of awareness was the best in comparison with other groups in the respective areas of interest.

DISCUSSION

Endodontically treated teeth are structurally different from normal teeth. Major changes following treatment include altered physical characteristics, loss of tooth structure and aesthetic changes [11]. Although the success rate of endodontically treated teeth is 91% [12], recent studies cannot emphasise more the importance of postendodontic restoration for the longevity of the tooth. Hence, while choosing a postendodontic restoration various factors must be considered- the amount of remaining tooth structure, position in the arch, aesthetics, and occlusal function [4].

According to Huang TJ et al., dehydration following endodontic treatment per se does not weaken the dentin structure in terms of physical properties. Other factors like the extent of caries and remaining dentin play an important role in the long-term survival of the tooth [13]. Thus, implying that teeth with sufficient dentin and coronal structure last longer when other factors are kept constant. This is in accordance with the results of this study, that when more than 50% of the coronal tooth structure is remaining without discoloration, it was better to go for a tooth-coloured restoration than a full coverage or partial coverage prosthesis as it conserves the remaining tooth structure present, which adds on to the longevity of the tooth. The construction of a core build-up is necessary as the amount of residual tooth substance decreases and the build-up augments the development of retention and resistance provided by the remaining tooth structure [14]. The commonly used core material is composites, glass ionomer cement, amalgam, and cast gold. Although amalgam has superior strength, low solubility, and coefficient of thermal expansion like that of the tooth; composites seem to be a better and preferred choice, despite its drawbacks, mainly when aesthetics is of prime concern, which is similar to the findings of Kumar G and Shivrayan A [15].

Dehydration of the tooth results in altered colour perception and shade selection, which could be the reason behind the altered shade selection of composites after rubber dam isolation [16]. A 78 (52%) of the respondents agree with the previous statement. Studies by Scurreia MS et al., and Sorensen JA and Martinoff JT stated that coronal coverage crowns in anterior teeth did not significantly contribute to longevity and those crowns are only indicated when the tooth is structurally weakened or require significant colour changes [17,18]. This was equivalent to the results of the 32 (88.8%) endodontists, followed by the other groups. And when given a choice between the above-stated two factors, most of the participants agreed that crowns improved the longevity of the tooth. As the translucency of lithium disilicate crowns is superior to Zirconia, it can simulate the natural tooth in terms of its ability to emit light, hence being preferred for aesthetic restorations [19].

A systematic review by Martins MD et al., states that there is no difference in the failure rates between glass fibre posts and cast posts [20]. Habibzadeh S et al., compared the fracture resistances of glass fibre posts, cast metal posts and zirconia posts [21]. They

concluded that the former had the greatest fracture resistance as the elastic modulus is like that of the dentin and its ability to bond to the tooth, especially when used with resin cement.

The presence of ferrule increases the fracture resistance and aesthetics of endodontically treated teeth regardless of the post system. Finite element analysis concluded that the ferrule is a determining factor on the strain, stress distribution, fracture resistance, and failure mode, [22] which explains the need for an ideal ferrule even for anterior teeth. Fragment reattachment is quick, aesthetic, and economical and the patient suffers minimal psychological and social trauma, which can be improved with different adhesive techniques and materials [23]. Because of its several advantages, fragment reattachment remains a much more aesthetic and economical treatment choice concerning both the patient and the dentist among most of the respondents. [Table/ Fig-3] shows the inferences from the previous literature compared with the present study [3,6,8,24-26].

S. No.	Author's name and year	Place of study	No. of subjects	Objective	Conclusion
1	Kon M et al., (2013) [24]	Switzerland	90	To evaluate the predominant opinion and knowledge of Swiss dentists in terms of current strategies for restoring endodontically treated teeth.	Metal posts predominantly used. Regardless of the type of post, composite cements were the most used luting materials.
2	Ratnakar P et al., (2014) [3]	North India	110	To determine the frequency of preferred methods, materials, timing, and other concerning factors regarding restoration of ETT.	Unrestored ETT is susceptible to fracture, which could lead to loss of tooth.
3	Akbar I (2015) [6]	North of Saudi Arabia	255	To investigate the materials, techniques used in the restoration of ETT by dentists in north of Saudi Arabia.	Practitioners had good knowledge of the techniques and materials for restoring ETT.
4	Ranganath A and Nasim I (2016) [25]	Chennai, India	315	To survey the planning of postendodontic restorations.	Endodontists are more aware about the ferrule effect which plays a peculiar role in postendodontic restorations.
5	Sharma D et al., (2020) [8]	Mumbai, India	239	To explore awareness, attitude, and practice of dental practitioners toward management of endodontically treated teeth and factors associated with it.	Most study subjects had moderate awareness, neutral attitude, and good practice regarding restoration of endodontically treated teeth.
6	Usta SN et al., (2022) [26]	Turkey	1093	To evaluate the different trends in postendodontic restoration preferences amongst Turkish dentists via survey.	Composite resins and fibre posts were the most common preferences in postendodontic restoration. Endodontists had a higher tendency to use posts than prosthodontists and general dental practitioners.

7	Present study (2023)	Maharashtra	150	To determine the consideration given to the root canal treated tooth in terms of the preferred method, material, aesthetics, and other concerning factors while providing a proper and successful postendodontic restoration.	Rubber dam isolation is done after composite shade selection. An ideal ferrule is always preferred for anterior teeth. Good awareness was noted among all the groups in terms of treatment choices and materials. Better decisions and awareness are need among general dentists (methods and aesthetics), postgraduates (patient preferences) and other specialists (treatment method).
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[Table/Fig-3]: Inferences from the previous literature compared with the present study [3,6,8,24-26].

ETT: Endodontically treated tooth

This study featured clinicians with a relatively wide range of clinical practice. The dentists' experience and skill influence their clinical decision-making for any scenario. Various studies assessing this factor have concluded that dentists with more clinical experience prefer conservative treatment options [27,28]. This might be because the clinical experience they accumulate during the years of practice greatly helps in decision-making and judging the situation better [29]. Walker I et al., stated that experienced or older dentists are not influenced by the financial incentives they receive while deciding on a procedure to perform and thus are more ethically inclined [30]. On assessing the percentage of each group responding to a particular question, it was found that in 14 out of 16 questions more than 50% of the endodontists' responses were similar to the previous studies [13-23]. In 10 out of 16 studies, more than 60% of the responses matched. This proportion was much higher than the other groups. Thus, the responses of the endodontists were considered as a comparison tool for assessing the similarity of the responses given by the other three groups. Since 40% of the participants were postgraduates, and the overall mean years of clinical practice in this survey were 5.57 years±8.15 months, the treatment options preferred by endodontists differed from the other groups, mainly because of their specialised training and experience.

Limitation(s)

The participants were included based on voluntary sampling. The overall sample size is less as compared to other previous studies. Although being used as a comparative group, the heterogeneity in the responses of the endodontists could be because of the wide differences in the years of clinical practice, and the fact that they comprise only 24% of the sample size. Higher levels of evidence-based studies in this domain and studies involving dentists from a wider geographical distribution with large sample sizes are needed.

CONCLUSION(S)

Within the limitations of the study, it can be concluded that direct composite restoration (54.7%) was preferred when there were more than 50% remaining tooth structure and prefabricated post and core with prosthesis (44%) when <50% structure remains. IPS Emax crown (56%) was considered more aesthetic as a postendodontic restoration. Patient's opinion was always considered while selecting the shade of the composite (52%) and prosthesis (60.7%). Thus, good awareness was noted among all the groups in terms of treatment choices and materials. Better decisions and awareness

are needed among general dentists (methods and aesthetics), postgraduates (patient preferences) and other specialists (treatment method). Conserving the maximum possible tooth structure along with proper treatment selection and providing an adequate seal, results in the longevity of the tooth-restoration complex.

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