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PREFERÊNCIAS RESTAURADORAS DE DENTISTAS E ALUNOS PARA RESTAURAR DENTES TRATADOS ENDODONTICAMENTE: UMA REVISÃO SISTEMÁTICA DE ESTUDOS DO TIPO *SURVEY*

PASSO FUNDO

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Dissertação apresentada ao Programa de Pós-Graduação em Odontologia da Faculdade IMED, como requisito parcial à obtenção do título de Mestre em Odontologia.

Professor orientador: Prof. Dr. Rafael Sarkis Onofre

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PROF. DR. RAFAEL SARKIS-ONOFRE (PPGO-IMED) – Presidente

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LUIZA PALOMA DOS SANTOS GIROTTO

Preferências Restauradoras de Dentistas e Alunos para Restaurar Dentes Tratados Endodonticamente: uma Revisão Sistemática de estudos do tipo *survey*

Dissertação apresentada ao Programa de Pós-Graduação em Odontologia da Faculdade IMED, como requisito parcial à obtenção do título de Mestre em Odontologia.

Banca examinadora:

Prof. Dr. Rafael Sarkis Onofre - Faculdade Meridional - IMED, Passo Fundo (orientador)

Prof. Dr. Rodrigo Varella de Carvalho - Faculdade Meridional - IMED, Passo Fundo (membro interno)

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Prof. Dr. Bernardo Agostini - Faculdade Meridional - IMED, Passo Fundo (suplente)

Dedico este trabalho à Deus. Eu sei que a ciência e Ele nem sempre andam juntos, mas foi Ele quem me permitiu estar aqui, Quem me manteve aqui e me fez viver essa experiência, evoluindo profissionalmente.

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"Que todos os nossos esforços estejam sempre focados no desafio à impossibilidade. Todas as grandes conquistas humanas vieram daquilo que parecia impossível."

Charles Chaplin

Notas Preliminares

O projeto de pesquisa relacionado à esta dissertação foi apresentado a banca de qualificação no dia 30 de abril de 2020 e aprovado pela Banca Examinadora composta pelos Professores Doutores Rodrigo Varella de Carvalho e Mateus Bertolini Fernandes dos Santos.

RESUMO

GIROTTO, Luiza PS. **Preferências restauradoras de dentistas e alunos para restaurar Dentes Tratados Endodonticamente: uma revisão sistemática de estudos do tipo *survey*.** 2021, 74p. Dissertação Mestrado em Odontologia – Programa de Pós-Graduação em Odontologia. Faculdade Meridional, Passo Fundo, 2021.

Esta revisão sistemática teve como objetivo avaliar as preferências restauradoras de dentistas e estudantes de odontologia para restaurar dentes tratados endodonticamente (DTE). Foram selecionados estudos do tipo *survey*, escritos em inglês, realizados com dentistas e estudantes de odontologia, que avaliaram o uso de pinos intrarradiculares e outros desfechos relacionados à restauração de DTE. As buscas foram realizadas nas bases de dados PubMed e SCOPUS sem restrição de tempo. A seleção e extração de dados foram realizadas por 2 pesquisadores de forma independente. Utilizou-se um planilha padronizada para extrair os dados (questões relacionadas ao tema e a taxa de resposta de cada questão da pesquisa) e avaliou-se o risco de viés. Foi realizada análise descritiva das informações coletadas. Vinte e cinco artigos foram incluídos. A maioria dos dentistas que responderam às pesquisas relatou o tempo desde a graduação de 1 a 20 anos (40%), e 44% eram especialistas. As escolhas mais relatadas quanto ao tipo de pino utilizado foram pinos pré-fabricados (45,8%), pino metálico fundido (16,7%) e ambos os pinos (16,7%). Os pinos de metal fundido foram citados com maior frequência em pesquisas publicadas entre 1994 e 2010, enquanto os pinos pré-fabricados, tanto de metal quanto de fibra de vidro, foram citados entre 2006 e 2019. O agente cimentante preferido para pinos intracanais foi os cimentos à base de resina (47%). Essas escolhas parecem ter sido influenciadas pelo tempo e pelo nível de formação em pós-graduação. As preferências restauradoras relacionadas aos pinos mudaram ao longo do tempo, desde o uso de pinos fundidos para pré-fabricados ou o uso de ambos os pinos e parecem ser influenciados pela experiência e formação em pós-graduação.

Palavras-chave: Revisão Sistemática, Inquéritos e Questionários, Técnica para Retentor Intrarradicular, Dente não Vital.

ABSTRACT

GIROTTO, Luiza PS. **Restorative preferences and choices of dentists and students for restoring endodontically treated teeth: A systematic review of survey studies.** 2021 p. 74. Dissertation (Master degree in Dentistry). Graduate Program in Dentistry. Meridional Faculty, Passo Fundo, 2021.

This systematic review aimed to assess the restorative preferences for endodontically treated teeth between dentists and dental students. Survey studies, written in English, of dentists and dental students which evaluated the use of intracanal posts and other restorative options for endodontically treated teeth were selected. Searches were performed in the PubMed and SCOPUS databases without time restriction. Screening and data extraction were performed by 2 researchers independently. A standardized outline was used to extract the data (questions related to the theme and the response rate of each question on the survey), and the risk of bias was assessed. Descriptive analysis was performed of the collected information. Twenty-five articles were included. Most dentists who answered the surveys reported the time since graduation as 1 to 20 years (40%), and 44% were specialists. The most-reported choices concerning the type of posts used were prefabricated posts (45.8%), cast metal posts (16.7%), and both posts (16.7%). The cast metal posts were cited more frequently in surveys published between 1994 and 2010, while prefabricated posts, both metal and glass fiber ones, were cited between 2006 and 2019. The preferred luting agent for intracanal posts was resin-based (47%). These choices seem to have been influenced by time and by the level of postgraduate training. Restorative preferences related to posts have changed over time, from the use of cast posts to prefabricated ones or the use of both posts and seem to be influenced by experience and postgraduate training.

Clinical significance: The decision on how to restore endodontically treated teeth seems to be influenced by experience and postgraduate training of dentists.

Keywords: Systematic Review, Surveys and Questionnaires, Post and Core Technique, Nonvital Tooth.

SUMÁRIO

Introdução

Após a realização de um tratamento endodôntico, alguns dentes podem apresentar sinais de grande destruição coronária resultante de lesões cariosas extensas, trauma ou tratamento endodôntico agressivo (FERNANDES, SHETTY, COUTINHO, 2003; NAUMANN, BLANKENSTEIN, DIETRICH, 2005; SARKIS-ONOFRE et al., 2015). Se a perda for substancial, métodos adicionais de retenção do material restaurador coronário à estrutura dentária, como pinos intrarradiculares, são necessários (FERNANDES, SHETTY, COUTINHO, 2003; MAROULAKOS; NAGY; KONTOGIORGOS, 2015).

Atualmente, não há consenso na literatura sobre a melhor maneira de restaurar os dentes tratados endodonticamente (DTE), porque muitos fatores estão envolvidos, como a escolha da restauração coronal final, o tipo de retentor intrarradicular (ABDULJAWAD et al., 2016; KARZOUN et al., 2015), a quantidade de estrutura coronal restante (SAMRAN; EL BAHRA; KERN, 2013; MANGOLD, KERN, 2011; AHMED, DONOVAN, GHUMAN, 2017) e a presença de férula (SAMRAN; EL BAHRA; KERN, 2013; SAMRAN et al., 2015).

A necessidade do uso de pino radicular para reter a restauração coronal em um DTE (FIGUEIREDO; MARTIN-FILHO; FARIA-E-SILVA, 2015), faz com que os cirurgiões-dentistas se deparem com um número crescente de materiais e técnicas para restaurar esses elementos, variando de um pino convencional de metal fundido a técnicas usando pinos de fibra de vidro ou pinos de fibra de vidro fresados em CAD-CAM (FERNANDES, SHETTY, COUTINHO, 2003; FARRELL, BURKE, 1989; FOKKINGA et al., 2007; NAUMANN et al., 2012; SARKIS-ONOFRE et al., 2015; NAUMANN et al., 2016). Independente do material, é importante ressaltar que o retentor intrarradicular não reforça a estrutura dental remanescente, ele apenas auxilia com a função de retenção da restauração (KIMMEL, 2000).

Em meio a variedade de pinos disponíveis para a prática odontológica, encontram-se as opções de Núcleo Metálico Fundido (NMF) e o Pino de Fibra de Vidro (PFV). Os NMF apresentam um alto módulo de elasticidade, podendo apresentar um comportamento mecânico diferente quando comparado a pinos com módulo de elasticidade semelhante a dentina (ZARONE et al., 2006). Ainda, esse tipo de pino possui a vantagem de adaptação perfeita entre o canal

radicular e o pino, favorecendo a retenção friccional resultando em uma boa capacidade de retenção. Assim, em casos de extrema perda da porção coronária, sem estrutura remanescente e em grandes próteses fixas, o pino de metal fundido ainda é muito utilizado (SARKIS-ONOFRE, PEREIRA-CENCI, CENCI, 2015). No entanto, o NMF requer um protocolo clínico mais complexo e envolve etapas laboratoriais, por este motivo acaba tendo um processo mais demorado e tendo um custo mais elevado.

Por outro lado, os pinos pré-fabricados podem ser feitos geralmente em uma única sessão, e no caso dos PFV, por exemplo, podem ser cimentados com cimento resinoso e instalados no mesmo momento em que o canal for preparado (PEGORETTI et al., 2002). Os PFV possuem um módulo de elasticidade semelhante a dentina (MALFERRARI, MONACO, SCOTTI, 2003; GLAZER, 2000; PEREL, MUROFF, 1972; AL-OMIRI et al., 2010; ROSA et al., 2013) e geralmente são brancos ou transparentes, sendo uma vantagem quando a estética do material restaurador depende da cor do substrato (MAROLI et al., 2017).

Além dos PFV pré-fabricados, a fabricação de PFV personalizados com uma fresagem CAD-CAM também é possível e tem suas vantagens. Esse processo permite uma camada de cimento de espessura mínima durante a cimentação, simplificando a técnica, reduzindo etapas, criando um retentor em monocamada (LIU et al., 2010). Entre outros fatores, o tipo de técnica de processamento, tipo de fibra e seu posicionamento irão interagir, definindo o desempenho mecânico do pino (BOUDRIAS et al., 2001; MACERI et al., 2009). O pino fresado em CAD-CAM parece ser um desenvolvimento promissor, mas o processo requer otimização, pois o PFV pré-fabricado ainda mostra melhores propriedades mecânicas e características superficiais em relação ao PFV fresado (RUSCHEL et al., 2018).

Uma revisão sistemática e meta-análise de estudos clínicos realizada em 2015, mostrou uma maior taxa de sobrevivência para NMF do que para PFV, principalmente por períodos mais longos de acompanhamento (FIGUEIREDO, MARTINS-FILHO, FARIA-E-SILVA, 2015). Em contraste, Sarkis-Onofre et al. (2014) em um ensaio clínico randomizado (ECR) mostrou que dentes severamente destruídos restaurados com PFV e NMF tiveram desempenho semelhante, com taxas de sobrevivência semelhantes após 3 anos de

acompanhamento. Outro estudo que relatou 10 anos de acompanhamento de diferentes retentores intracanais em dentes restaurados com coroa de zircônia mostraram que não houveram diferenças significativas nas taxas de sobrevivência entre eles (CALABRO et al., 2019). O que corrobora com dois outros estudos clínicos com duração de 12 meses de acompanhamento (PREETHI, KALA, 2008) e acompanhamento em intervalos de 1, 3 e 5 anos (CLOET, DEBELS, NAERT, 2017), os quais afirmaram que tanto o PFV quanto NMF apresentam altas taxas de sucesso, sendo que no ECR realizado por Naumann et al. (2017) as taxas de sobrevida de 58,7% para restaurações de PFV e a taxa anual de falhas em até 154 meses foi de 4,2% para PFV. Recentemente, uma revisão sistemática evidenciou que o uso de PFV aumenta a resistência à fratura de DTE (JUREMA et al., 2021). Portanto, tanto o NMF quanto o PFV apresentam boa performance clínica quando condicionadas às indicações adequadas.

Após o dente estar tratado endodonticamente e o pino estar instalado, há a necessidade de uma restauração, para a qual inúmeros materiais estão disponíveis no mercado. Embora uma prótese fixa possa ser considerada a reconstrução padrão de um dente amplamente comprometido (MAGNE et al., 2016), há estudos relatando bons resultados para grandes restaurações diretas de resina composta (DIJKEN et al., 2010; OPDAM et al., 2012). As vantagens das restaurações diretas são: menor custo, preservação de tecido dental sadio, menor tempo de procedimento e maiores opções de reparo se necessário (SKUPIEN et al., 2016).

Em um estudo realizado em 2013 foi analisada a sobrevivência e o sucesso de restaurações por até 9 anos. O sucesso da restauração para compósitos e para coroas foi semelhante, mas após 5 anos a falha da coroa apresentava uma tendência a impactar significativamente mais na sobrevivência dos dentes (SKUPIEN et al., 2013). Outro ensaio clínico randomizado concluiu que as restaurações diretas apresentam uma alta taxa de sobrevivência, entretanto, as restaurações indiretas proporcionam maior aceitabilidade clínica, melhor desempenho e menor necessidade de reintervenção (SKUPIEN et al., 2016). Além disso, sabe-se que o sucesso clínico de uma restauração de DTE depende do grau de destruição do respectivo dente e que não existe uma terapia absolutamente “segura” para determinado caso, portanto o nível de estrutura

dentária remanescente deve ser muito bem avaliado antes da escolha do material restaurador (KOLPIN et al., 2014).

A literatura atual mostra que alguns fatores relacionados aos dentistas também podem influenciar o processo de tomada de decisão, especificamente em relação à experiência clínica e à formação de pós-graduação (NASCIMENTO et al., 2013; MITOV, et al., 2014; SARKIS-ONOFRE et al., 2015.). Assim, maior interesse tem sido observado na abordagem da pesquisa baseada na prática odontológica, onde as preferências dos dentistas são levadas em consideração e os tratamentos são avaliados em um cenário de prática clínica do “mundo real” (HORN, GASSAWAY, 2007; OPDAM et al., 2008). Essa forma de associar conhecimento à interpretação científica tem sido considerada o melhor método e pode ser implementada direta e rapidamente na prática clínica regular (GILBERT et al., 2011).

Considerando que os materiais e técnicas para restaurar um DTE variaram nos últimos anos, as pesquisas são ferramentas importantes para avaliar e entender as abordagens de tratamento para restaurar um DTE. Assim, o objetivo desta revisão sistemática é conhecer as preferências restauradoras de dentistas e estudantes para restaurar dentes tratados endodonticamente.

ARTIGO 1

Title page

Restorative preferences and choices of dentists and students on restoring endodontically treated teeth: a systematic review of survey studies

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Restorative preferences and choices of dentists and students for restoring endodontically treated teeth: A systematic review of survey studies

Abstract

Statement of problem: The best protocol to restore endodontically treated teeth (ETTs) is still unclear, with many factors to be considered, including the selection and necessity of a post, the type of coronal restoration, the amount of remaining coronal structure, and the type of luting agent.

Purpose: The purpose of this systematic review was to assess the restorative preferences for ETTs between dentists and dental students.

Material and methods: Survey studies, written in English, of dentists and dental students which evaluated the use of intracanal posts and other restorative options for endodontically treated teeth were selected. Searches were performed in the PubMed and SCOPUS databases without time restriction. Screening and data extraction were performed by 2 researchers independently. A standardized outline was used to extract the data (questions related to the theme and the response rate of each question on the survey), and the risk of bias was assessed. Descriptive analysis was performed of the collected information.

Results: Twenty-five articles were included. Most dentists who answered the surveys reported the time since graduation as 1 to 20 years (40%), and 44% were specialists. The most-reported choices concerning the type of posts used were prefabricated posts (45.8%), cast metal posts (16.7%), and both posts (16.7%). The cast metal posts were cited more frequently in surveys published between 1994 and 2010, while prefabricated posts, both metal and glass fiber ones, were cited between 2006 and 2019. The preferred luting agent for intracanal posts was resin-based (47%). These choices seem to have been influenced by time and by the level of postgraduate training.

Conclusions: Restorative preferences related to posts have changed over time, from the use of cast posts to prefabricated ones or the use of both posts and seem to be influenced by experience and postgraduate training.

Clinical implicance: The decision on how to restore endodontically treated teeth seems to be influenced by experience and postgraduate training of dentists.

Keywords: Systematic Review, Surveys and Questionnaires, Post and Core Technique, Nonvital Tooth.

Introduction

After endodontic therapy, teeth may have extensive coronal damage from caries, trauma, and the endodontic treatment[1-3] and intracanal posts may be indicated for retention.[1,4-8] However, the optimal protocol to restore endodontically treated teeth (ETTs) is still unclear, and different factors should be considered, including the selection and necessity of a post, the type of coronal restoration, the amount of remaining coronal structure, and the type of luting agent.[9-23]

To restore ETTs, dentists must select from different materials and techniques varying from conventional cast metal posts, prefabricated metal, carbon, and glass fiber posts, or milled computer-aided design and computer-aided manufacturing (CAD-CAM) glass fiber, metal, or ceramic posts.[3,24-28] The clinical performance and longevity can vary depending on the material.[15,29-38] A focus on a scientific evidence-based dental practice can resolve such selection problems. Associating practice, knowledge, and scientific interpretation has been considered the best method and can be implemented directly and rapidly in clinical practice.[39] Nevertheless, factors related to dentists can also influence the decision-making process, specifically concerning clinical experience and postgraduate training.[40,41] Thus, the preferences of dentists should be taken into consideration, and the treatment options should be evaluated in the clinical situation to provide reliable scientific evidence.[42,43]

Surveys are important tools for assessing and understanding the treatment approaches and decision-making process for restoring ETTs. Therefore, the purpose of this systematic review was to assess the preferences of the restorative options of ETTs between dentists and dental students.

Material and Methods

This systematic review was registered in the PROSPERO (CRD42020148985) and was reported based on the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement.[44] Survey studies of dentists and dental students for ETTs which evaluated the use of intracanal posts, regardless of type, and also other restorative outcomes, such as the use of different adhesive techniques and luting agents or different materials to restore the coronal portion of the tooth were included. A survey is

defined as a research method for collecting data from a predefined group of respondents to gain information and insights into various topics of interest. Surveys were included independently of the method used for the data collection. Other types of study designs and studies that did not assess the use of intracanal posts were excluded.

The following population, intervention, comparison, outcome (PICO) question was used: P: Dentists and students of dentistry respondents of surveys related to restorations of endodontically treated teeth. I: The respondents of surveys answered questionnaires about restoration of endodontically treated teeth, such as use of intracanal posts, use of adhesive techniques, or different materials to restore the coronal portion of the tooth. C: A specific comparator was not determined. O: The response rate of dentists and students related to the use of intracanal posts to restore endodontically treated teeth and the response rate of dentists and students related to other questions about the restoration of endodontically treated teeth such as the use of adhesive techniques or different materials to restore the coronal portion of the tooth.

The search was conducted without period restrictions in 2 electronic databases (PubMed and SCOPUS) and restricted to English language reports. The last search was carried out in November 2019. The reference lists of all included articles were also screened to identify any further relevant studies. Supplementary Table 1 presents the search strategy used in both databases.

Study selection was performed by using a software program (EndNote X7; Thomson Reuters). The articles identified in all databases were screened for duplicates, which were excluded. Two researchers (L.G., L.D.) independently identified articles by first analyzing titles and abstracts for relevance and the presence of the selection criteria listed above. Retrieved records were classified as include, exclude, or uncertain. The full-text articles of included and uncertain records were obtained for further eligibility screening by the same 2 reviewers. Discrepancies in eligibility were resolved through discussion between the 2 reviewers. In the event of an unresolved disagreement, the opinion of a third reviewer (R.O.) was obtained. In situations in which access to the full-text article was not possible or data were missing, the authors were contacted by e-mail at least 3 times.

A standardized outline was used to extract the following data: publication

details (author and year of publication); characteristics of the study (setting, country, sample size, number of respondents, response rate, and main objective); characteristics of respondents (dentists: time since graduation in years, postgraduate training (yes or no, level) and workplace; or students: school year); questions related to restorations of endodontically treated teeth and the response rate of each question. Initially, a pilot test was performed through a discussion between the reviewers to consider all data for extraction. Subsequently, data extraction was performed by 2 reviewers independently, and discrepancies were resolved through discussion between the 2 reviewers (L.G., L.D.). In the event of an unresolved disagreement, the opinion of a third reviewer was obtained (R.O.).

The tool developed by Agarwal et al[45] was used to assess the risk of bias. The following domains were considered: representativeness of the sample, adequacy of the response rate, missing data within completed questionnaires, conduct of pilot testing, and established validity of the survey instrument. All domains were classified as low risk of bias, unclear risk of bias, or high risk of bias based on the study reporting. Initially, a pilot test was performed through a discussion between the reviewers. The assessment of each study was performed by 1 reviewer (L.G.) and verified by the other (L.D.).

Tables were generated to summarize the included studies and the results. The first goal was to synthesize data about the type of intracanal post used by dentists or students. A figure was created considering the type of posts used over the years by survey responses. The second goal was to synthesize data related to other restorative outcomes; however, based on information available in the included studies, it was only synthesized data related to the cement used to lute posts and the type of failures related to the use of posts and ETTs.

Results

Figure 1 presents the flow chart of the study selection. The literature search yielded 636 articles, and an additional 4 studies were identified after assessing the reference lists of the included studies. After the removal of duplicates and irrelevant articles, 52 articles met the eligibility criteria based on title and abstract, after which full-text screening resulted in 25 articles being included.

The characteristics of the included studies are presented in Supplementary Table 2. Most of the studies (56%) were published between 2015 and 2019 and performed in European (40%) and Middle Eastern (20%) countries. The sample sizes of dentists and dental students in most of the surveys (64%) ranged from 90 to 600 participants and most of the response rates (52%) ranged from 50% to 80%. The sample in each study considered dentists only (88%), dentists and dental students (8%), and 4% were considered unclear. For dentists, the mean time since graduation varied from 1 to more than 30 years, the majority reporting 1 to 20 years (40%). Forty-four percent of the dentists were specialists, and only 2 studies assessed dental students.

The results demonstrated that some factors could influence the restorative preferences and choices of dentists. Mitov et al[46] reported that clinicians with fewer than 15 years of experience would use posts significantly less frequently. Naumann et al[47] reported that the frequency of post placement differed significantly among groups depending on professional experience. Rabi[48] reported that factors such as sex, type, and years of experience influenced the choices. Weerapperuma et al[49] and Sarkis-Onofre et al[3] reported that postgraduate training appeared to influence post selection, while Sambrock and Burrow[50] reported that the type of planned restoration and the location of the tooth in the arch influenced the restorative decision.

Supplementary Table 3 presents the results of surveys related to restorative preferences and choices, and Figure 2 presents the type of posts used over the years by survey respondents. The types of posts used were prefabricated posts (45.8%), cast metal posts (16.7%), both posts (16.7%), it depends on the situation (16.7%), and no post (4.1%). In addition, between 1994 and 2010, 6 studies were included, and 4 reported the use of cast metal posts (2 – both posts and 2 – cast posts) and between 2014 and 2019, 19 studies were selected, and 13 reported the use of prefabricated posts (11 - prefabricated posts and 2 both posts).

Seventeen studies reported the preferences of dentists for the type of luting agent used for the posts. The preferences were resin-based luting agents (47%), zinc phosphate (23%), glass ionomer (18%), zinc ionomer (6%), and resin-modified glass ionomer cements (6%). Zinc phosphate cement was cited more frequently in older surveys for luting cast posts. The resin-based luting

agents, including self-adhesive resin and conventional dual-polymerized adhesive resin, were used in most studies because they are frequently indicated to lute prefabricated posts.

Six surveys asked about the most frequent failure of ETTs: crown fracture,[27,51] endodontic failure,[27,52,53] and loss of retention.[47,53] In addition, Jacinkeviciute et al[54] cited root fracture as the main cause of failure in groups using posts.

Some surveys reported that general dentists, specialists, and dental students believe that sometimes the placement of a post reinforces ETTs and reduces the fracture probability.[27,47,51-53,55] In addition, it was found that the function of a post is to retain the core and that a ferrule effect can increase the fracture resistance of ETTs.[27,48,51-53,55-57] Supplementary Table 4 presents the risk of bias judgment. Most of the studies (92%) judged as “Unclear” related to missing data within completed questionnaires and “Definitely no” related to “conduct of piloting test” (82.6%).

Discussion

The authors are unaware of a previous systematic review of surveys on the preferences and choices of dentists and students to restore ETTs. The findings of this study can provide information about opinions, demographics, attitudes, and different treatment approaches. The data show that dentists preferred prefabricated and cast metal posts to restore ETTs and resin-based luting agents for bonding such posts. The choice of posts seems to be influenced by time because the cast metal post was cited more frequently in older surveys, while prefabricated posts were cited in surveys published recently (Fig. 2). This difference might be related to the cast metal post technique being established earlier than the prefabricated post technique, which was introduced to facilitate clinical practice and save time.[29] In addition, postgraduate training might have influenced the choices because dental specialists could be more familiar with the literature and prepared to introduce new technologies in their clinical practice.[40,41]

Glass fiber posts, cast metal, carbon fiber posts, and prefabricated metal posts have different mechanical properties. Cast and prefabricated metal posts have a high elastic modulus and may perform differently than posts with an elastic modulus similar to that of dentin.[30] Prefabricated glass fiber posts have an elastic

modulus similar to that of dentin and could be associated with better stress distribution.[11]

A systematic review and meta-analysis of clinical studies showed a higher survival rate for cast metal posts than glass fiber posts, mainly after longer follow-up periods.[11] Sarkis-Onofre et al[31] reported that posts with a high elastic modulus appear perform better when restoring ETTs without a ferrule; however, the authors reported that studies assessing glass fiber posts with longer follow-up periods are needed. Sarkis-Onofre et al[15] also showed that severely damaged teeth restored with glass fiber posts and cast metal posts had good and similar performance after 9 years of follow-up. Another study on the 10 years of follow-up of different posts on teeth restored with zirconia crowns reported no significant differences in survival rates between cast metal and glass fiber posts.[32] A study with 12 months of follow-up[33] and another with follow-up at intervals of 1, 3, and 5 years[34] reported that both glass fiber and cast metal posts had high success rates. Naumann et al[35] reported survival rates of 58.7% for glass fiber post restorations and an annual failure rate of 4.2% up to 154 months. Therefore, both cast metal posts and glass fiber posts can be expected to have good clinical performance when used appropriately.[15,36,37]

Schwendicke and Stolpe[38] assessed the cost-effectiveness of different post-retained crowns. They reported that cast metal posts and glass fiber posts presented similar effectiveness but that glass fiber posts were less costly with fewer catastrophic complications occurring, reducing the cost of retreatments. Preferences for glass fiber posts can be justified by the additional long-term costs of cast metal posts and the minimal gain in effectiveness, as well as the poor esthetics of these posts.[38] Nevertheless, some still consider both the cast metal posts and glass fiber posts to be cost-effective because they successfully retain teeth for long periods.[38]

The preferences of dentists concerning luting strategies for posts were mainly for resin-based agents. A systematic review of in vitro studies that used different luting strategies and different bond strength tests reported that the use of a self-adhesive resin-based luting agent improved the retention of glass fiber posts in root canals.[16] Enhanced adhesive procedures are now possible through the use of adhesive luting systems in combination with prefabricated posts and direct core foundations.[17] The luting of prefabricated posts using an adhesive

luting system could result in greater retention, less marginal microleakage, and good marginal seal, preventing reinfection of the tooth[18-21] and possibly resulting in improved clinical performance.[22,23]

Some surveys reported that general dentists, specialists, and dental students from the United States, Sweden, Germany, Saudi Arabia, and India are under the impression that the placement of a post reinforces ETTs and reduces fracture probability.[4,27,46,47,51-53,55,56] This finding was also reported in Lithuania and Northern Ireland.[5,54] However, it is at odds with current evidence-based investigations, which have reported that posts do not reinforce ETTs[6,7] as the purpose of a post is only to retain the core or the restoration.[8]

Limitations of this systematic review included that only studies in English were evaluated, that the included studies had different objectives, making it difficult to compare among them and to explore different outcomes related to the restoration of ETTs. Most of the studies judged as “Unclear” related to missing data within the completed questionnaires, indicating that it was not possible to know how missing data were handled or the impact of this on the results. This domain is important because a substantial amount of missing data from unanswered items may introduce bias into the original studies and their inherent observations.

Conclusions

Based on the findings of this systematic review, the following conclusions were drawn:

1. The restorative preferences related to posts changed over time, from the use of cast posts to prefabricated ones or the use of both posts and seem to be influenced by experience and postgraduate training.
2. The results should be interpreted with caution because most of the studies judged as “Unclear” related to missing data, which could introduce bias and jeopardize the reliability of the data.

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Table Captions

Table 1. Search strategy.

Table 2. Characteristics of included studies.

Table 3. Results of surveys related to restorative preferences, choices and philosophies.

Table 4. Risk of bias judgment.

Figure captions

Figure 1. Flow diagram of study selection.

Figure 2. Timeline of type of posts most used considering each study.

Table 1 – Search strategy

PUBMED

"Tooth, Nonvital"[Mesh] OR "Tooth, Nonvital" OR "Nonvital Tooth" OR "Tooth, Devitalized" OR "Devitalized Tooth" OR "Tooth, Pulpless" OR "Pulpless Tooth" OR "Teeth, Pulpless" OR "Pulpless Teeth" OR "Teeth, Devitalized" OR "Devitalized Teeth" OR "Teeth, Nonvital" OR "Nonvital Teeth" OR "Teeth, Endodontically-Treated" OR "Endodontically-Treated Teeth" OR "Teeth, Endodontically Treated" OR "Tooth, Endodontically-Treated" OR "Endodontically-Treated Tooth" OR "Tooth, Endodontically Treated" AND "Dental Restoration, Permanent"[Mesh] OR "Dental Restoration, Permanent" OR "Restorations, Permanent Dental" OR "Permanent Dental Restorations" OR "Restoration, Permanent Dental" OR "Dental Restorations, Permanent" OR "Permanent Dental Restoration" OR "Dental Permanent Fillings" OR "Fillings, Permanent Dental" OR "Permanent Dental Fillings" OR "Permanent Fillings, Dental" OR "Permanent Filling, Dental" OR "Dental Filling, Permanent" OR "Dental Permanent Filling" OR "Filling, Dental Permanent" OR "Filling, Permanent Dental" OR "Permanent Dental Filling" OR "Fillings, Dental Permanent" OR "Dental Fillings, Permanent" AND “Post and Core Technique"[Mesh] OR "Post and Core Technique" OR "Post-Core Technic” OR "Post-Core Technics” OR ”Technic, Post-Core” OR ”Technics, Post-Core” OR ”Post and Core Technic” OR ”Post Technique” OR ”Post Techniques” OR ”Technique, Post” OR ”Techniques, Post” OR ”Post Technic” OR ”Post Technics” OR ”Technic, Post” OR ”Technics, Post” OR ”Dental Dowel” OR ”Dowels, Dental” OR ”Dental Dowels” OR ”Dowel, Dental” OR “post” OR “fiber post” OR “fibre post” AND "Surveys and Questionnaires"[Mesh] OR "Surveys and Questionnaires" OR "Questionnaires and Surveys" OR "Survey Methods" OR "Methods, Survey" OR "Survey Method" OR "Methodology, Survey" OR "Survey Methodology" OR "Community Surveys" OR "Community Survey" OR "Survey, Community" OR "Surveys, Community" OR "Repeated Rounds of Survey" OR "Surveys" OR "Survey" OR "Questionnaire Design" OR "Design, Questionnaire" OR "Designs, Questionnaire" OR "Questionnaire Designs" OR "Baseline Survey" OR "Baseline Surveys" OR "Survey, Baseline" OR "Surveys, Baseline" OR "Respondents" OR "Respondent" OR "Randomized Response Technique" OR "Randomized Response Techniques" OR "Response Technique, Randomized" OR "Response Techniques, Randomized" OR "Techniques, Randomized Response" OR "Questionnaires" OR "Questionnaire" OR "Nonrespondents" OR "Nonrespondent"

SCOPUS

"Tooth, Nonvital" OR "Nonvital Tooth" OR "Tooth, Devitalized" OR "Devitalized Tooth" OR "Tooth, Pulpless" OR "Pulpless Tooth" OR "Teeth, Pulpless" OR "Pulpless Teeth" OR "Teeth, Devitalized" OR "Devitalized Teeth" OR "Teeth, Nonvital" OR "Nonvital Teeth" OR "Teeth, Endodontically-Treated" OR "Endodontically-Treated Teeth" OR "Teeth, Endodontically Treated" OR "Tooth, Endodontically-Treated" OR "Endodontically-Treated Tooth" OR "Tooth, Endodontically Treated" AND "Dental Restoration, Permanent" OR "Restorations, Permanent Dental" OR "Permanent Dental Restorations" OR "Restoration, Permanent Dental" OR "Dental Restorations, Permanent" OR "Permanent Dental Restoration" OR "Dental Permanent Fillings" OR "Fillings, Permanent Dental" OR "Permanent Dental Fillings" OR "Permanent Fillings, Dental" OR "Permanent Filling, Dental" OR "Dental Filling, Permanent" OR "Dental Permanent Filling" OR "Filling, Dental Permanent" OR "Filling,

Permanent Dental" OR "Permanent Dental Filling" OR "Fillings, Dental Permanent" OR "Dental Fillings, Permanent" AND "Post and Core Technique" OR "Post-Core Technic" OR "Post-Core Technics" OR "Technic, Post-Core" OR "Technics, Post-Core" OR "Post and Core Technic" OR "Post Technique" OR "Post Techniques" OR "Technique, Post" OR "Techniques, Post" OR "Post Technic" OR "Post Technics" OR "Technic, Post" OR "Technics, Post" OR "Dental Dowel" OR "Dowels, Dental" OR "Dental Dowels" OR "Dowel, Dental" OR "post" OR "fiber post" OR "fibre post" AND "Surveys and Questionnaires" OR "Questionnaires and Surveys" OR "Survey Methods" OR "Methods, Survey" OR "Survey Method" OR "Methodology, Survey" OR "Survey Methodology" OR "Community Surveys" OR "Community Survey" OR "Survey, Community" OR "Surveys, Community" OR "Repeated Rounds of Survey" OR "Surveys" OR "Survey" OR "Questionnaire Design" OR "Design, Questionnaire" OR "Designs, Questionnaire" OR "Questionnaire Designs" OR "Baseline Survey" OR "Baseline Surveys" OR "Survey, Baseline" OR "Surveys, Baseline" OR "Respondents" OR "Respondent" OR "Randomized Response Technique" OR "Randomized Response Techniques" OR "Response Technique, Randomized" OR "Response Techniques, Randomized" OR "Techniques, Randomized Response" OR "Questionnaires" OR "Questionnaire" OR "Nonrespondents" OR "Nonrespondent" AND (LIMIT-TO (LANGUAGE , "English")

Table 2: Characteristics of included studies

Author	Setting	Country	Sample size invited	N*	Response rate	Main objective	Dentists and/or Students	Time since graduation	Dentist Post graduation training	Work-place	Student School year	Factors
Ahmed et al., 2017	Dentists attending continuing education courses in 5 countries	USA, Canada, Scotland, Ireland, Greece	Unclear	1008	Unclear	The purpose was to gain insight into the rationale for choice of endodontic posts and the different endodontic post systems currently used by dental practitioners.	Dentists	Mean time - 26 years	92% - GP	NR	NA	
Akbar, 2015.	Clinical Dentists in north of Saudi Arabia	Saudi Arabia	255	153	60%	The aim was investigate the materials, techniques used in the restoration of ETT by dentists in north of Saudi Arabia	Dentists	Mean time - 7.5 years	81% - GP	NR	NA	NA
Alenzi et al., 2018.	Dental practitioners anonymously throughout Saudi Arabia (five regions)	Saudi Arabia	300	164	54.7%	The aim was to assess the strategies and preferences for restoring ETT among dental practitioners in Saudi Arabia.	Dentists	Between 1 and 35 years	66.5% - GP	NR		
AlZain, 2019.	Dental students and new graduates	Saudi Arabia	238	233	98%	Evaluate the efficiency of dental students and new graduates of College of Dentistry at	Dentists and Students	NR	NR	NR	4th and 5th year	

						King Saud University in Riyadh, Saudi Arabia, to select the appropriate methods of restoring posterior ETT at different conditions of remaining sound tooth structure.					
Brunton et al., 2019.	Dentists GP	New Zealand	351	204	58%	Investigate the selection and the use of materials and techniques for core buildups, indirect restorations, and fixed prosthodontics by general dentists in New Zealand.	Dentists	Unclear	Just GP	NR	NA
Eckerbom et al., 2001	GP and board-certified prosthodontists registered by the Swedish Dental Association in Sweden	Sweden	892 GP and 150 BCP	532 of GP and 101 of BCP.	60% of GP and 67% of BCP.	Investigate the current opinion among GP and BCP in Sweden on how to restore ETT.	Dentists	Mean time - 20 years (GP) and 12 years (BCP)	101 BCP	Public Dental Service (52% of GP and 51% of BCP)	NA
Habib et al., 2014.	Dentists in Saudi Arabia	Saudi Arabia	680	204	30%	Investigate the techniques and materials used in the restoration of ETT by dentists in Saudi Arabia	Dentists	Mean time - 34 years	49% Specialists	NR	NA

Hussey, Killough, 1995.	General Dental Practioners	Northern Ireland	550	363	66%	Investigate the current beliefs of the GP in Northern Ireland regarding the restoration of root-filled teeth.	Dentists	55.6% after 1980	Just GP	NR	NA	
Jacinkeviciute et al., 2017	Dentists	Lithuania	170	136	80%	Investigate the present opinions and knowledge of Panevezys dentists on current strategies and materials to restore ETT.	Dentists	Mean time - 10 years	prosthodontists - 15.4% and endodontists - 2.9%	Private institutions - 55.9%	NA	
Kon et al., 2013.	Dentists attending continuing education seminars on “Postendodontic Restoration”	Switzerland	95	Unclear	Unclear	Evaluate the predominant opinion and knowledge of Swiss dentists in terms of current strategies for restoring ETT.	Dentists	More than 15 years - 79%	NR	Rural area - 52%	NA	
Mitov et al., 2014.	Dental practitioners	Germany	615	Unclear	33%	Evaluate the trend of dental practitioners in the federal state of Saarland in Germany in regard to restoring ETT using a Web-based survey.	Dentists	Over than 16 years - 62%	NR	NR	NA	The clinicians with fewer than 15 years of experience would use posts significantly less frequently.
Morgano et al., 1994	Practicing BCP, educationall	United States	1525	1066	70%	Improve the understanding of Contemporary	Dentists	Unclear	44% BCP	NR	NA	Philosophies and techniques of

	y qualified prosthodontists and GP					philosophies and techniques for the restoration of ETT.						restoring ETT vary significantly by geographic region, age, faculty status and a specialty status.
Naumann et al., 2006	Registered Dentists throughout Germany	Germany	36500	6029	16.5%	Determine current opinions, applied techniques and materials for restoring ETT in Germany.	Dentists	Professional experience - more than 30 years - 35%	NR	NR	NA	The frequency of post placement differed significantly between the groups depending on professional experience.
Naumann et al., 2015	Dentists	Germany	2626	1648	63%	Assess current opinions, applied techniques, and materials for the restoration of ETT in a nationwide survey in Germany.	Dentists	Unclear	NR	NR	NA	
Rabi, 2015.	Dentists	Palestine	300	204	68%	Understand the attitudes and practices of the dentists in Palestine regarding the restoration of ETT	Dentists	44.6% - less than 6 years	7% Specialists	NR	NA	There were certain variations in these beliefs when gender,

						based on their gender, years of professional experience and type of practice						type and years of experience were considered.
Ratnakar et al., 2014.	Prosthodontists, endodontists and GP who work in private and government clinics of north India region	North India	220	110	50%	Determine the frequency of preferred methods, materials, timing and other concerning factors regarding restoration of ETT.	Dentists	Unclear	NR	NR	NA	
Sambrook and Burrow, 2018	Dental practitioners who were registered as Prosthodontists throughout Australia	Australia	171	95	55%	Gain insight into common practices of Australian prosthodontists when placing a post in an ETT.	Dentists	Unclear	All prosthodontists	NR	NA	The type of planned restoration (72%) and the location of the tooth in the arch (58%) influences the restorative decision
Sarkis-Onofre et al., 2015.	Dentists registered at the local division of the Regional	Brazil	276	187	68%	Evaluate the preferences of dentists for the materials chosen to restore ETT, and the influence of both clinical experience	Dentists	53.2% - ≥ 10 years	64.7% - some degree of post-graduate training	NR	NA	Continuing education was a factor influencing the decisions on the choice

	Council of Dentistry					(time since graduation) and level of specialization (post-graduate training) on the dentist's choice of posts.					of dental posts
Sedrez-Porto et al., 2017.	Dental students of the School of Dentistry of the Federal University of Pelotas and dentists of the same city	Brazil	357	300	NR	Evaluate the knowledge and attitudes of dental students and dentists about the use and cementation of intra-radicular posts	Both	Mean time - 18 years	80% - specialists	Private practice - 60%	Students who had already learned about the topic
Seow et al., 2003.	GP	United Kingdom	503	351	70%	Investigate aspects of the restoration of ETT by a selected group of GDPs.	Dentists	Unclear	Just GP	NR	
Sheehan et al., 2019.	Dental staff from selected dental clinics in Saudi Arabi	Saudi Arabia	150	150	100%	Assess the staff perspective toward restoring ETT at selected dental clinic	Dentists	NR	NR	NR	
Spielman et al., 2012.			1323	1298	Unclear	Present the outcome of the definitive restoration placed after the completion of endodontic therapy					

Tortopodis et al., 2010.	Greek dentists	Greece	600	350	58.3%	Investigate the attitudes of Greek dentists regarding the restoration of lost coronal structure of root canal treated teeth and to compare them to recommended guidelines from the literature	Dentists	6 - 20 years - 44.6%	54 of the dentists (15.4%) reported that they had a special training, 8 (2.3%) hold an MSc and 7 (2.0%) a PhD	Semi urban and rural areas - 57.1%		
Weerappe ruma et al., 2016.	GDPs and specialist staff in secondary care (University of Manchester Dental Hospital).	United Kingdom	219	109	49.7%	Primary - Investigate the use of intra radicular posts and rationale for their selection by GP and delegates attending a specialist prosthodontic conference. Secondary - Investigate if any difference in the provision of post and core restorations exist amongst the two groups, the type of post and core system(s) being used, the rationale behind selection of a post system(s), and the effect of postgraduate	Dentists	NR	12.5% of GDP and 62.2% of delegates attending the British Society of Prosthodontics annual conference	NR	NA	Postgraduate qualifications appear to have an influence on the post selection.

						training on the provision of post core restorations					
Kavlekar et al., 2016.	General practitioners, prosthodontists, and endodontists	India	913	338	37%	To study the treatment concepts for restoration of ETT among GP, prosthodontists, and endodontists in India and to compare practices followed by practitioners in India with that of other countries.	Dentists	Most of respondents had a clinical experience of 0 to 5 years	121 prosthodontists, 101 endodontists		NA

General Practitioners (GP); Number of respondents (N*); Endodontically Treated Teeth (ETT); Board-Certified Prosthodontists (BCP); Not Applied (NA); Not Reported (NR).

Table 3: Results of surveys related to restorative preferences, choices and philosophies

Author	Questions										
Ahmed et al., 2017	**Type of post used**	**Type of cement used to luted posts**	**What are the functions of a post?**	**Design of post**	**Active screw of posts**						
	FP (72.2%)	Resin modified GI (39.9%)	Retention of the core (88%)	Passive posts (76.5%)	Passive posts (76.5%)						
	Type of PfP do you prefer from longevity point of view	**Type of cement used to luted posts**	**Type of PfP do you prefer from retention point of view**	**Frequency of post placement in ETT**	**Ferule effect can increase fracture resistance in ETT**	**Do you believe that post reinforces ETT and reduces fracture probability?**	**What is the most appropriate length of the post?**	**What you believe should be the apical seal after post placement?**	**What you believe should be the diameter of the post?**	**Which type of post affects esthetic outcome especially with composite build ups?**	**What is the most frequent failure of ETT?**
Akbar, 2015.	MP (43.1%)	GI cement (76%)	Depends on the canal anatomy and available dentin (33.3%)	Depends on remaining tooth structure (54.9%)	Always (50.9%)	Sometimes (39.2%)	2/3rd of the length of root canal (66.6%)	4-5mm (47%)	1/3rd of the root diameter (50.9%)	FP (50.9%)	Crown fracture (45%)

	Type of post used	Type of cement used	Type of PfP	Belief that every ETT must receive a post?	The importance of a ferrule below the core foundation ?	Belief that posts strengthen ETT?	The main criteria that led to the preferred use of fiber posts or custom-made posts and core systems	Design of prefabricated MP	Type of custom-made post and core
Alenzi et al., 2018.									
	PfP (84.1%)	Dual polymerized adhesive RC (34.1%) and Self-adhesive RC (34.1%)	Fiber-reinforced composite posts (79.9%)	Did not believe that all ETT must receive a post (90.9%)	Ferrule would increase the fracture resistance of ETT (86.6%)	The post would strengthen ETT and therefore decrease the risk of fracture (82.9%)	The remaining tooth structure (77.4%)	Tapered design (59.8%)	Base-metal custom-made CP and core (62.8%)
AlZain, 2019.	**Restoring ETT with >50% remaining sound tooth structure**	**Restoring ETT with 50% remaining sound tooth structure**	**Restoring ETT with <50% remaining sound tooth structure**						
	Only amalgam restoration (39,9%)	Amalgam/tooth-colored restoration and crown (30,9%)	CP-and-core and crown (74,6%)						
Brunton et al., 2019.	**Preferred type of post** FP (61.6%)								

Eckerbom et al., 2001	**Preferred type of post for single crown**	**Type of cement used to luted posts**	**Ferrule effect in ETT**	**Opinion about functions of posts**					
	CP	ZP cement (92% of GP and 68% of BCP)	53% of GP and 44% of BCP thought that a ferrule increases the fracture resistance of an ETT when attached to the post	29% of GP and 17% of BCP that post reinforces an ETT					
Habib et al., 2014	**Preference of Post technique in ETT?**	**Choice of cement used for cementation of ETT?**	**Preference of type of PfP?**	**Frequency of Post placement in ETT?**	**Increased fracture resistance of an ETT with 1-2mm of Ferule?**	**Reinforcement of an ETT with post?**	**Appropriate length for a post?**	**Effect of post on the esthetic outcome of the tooth?**	**What is the most frequent failure of ETT?**
	PfP (53%)	GI (48%)	Parallel sided MP - 29; Parallel sided non-MP (29%)	Depends on remaining tooth structure (62%)	Always (46%)	Sometimes (36%)	2/3rd of canal (60%)	Sometimes (44%)	Endodontic failure (47%)
Hussey, Killough, 1995.	**Type of post do you use often for restoring root filled teeth**	**What material do you routinely use to lute posts?**	**Provide a post for an anterior tooth which has been root filled?**	**Provide a post for a molar/premolar which has been root filled?**	**Do you believe that a root restored with a post is strengthened by the procedure?**	**How long do you try to make a post?**	**How long after root filling a tooth would you prepare the canal for a post?**	**Have you ever attended a postgraduate lecture/course on the restoration of root filled teeth?**	

	Cast nonprecious MP (49.4%)	ZP (59.9%)	No (56%)	No (76%)	No (76.2%)	Two-thirds of root length (51.4%)	1 week later (42.1%)	Yes, in the last 5 years (60.5%)
Jacinkeviciute et al., 2017	**Type of post for anterior and posterior teeth** Anterior - Glass FP (33.1%); posterior - Glass FP (39%)	**Type of cement to luted posts** MP - GI cement (86%); Glass FP - GI cement (52.3%) or RC (46.3%)	**How often prefer posts for ETT (by teeth)?** Anterior – Sometimes (44.9%); Premolar - Very rarely (48.5%); Molar - Often (51.5%)	**What you believe should be the apical seal after post placement?** 77.2% leave 4mm of filling material in the root canal	**Failure after luting posts** Root fracture (34.6%)			
Kon et al., 2013.	**Type of posts for anterior and posterior teeth used very often** Glass FP for anterior (18.9%); posterior (10.5%)	**Which luting material do you prefer for intracanal posts** Composite-based “cement” - 66.3% for FP; GI cement - 37.9% for MP	**How often would you estimate that you place a post in an ETT?** Occasionally in anterior teeth (36%) and rarely in molars (39%)	**Do the post-and-core build-up strengthens an ETT and decreases its risk of fracture?** No - 54%	**Desired post lengths** Approximately 2⁄3 of the root length (43%)	**Precision of fit of intracanal posts** Maximum fit (43%)	**About precision of fit of intracanal posts** Maximum fit (43%)	**As of which lesion extent do you decide to place an intracanal post?** When only 1 coronal wall remains in premolars (46.3%)
Mitov et al., 2014.	**Type of posts**	**Luting material**	**Reinforcement of an ETT with a post?**					

	Generally preferred Pfp (87.1–96.1%)	ZP, polycarboxylate, or GI cements to cement metal-based posts (84.6%). Adhesive cementation techniques with resin-based luting cements to cement ceramic and FRC posts (93.6% and 95.7%)	The majority of the dentists believed in the reinforcement effect of post placement (percentage depends of the case)	
	Type of posts	**Type of cement**	**Do you believe that a post will reinforce an ETT and reduce the chances of fracture?**	**How many ETT are restored by year?**
Morgano et al., 1994	The majority of dentists in the USA use either CP exclusively or both CP and PfP to restore ETT in their	ZP cement was most frequently used by 54% of BCP, followed by GI cement (32%).	43% of BCP believed that a post will reinforce an ETT; 55 % of the educationally qualified	85% restoring more than 30 ETT per year

	practices, although 40% of GP use PfP most of the time. The most popular PfP is the parallel sided serrated post	Polycarboxylate cements and RC were relatively unpopular among the BCP	prosthodontists and 59 % of the GP believed in reinforcement				
Naumann et al., 2006	**Type of posts used most frequently**	**Type of cement most used**	**Type of PfP preferred**	**Do you believe that every ETT must receive a post?**	**Do you believe that posts reinforce ETT and reduce the fracture probability ?**	**Most frequent failures**	**How many ETT are restored by year?**
	55% PfP and CP and cores	ZP cement (51%)	Screw type (47%)	Majority believe that not every ETT must receive a post (65%)	Yes, definitely - 54%	Loss of retention - 43%	96.7% restoring more than 30 ETT per year
Naumann et al., 2015	**Type of posts most widely used for direct restorations**	**Cement used most frequently**	**How often do you place a post a in laboratory restored ETT?**	**Ferule effect can increase fracture resistance in ETT**	**Do you believe that a post reinforces an ETT and reduces the fracture probability ?**	**Reported reasons for the failure of post-endodontic restoration**	
	Glass FP (69%)	Resin composite cements (49%)	61% frequently /always	88% - Yes, ferrule increases	Yes (27%) Yes, if adhesively luted (30%)	13% - crown fracture; 13% failure of the	

				fracture resistance.		endodontic treatment	
Rabi, 2015.	**If you use PfP, which type of PfP do you use most frequently?**	**Do you believe that every RCT tooth requires a post?**	**Do you believe that a ferrule increases the fracture resistance of RCT teeth when attached to the post?**	**Do you believe that the placement of a post reinforces an RCT tooth and reduces the fracture probability?**	**If you use CP and cores, which material alloy do you prefer most frequently?**	**Which post type and core material do you use most frequently for the restoration of anterior RCT teeth?**	**Which post type and core material do you use most frequently for the restoration of anterior RCT teeth?**
	Most of GP and specialists used screw type	Most of GP and all specialists answered no	Most of GP and all specialists answered yes	Most of GP answered yes and most of specialists answered no	Most of GP and all specialists answered nonprecious alloy	Most of GP and all specialists answered non-MP with composite resin core	Most of GP and all specialists answered PfP metallic with a core build-up of amalgam or composite resin
Ratnakar et al., 2014.	**Type of posts used to determinate condition** 50% of tooth structure remaining - PfP and tooth-colored restoration 24.5% less than 50% of						

	tooth structure remaining - CP and crown 80.9%							
	Preferences for post type and reason	**Cement used for post cementation**	**What influences the decision to place a post?**	**The primary purpose of a post is to reinforce an ETT**	**What is the ideal post length?**	**How is post diameter established?**	**Preference for post surface texture**	**The primary purpose of a post is to retain a core**
Sambrook and Burrow, 2018	Custom cast MP (49%)	Composite RC (39%)	The quantity of tooth structure influences the decision to place a post (96%)	A post does not reinforce an ETT (93%)	4 to 5 mm of gutta percha (76.8%)	Established by conforming to the existing canal with preparation of the apical portion (44%)	Passive post (75%)	The purpose of a post was to retain a core (99%)
	The most commonly used type of intra-radicular post	**Type of cement**	**Use of rubber dam**					
Sarkis-Onofre et al., 2015.	Cast MP (24.5%)	RC (66.7%)	Non-use of a rubber dam - 93.1%					
	Type of posts in anterior teeth with large destruction of coronal portion	**Considering posts in posterior teeth**	**Type of cement in anterior teeth with large destruction of coronal portion**	**Considering cement in posterior teeth**	**The reinforcement of the tooth structure using intra-radicular posts**	**Regarding to the function of intra-radicular posts**		
Sedrez-Porto et al., 2017.	Students presented an	Students presented	Students presented an	Students presented an	Students have 70%	Students had more than		

	odd to choose PfP (127%) greater	an odd 40% smaller to choose PfP	odd 105% greater to choose self-adhesive RC	odd 51% greater to choose conventional RC	less chance to believe that posts are used to reinforce tooth structure	four times higher chances than dentists to believe that the posts help in the retention of the coronal restorative material					
Seow et al., 2003.	**What type of post do you use most often in the restoration of incisors?**	**What type of post do you use most often in the restoration of canines?**	**What type of post do you use most often in the restoration of posterior teeth (premolar/molar)?**	**What luting cement do you routinely use to lute posts?**	**Do you believe that the placement of a post strengthens a root-filled tooth?**	**What length of post do you attempt to place in a root filled incisor?**	**What length of post do you attempt to place in a root filled canine?**	**What length of post do you attempt to place in a root filled posterior tooth?**	**Do you routinely place a post in a root filled incisor prior to crowning?**	**Do you routinely place a post in a root filled canine prior to crowning?**	**Do you routinely place a post in a root filled posterior tooth (premolar/molar) prior to crowning?**
	Cast precious post (56.6%)	Cast precious post (56.4%)	PfP (48.1%)	ZIC (50.4%)	No (60.6%)	2/3 of root length (36.1%)	2 /3 of root length (41.3%)	Same length as crown (24.5%)	No (64.6%)	No (66.3%)	No (84.9%)
Sheehan et al., 2019.	**The authors applied a questionnary assessing the use of posts, however the results were not presented.**										
Spielman et al., 2019.	**Type of post** Preformed metal										

	(cemented) (59%)				
Tortopodis et al., 2010.	**Which post type material do you use most frequently for the restoration of RCT teeth?** Anterior teeth - Custom CP (40%); Posterior teeth – PfP metallic with a core built-up of amalgam or composite resin (42.4%)	**Do you believe that every RCT tooth requires a post?** No (89.4%)	**Do you believe that a ferrule increases the fracture resistance of RCT teeth when attached to the post?** Yes (76.2%)	**Do you believe that the placement of a post reinforces an RCT tooth and reduces the fracture probability?** No (53.6%)	**What length of post do you attempt to place as optimal in a root of RCT tooth?** Equal to 1/3 of remaining root's length - 41%
Weerapperuma et al., 2016.	**Type of post system used** Most of GPs and delegates attending the British Society of Prosthodontics annual conference answered MP and metal free posts systems				

	Type of post	Type of cement	Do you believe that every ETT requires a post?	Ferrule increases the fracture resistance of ETT	Post reinforces an ETT	Failure	Design of post
Kavlekar et al., 2016.	83.2% endodontists use CP more frequently, however, 78.4% GP place PfP more frequently whereas 52.9% prosthodontists place PfP while 47.1% place CP	Among prosthodontists, 41.3% prefer GI cement; among endodontists, 37.6% prefer GI cement; among GP, 56.9% prefer RC	89.3% prosthodontists, 81.2% endodontists, and 90.5% GP believed that every ETT need not receive a post	82.6% prosthodontists and 75% GP believe that using ferrule increases fracture resistance	70.7% GP believe that a post definitely reinforces an ETT and reduces fracture probability	81% prosthodontists and 74.1% GP reported endodontic failure;79.2% endodontists reported loss of retention of posts.	70.3% endodontists and 74.1% GP preferred tapered posts whereas when compared to prosthodontists, 46.3% preferred tapered posts, 21.5% preferred combined parallel sided/tapered posts, and 20.7% preferred parallel posts.

Fiber Post (FP); Prefabricated Post (PfP); Metal Post (MP); Glass Ionomer (GI); Cast Post (CP); Zinc Phosphate (ZP); Glass Fibre-Reinforced Composite (FRC); General Practitioners (GP); Board-Certified Prosthodontists (BCP); Root Canal Treated (RCT); Resin Cement (RC); Zinc Ionomer Cement (ZIC).

Table 4: Risk of bias judgment

Author/year	Representativeness of the sample	Adequacy of response rate	Missing data within completed questionnaires	Conduct of pilot testing	Established validity of the survey instrument
Ahmed et al., 2017	Probably yes	Unclear	Unclear	Definitely no	Probably no
Akbar, 2015	Probably yes	Probably yes	Unclear	Definitely yes	Definitely yes
Alenzi et al., 2018	Probably yes	Probably yes	Unclear	Definitely no	Definitely yes
AlZain, 2019	Probably yes	Definitely yes	Unclear	Definitely no	Definitely yes
Brunton et al., 2019	Definitely yes	Probably yes	Unclear	Definitely no	Probably yes
Eckerbom et al., 2001	Definitely yes	Probably yes	Unclear	Definitely no	Probably no
Habib et al., 2014	Probably yes	Probably no	Unclear	Definitely no	Definitely yes
Hussey, Killough, 1995	Definitely yes	Probably yes	Unclear	Definitely no	Probably yes
Jacinkeviciute et al., 2017	Definitely yes	Definitely yes	Unclear	Definitely no	Probably yes
Kon et al., 2013	Probably no	Unclear	Unclear	Definitely no	Probably no
Mitov et al., 2014	Probably no	Probably no	Unclear	Definitely yes	Probably no
Morgano et al., 1994	Definitely yes	Probably yes	Unclear	Definitely no	Probably no

Naumann et al., 2006	Definitely yes	Definitely no	Unclear	Definitely no	Definitely yes
Naumann et al., 2015	Definitely yes	Probably yes	Unclear	Definitely no	Probably yes
Rabi, 2015	Definitely yes	Probably yes	Unclear	Definitely no	Definitely yes
Ratnakar et al., 2014	Probably no	Probably yes	Unclear	Definitely no	Definitely no
Sambrook and Burrow, 2018	Probably no	Probably yes	Unclear	Definitely no	Probably yes
Sarkis-Onofre et al., 2015	Definitely yes	Probably yes	Probably yes	Definitely yes	Probably no
Sedrez-Porto et al., 2017	Definitely yes	Unclear	Unclear	Definitely yes	Probably no
Seow et al., 2003	Probably no	Probably yes	Probably yes	Definitely no	Probably no
Sheehan et al., 2019	Probably yes	Definitely yes	Unclear	Definitely no	Definitely yes
Spielman et al., 2019	Probably no	Unclear	Unclear	Definitely no	Definitely yes
Tortopodis et al., 2010	Probably no	Probably yes	Unclear	Definitely yes	Definitely yes
Weerapperuma et al., 2016	Probably no	Probably no	Unclear	Definitely yes	Probably no
Kavlekar et al., 2016	Probably yes	Probably no	Unclear	Definitely no	Probably no

Probably yes and Definitely yes were considered as "Low risk of bias" and Probably no and Definitely no we considered as "High risk of bias"

Figure 1. Flow diagram of study selection

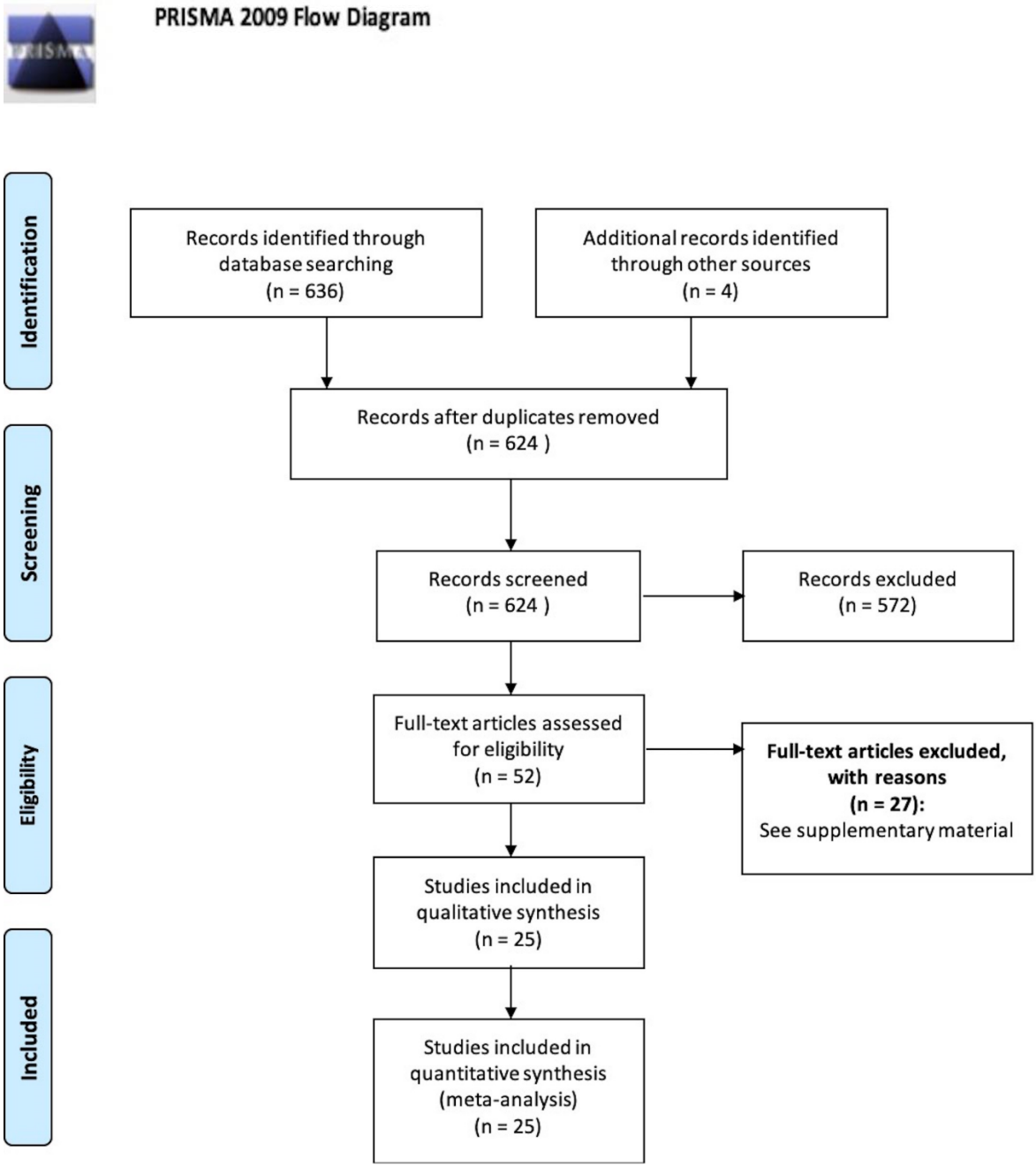
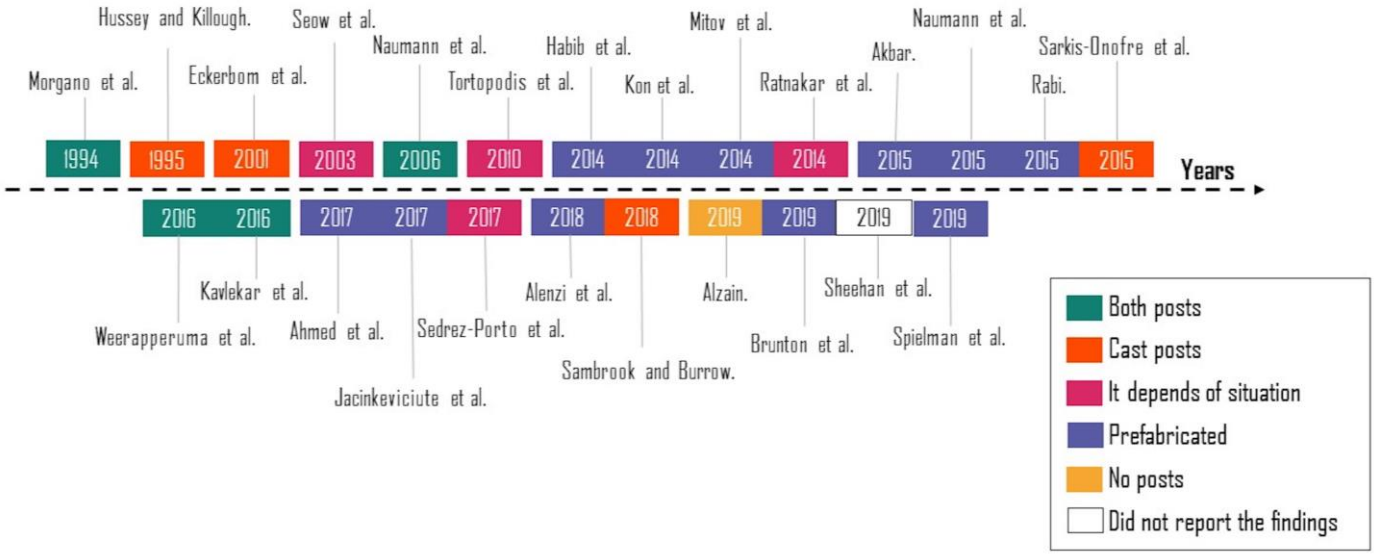


Figure 2. Timeline of type of posts most used considering each study.



Supplementary Materials

LIST OF ARTICLES EXCLUDED WITH REASONS (n=27)

REASONS

The survey was not related to endodontically treated teeth:

1. Abramovitz I et al., 2002. Title: Case selection for apical surgery: A retrospective evaluation of associated factors and rational.
2. Al-Ali K et al., 2005. Title: An assessment of endodontic re-treatment decision-making in an educational setting.
3. Brennan DS, Balasubramanian M, Spencer AJ, 2015. Title: Treatment of caries in relation to lesion severity: implications for minimum intervention dentistry.
4. Fukai K, Ohno H, Blinkhorn AS, 2010. Title: A cross-sectional survey investigating the care of the primary dentition by general dental practitioners working in Japan and England.
5. Hommez GMG, De Moor RJG, Braem M, 2003. Title: Endodontic treatment performed by Flemish dentists. Part 2. Canal filling and decision making for referrals and treatment of apical periodontitis.
6. Kohli A et al., 2014. Title: A comparative evaluation of endodontic practice trends in India: "The Mumbai study".
7. Maidment Y, Durey K, Ibbetson R, 2010. Title: Decisions about restorative dental treatment among dentists attending a postgraduate continuing professional development course.
8. Mileman PA, Van Den Hout WB, 2003. Title: Preferences for oral health states: Effect on prescribing periapical radiographs.
9. Palmer NOA, Ahmed M, Grieveson B, 2009. Title: An investigation of current endodontic practice and training needs in primary care in the north west of England.
10. Heinikainen M, Vehkalahti M, Murtomaa H, 2002. Title: Retreatment in endodontics: treatment decisions by general practitioners and dental teachers in Finland.
11. Saunders WP, Chestnutt IG, Saunders EM, 1999. Title: Factors influencing the diagnosis and management of teeth with pulpal and periradicular disease by general dental practitioners.
12. Sebring D et al., 2016. Title: Characteristics of teeth referred to a public dental specialist clinic in endodontics.
13. Trautmann G et al., 2000, Title: Restoring teeth that are endodontically treated through existing crowns. Part I: Survey of pulpal status on access.
14. Trautmann G et al., 2000, Title: Restoring teeth that are endodontically treated through existing crowns. Part II: Survey of restorative materials commonly used.
15. Vail MM, Steffel CL, 2006. Title: Preference of Temporary Restorations and Spacers: A Survey of Diplomates of the American Board of Endodontists.

16. Wenteler GL, Sathorn C, Parashos P, 2014. Title: Factors influencing root canal retreatment strategies by general practitioners and specialists in Australia.

The study was not related to restorative techniques or posts:

1. Rotstein I, Salehrabi R, Forrest JL, 2006. Title: Endodontic Treatment Outcome: Survey of Oral Health Care Professionals.
2. Stockhausen R et al., 2011. The perceived prognosis of endodontic treatment and implant therapy among dental practitioners.
3. Taha NA, Albashaireh ZS, Alfied RG, 2019. Title: Endodontic decision making for asymptomatic root-filled teeth with apical periodontitis – A radiographic survey.
4. Tanalp J, Guven EP, Oktay I, 2013. Title: Evaluation of dental students' perception and self-confidence levels regarding endodontic treatment.

The study was not a survey:

1. Varlan C et al., 2009. Title: Current opinions concerning the restoration of endodontically treated teeth: basic principles.
2. Wigsten E et al., 2017. Title: Comparative analysis of general dental practitioners' fees and scheduled fees for root canal treatment and coronal restorations in the adult population of Sweden: a 5-year follow-up of data from the Swedish Dental Register.

It was not found full-text article:

1. Antonoff SJ, Gulker IA, Kaufman EG, 1978. Title: A survey of post and core designs for endodontically treated teeth.
2. Goldstein GR, Hittelman E, 1992. Title: Survey of post procedures.
3. Kronström M, Palmqvist S, Söderfeldt B, 1999. Title: Prosthodontic Decision Making among General Dentists in Sweden. I: The Choice between Crown Therapy and Filling.
4. Rotstein I, Salehrabi R, 2008. Title: Opinions of dental professionals from a large American insurance system on outcome of non-surgical root canal treatment.
5. Foley JI, 2011. Title: Use of mineral trioxide aggregate (MTA by postgraduates in restorative dentistry in the UK

Considerações Finais

Com base nos resultados desta revisão sistemática, pode-se concluir que as preferências restauradoras relacionadas aos pinos mudaram ao longo do tempo, desde o uso de pinos de metal fundidos para pré-fabricados ou o uso de ambos os pinos. Além disso, evidencia-se que os agentes cimentantes mais utilizados são os cimentos à base de resina e que essas escolhas são influenciadas pela experiência do profissional e formação em pós-graduação. No entanto, os resultados devem ser interpretados com cautela, pois a maioria dos estudos julgados como “pouco claros” estão relacionados à falta de dados, o que pode introduzir viés e comprometer a confiabilidade dos dados.

Ainda é importante destacar que com base na literatura, os materiais citados para a restauração de dentes tratados endodonticamente apresentam bom desempenho clínico e boa longevidade.

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APÊNDICES

APÊNDICE 1

Lista de artigos inclusos na revisão sistemática

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APÊNDICE 2

Lista suplementar à tabela 3

Results of each survey related to restorative preferences, choices, and philosophies:

QUESTIONS

Ahmed et al, 2017

Type of post used - FP (72.2%)
Type of cement used to luted posts - Resin modified GI (39.9%)
What are the functions of a post? Retention of the core (88%)
Design of post - Passive posts (76.5%)
Active screw of posts - Passive posts (76.5%)

Akbar, 2015

Type of PfP do you prefer from longevity point of view - MP (43.1%)
Type of cement used to luted posts - GI cement (76%)
Type of PfP do you prefer from retention point of view - Depends on the canal anatomy and available dentin (33.3%)
Frequency of post placement in ETT - Depends on remaining tooth structure (54.9%)
Ferule effect can increase fracture resistance in ETT - Always (50.9%)
Do you believe that post reinforces ETT and reduces fracture probability? Sometimes (39.2%)
What is the most appropriate length of the post? 2/3rd of the length of root canal (66.6%)
What you believe should be the apical seal after post placement? 4-5mm (47%)
What you believe should be the diameter of the post? 1/3rd of the root diameter (50.9%)
Which type of post affects esthetic outcome especially with composite build ups? FP (50.9%)
What is the most frequent failure of ETT? Crown fracture (45%)

Alenzi et al, 2018

Type of post used - PfP (84.1%)
Type of cement used - Dual polymerized adhesive RC (34.1%) and Self-adhesive RC (34.1%)
Type of PfP - Fiber-reinforced composite posts (79.9%)
Belief that every ETT must receive a post? Did not believe that all ETT must receive a post (90.9%)
The importance of a ferrule below the core foundation? Ferrule would increase the fracture resistance of ETT (86.6%)
Belief that posts strengthen ETT? The post would strengthen ETT and therefore decrease the risk of fracture (82.9%)
The main criteria that led to the preferred use of fiber posts or custom-made posts and core systems -The remaining tooth structure (77.4%)
Design of prefabricated MP - Tapered design (59.8%)
Type of custom-made post and core - Base-metal custom-made CP and core (62.8%)

AlZain, 2019

Restoring ETT with >50% remaining sound tooth structure - Only amalgam restoration (39.9%)
Restoring ETT with 50% remaining sound tooth structure - Amalgam or tooth-colored restoration and crown (30.9%)
Restoring ETT with <50% remaining sound tooth structure - CP-and-core and crown (74.6%)

Brunton et al, 2019

Preferred type of post - FP (61.6%)

Eckerbon et al, 2001

Preferred type of post for single crown – CP
Type of cement used to luted posts - ZP cement (92% of GP and 68% of BCP)
Ferrule effect in ETT - ferrule increases the fracture resistance of an ETT when attached to the post (53% of GP and 44% of BCP)
Opinion about functions of posts - post reinforces an ETT (29% of GP and 17% of BCP)

Habib et al, 2014

Preferences of post technique in ETT? PfP (53%)
Choice of cement used for cementation of ETT? GI (48%)
Preference of type of PfP? Parallel sided MP (29%); Parallel sided non-MP (29%)
Frequency of post placement in ETT? Depends on remaining tooth structure (62%)
Increased fracture resistance of an ETT with 1-2mm of Ferule - Always (46%)
Reinforcement of an ETT with post? Sometimes (36%)
Appropriate length for a post? 2/3rd of canal (60%)
Effect of post on the esthetic outcome of the tooth? Sometimes (44%)
What is the most frequent failure of ETT? Endodontic failure (47%)

Hussey and Killough, 1995

Type of post do you use often for restoring root filled teeth - Cast nonprecious MP (49.4%)
What material do you routinely use to lute posts? ZP (59.9%)
Provide a post for an anterior tooth which has been root filled? No (56%)
Provide a post for a molar/premolar which has been root filled? No (76%)
Do you believe that a root restored with a post is strengthened by the procedure? No (76.2%)
How long do you try to make a post? Two-thirds of root length (51.4%)
How long after root filling a tooth would you prepare the canal for a post? 1 week later (42.1%)
Have you ever attended a postgraduate lecture or course on the restoration of root filled teeth? Yes, in the last 5 years (60.5%)

Jacinkeviciute et al, 2017

Type of post for anterior and posterior teeth - Anterior: Glass FP (33.1%); Posterior: Glass FP (39%)
Type of cement to luted posts – MP: GI cement (86%); Glass FP: GI cement (52.3%) or RC (46.3%)

How often prefer posts for ETT (by teeth) – Anterior: sometimes (44.9%); Premolar: very rarely (48.5%); Molar: often (51.5%)
What you believe should be the apical seal after post placement? Leave 4mm of filling material in the root canal (77.2%)
Failure after luting posts - Root fracture (34.6%)

Kon et al, 2013

Type of posts for anterior and posterior teeth used very often - Glass FP for anterior (18.9%); posterior (10.5%)
Which luting material do you prefer for intracanal posts - Composite-based "cement" (66.3% for FP); GI cement (37.9% for MP)
How often would you estimate that you place a post in an ETT? Occasionally in anterior teeth (36%) and rarely in molars (39%)
Do the post-and-core build-up strengthens an ETT and decreases its risk of fracture? No (54%)
Desired post lengths - Approximately 2⁄3 of the root length (43%)
Precision of fit of intracanal posts - Maximum fit (43%)
As of which lesion extent do you decide to place an intracanal post? When only 1 coronal wall remains in premolars (46.3%)

Mitov et al, 2014

Type of posts - Generally preferred Pfp (87.1–96.1%)
Luting material - ZP, polycarboxylate or GI cements to cement metal-based posts (84.6%). Adhesive cementation techniques with resin-based luting cements to cement ceramic and FRC posts (93.6% and 95.7%)

Reinforcement of an ETT with a post - The majority of the dentists believed in the reinforcement effect of post placement (percentage depends of the case)

Morgano et al, 1994

Type of posts - The majority of dentists in the USA use either CP exclusively or both CP and PfP to restore ETT in their practices, although 40% of GP use PfP most of the time. The most popular PfP is the parallel sided serrated post
Type of cement - ZP cement was most frequently used (54% of BCP) followed by GI cement (32%)
Do you believe that a post will reinforce an ETT and reduce the chances of fracture? Post will reinforce an ETT (43% of BCP; 55 % of prosthodontists; 59 % of the GP)

How many ETT are restored by year? More than 30 ETT per year (85%)

Naumann et al, 2006

Type of posts used most frequently - PfP and CP and cores (55%)
Type of cement most used - ZP cement (51%)
Type of PfP preferred - Screw type (47%)
Do you believe that every ETT must receive a post? Majority believe that not every ETT must receive a post (65%)
Do you believe that posts reinforce ETT and reduce the fracture probability? Yes, definitely (54%)
Most frequent failures - Loss of retention (43%)

How many ETT are restored by year? More than 30 ETT per year (96.7%)

Naumann et al, 2015

Type of posts most widely used for direct restorations - Glass FP (69%)

Cement used most frequently - Resin composite cements (49%)

How often do you place a post a in laboratory restored ETT? Frequently or always (61%)
Ferule effect can increase fracture resistance in ETT - Yes, ferrule increases fracture resistance (88%)
Do you believe that a post reinforces an ETT and reduces fracture probability? Yes (27%); Yes, if adhesively luted (30%)

Reported reasons for the failure of post-endodontic restoration - Crown fracture (13%); failure of the endodontic treatment (13%)

Rabi, 2015

If you use PfP, which type of PfP do you use most frequently? Most of GP and specialists used screw type
Do you believe that every RCT tooth requires a post? Most of GP and all specialists answered no
Do you believe that a ferrule increases the fracture resistance of RCT teeth when attached to the post? Most of GP and all specialists answered yes
Do you believe that the placement of a post reinforces an RCT tooth and reduces the fracture probability? Most of GP answered yes and most of specialists answered no
If you use CP and cores, which material alloy do you prefer most frequently? Most of GP and all specialists answered nonprecious alloy
Which post type and core material do you use most frequently for the restoration of anterior RCT teeth? Most of GP and all specialists answered non-MP with composite resin core
Which post type and core material do you use most frequently for the restoration of posterior RCT teeth? Most of GP and all specialists answered PfP metallic with a core build-up of amalgam or composite resin

Ratnakar et al. 2014

Type of posts used in 50% of tooth structure remaining - PfP and tooth-colored restoration (24.5%)

Type of posts used in less than 50% of tooth structure remaining - CP and crown (80.9%)

Sambrook, Burrow, 2018

Preferences for post type and reason - Custom cast MP (49%)

Cement used for post cementation - Composite RC (39%)
What influences the decision to place a post? The quantity of tooth structure influences the decision to place a post (96%)
The primary purpose of a post is to reinforce an ETT - A post does not reinforce an ETT (93%)
What is the ideal post length? 4 to 5 mm of gutta percha (76.8%)
How is post diameter established? Established by conforming to the existing canal with preparation of the apical portion (44%)

Preference for post surface texture - Passive post (75%)
The primary purpose of a post is to retain a core - The purpose of a post was to retain a core (99%)

Sarkis-Onofre et al, 2015

The most commonly used type of intra-radicular post - Cast MP (24.5%)
Type of cement - RC (66.7%)
Use of rubber dam - Non-use of a rubber dam - 93.1%

Sedrez Porto et al, 2017

Type of posts in anterior teeth with large destruction of coronal portion - Students presented an odd to choose PfP (127%)
Considering posts in posterior teeth - Students presented an odd 40% smaller to choose PfP
Type of cement in anterior teeth with large destruction of coronal portion - Students presented an odd 105% greater to choose self-adhesive RC
Considering cement in posterior teeth - Students presented an odd 51% greater to choose conventional RC
The reinforcement of the tooth structure using intra-radicular posts - Students have 70% less chance to believe that posts are used to reinforce tooth structure
Regarding to the function of intra-radicular posts - Students had more than four times higher chances than dentists to believe that the posts help in the retention of the coronal restorative material

Seow et al, 2003

What type of post do you use most often in the restoration of incisors? Cast precious post (56.6%)
What type of post do you use most often in the restoration of canines? Cast precious post (56.4%)
What type of post do you use most often in the restoration of posterior teeth (premolar/molar)? PfP (48.1%)
What luting cement do you routinely use to lute posts? ZIC (50.4%)
Do you believe that the placement of a post strengthens a root-filled tooth? No (60.6%)
What length of post do you attempt to place in a root filled incisor? 2/3 of root length (36.1%)
What length of post do you attempt to place in a root filled canine? 2 /3 of root length (41.3%)
What length of post do you attempt to place in a root filled posterior tooth? Same length as crown (24.5%)
Do you routinely place a post in a root filled incisor prior to crowning? No (64.6%)
Do you routinely place a post in a root filled canine prior to crowning? No (66.3%)
Do you routinely place a post in a root filled posterior tooth (premolar/molar) prior to crowning? No (84.9%)

Sheehan et al, 2019

The authors applied a questionnaire assessing the use of posts, however the results were not presented.

Spielman et al, 2019

Type of post - Preformed metal (cemented) (59%)

Tortopodis et al, 2010

Which post type material do you use most frequently for the restoration of RCT teeth? Anterior teeth - Custom CP (40%); Posterior teeth -PfP metallic with a core built-up of amalgam or composite resin (42.4%)
Do you believe that every RCT tooth requires a post? No (89.4%)
Do you believe that a ferrule increases the fracture resistance of RCT teeth when attached to the post? Yes (76.2%)
Do you believe that the placement of a post reinforces an RCT tooth and reduces the fracture probability? No (53.6%)
What length of post do you attempt to place as optimal in a root of RCT tooth? Equal to 1/3 of remaining root's length (41%)

Weerapperuma et al, 2016

Type of post system used - Most of GPs and delegates attending the British Society of Prosthodontics annual conference answered MP and metal free posts systems

Kavlekar et al, 2016

Type of post - CP more frequently (83.2% of endodontists); PfP more frequently (78.4% of GP); PfP (52.9% of prosthodontists)
Type of cement - GI cement (41.3% of prosthodontists, 37.6% of endodontists); RC cement (56.9% of GP)
Do you believe that every ETT requires a post? Not every ETT need receive a post (89.3% prosthodontists; 81.2% endodontists; 90.5% GP)
Ferrule increases the fracture resistance of ETT - Using ferrule increases fracture resistance (82.6% prosthodontists; 75% GP)
Post reinforces an ETT - Post definitely reinforces an ETT and reduces fracture probability (70.7% GP)
Failure - Endodontic failure (81% prosthodontists; 74.1% GP); loss of retention of posts (79.2% endodontists)
Design of post - Tapered posts (70.3% endodontists; 74.1% GP; 46.3% prosthodontists)

Fiber Post (FP); Prefabricated Post (PfP); Metal Post (MP); Glass Ionomer (GI); Cast Post (CP); Zinc Phosphate (ZP); Glass Fibre-Reinforced Composite (FRC); General Practitioners (GP); Board-Certified Prosthodontists (BCP); Root Canal Treated (RCT); Resin Cement (RC); Zinc Ionomer Cement (ZIC).