Original Article

Endodontic retreatment practice trends among dental surgeons: A survey-based research

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Abstract

Aim: Root canal treatment procedures are considered "the bread and butter" for routine clinical practice. Although retreatments have been primarily performed by endodontists (ENs), many senior practitioners and dentists who are root canal enthusiasts do opt for undertaking endodontic retreatment procedures. This survey helps us understand the practice trends and attitude of dentists undertaking endodontic retreatment procedures in and around Mumbai city.

Materials and Methods: Questionnaires pertaining to endodontic retreatment were randomly distributed (hard copy/soft copy) to 1000 practicing dentists in and around Mumbai city. The questionnaire survey was divided into Part A: involving basic details such as name, demographic information, and clinical experience of the dentist and Part B: a set of questions based on assessing the trends, techniques, materials, and opinions of dentists regarding endodontic retreatment. Only those dentists who treated endodontic retreatment patients were asked to fill the Part B form. A response rate of 60.2% was achieved.

Results: Out of total 602 participants, 49% of dentists (295) reported to undertake endodontic retreatment cases. Among the 295 respondents, 46.11% were Endodontists (ENs) while 53.8% were BDS or MDS of other specialties (ODs). Most dentists preferred multi-visit retreatment and prescribed antibiotics only in specific cases. Radiovisiography was the most preferred imaging aid. Calcium hydroxide and 3% sodium hypochlorite were favored choices for intracanal medicament and irrigant, respectively. Cold lateral compaction obturation technique was most common. Advanced equipment such as microscopes, loupes, ultrasonics, retreatment files, and thermoplastic obturations were more prevalent among ENs as compared to ODs.

Conclusion: This study found some differences in endodontic retreatment practice trends among ENs and other dentists. But overall, most clinicians followed the international norms and are updated in recent advances in materials and techniques used in endodontic retreatment.

Keywords: Dental practitioners; endodontic retreatment; questionnaire

INTRODUCTION

Root canal therapies focus on debridement and disinfection of root canal system. As per data available from numerous studies, endodontic treatment has yielded a success rate of 40%–93%.[1,2] Although the techniques and equipment used in root canal therapy have undergone significant evolution, root canal treatments have been reported to fail under certain circumstances. An endodontic therapy usually fails in scenarios where debridement, disinfection, or both fall short of expected standards. Numerous epidemiological studies investigating various aspects of root canal therapy and practice trends of dentists all around the world have been conducted and published. However, there is a dearth of research regarding endodontic retreatment – the knowledge, attitude, treatment trends, and protocols that the practicing dentists follow while taking on a retreatment case. This survey was conducted to understand the practice trends of

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Date of submission : 04.09.2023
Review completed : 12.09.2023
Date of acceptance : 06.10.2023
Published : 22.11.2023

Access this article online

Quick Response Code:

Website: https://journals.lww.com/jcde

DOI: 10.4103/JCDE.JCDE_166_23

How to cite this article: Mandke L, Koparkar T, Bhagwat S, Vimala N, Vandekar M. Endodontic retreatment practice trends among dental surgeons: A survey-based research. J Conserv Dent Endod 2023;26:663-70.

endodontists (ENs) and other dentists during endodontic retreatment procedures.

MATERIALS AND METHODS

Approval for the study was obtained from the Institutional Ethical Committee (IREB/2020/CONS/03). A questionnaire focusing on endodontic retreatment trends was designed and distributed among randomly selected dentists practicing in and around Mumbai city. Nonpracticing and retired dentists were excluded from participating in this survey. All responses were anonymous.

The data were analyzed and presented in the following study. The study took place in Mumbai area, spanning a period of one year. It was an observational cross-sectional study, with a total of 1000 survey forms distributed via hard copy, E-mails, and online messenger services. Sample size was calculated using the formula: $n = Z\ 2\ P\ (1-P)\ d2$. The sample size was calculated at 95% confidence levels, 5% alpha error with expected prevalence or proportion (P) 50%, and 4% absolute precision (d); the sample size (n) was estimated to be 601. We received a response from 602 dental surgeons.

The questionnaire survey was divided into two parts. Part A involved basic details such as name, demographic information such as age, sex, gender, clinical experience, qualification, training background, and practice profile of the dentist. Dentists were also asked whether they treated retreatment patients. Only those dentists who answered affirmatively to the last question were asked to continue to Part B of the form. Part B of the survey questionnaire consisted of 20 questions based on assessing the trends, techniques, materials, and opinions of dentists regarding their approach toward endodontic retreatment. Only those dentists who treated endodontic retreatment patients filled the Part B form.

The survey was carried out during the COVID-19 pandemic of 2020 and 2021 and hence dentists were asked to fill the responses based on their treatment protocols and practicing trends prior to the COVID-19 pandemic. All the results from the survey forms were compiled using Google Forms and spreadsheets for better assessment. Results were subjected to statistical analysis, and Chi-square correlation test was applied using Excel and R- Programming Software, The R Foundation, Auckland, New Zealand.

RESULTS

The survey form was distributed to 1000 dentists and received a response rate of 60.2% from 602 individuals.

The survey form was designed in two parts: A and B for a specific purpose. Part A was a general information form, with the last question as to whether the dentist performed retreatments or not. The intent was to find the prevalence rate of retreatments being done by dentists. The prevalence rate was 49%. Part B concentrated on retreatment practices followed.

Out of the total 602 responses, 295 dentists (49%) responded that they did endodontic retreatment cases, so these 295 filled the part B form. Hence, the prevalence rate for dentists performing endodontic retreatment was 49%.

Among the 295 practitioners (67.1% – female and 32.9% – male) who filled Part B of the survey, 136 respondents were ENs (46.1%) (63.2% – female and 36.8% – male) while 159 respondents were dentists who were BDS or MDS of other specialties (ODs – 53.89%) (70.4% – female and 29.6% – male).

Among the ENs, 41.9% had <5 years of experience, 21.3% had between 5 and 10 years of experience, 17.6% had between 10 and 15 years of experience, and 19.1% had over 15 years of experience.

Among the other dentists, 37.7% had <5 years of experience, 34.6% had between 5 and 10 years of experience, 12.6% had between 10 and 15 years of experience, and 15.1% had over 15 years of experience.

Table 1 shows the analyzed data in percentage. Results showed that most clinicians treated <5 retreatment cases in a month, and preferred multi-visit endodontic retreatments. ODs treated the easier retreatment cases, whereas the difficult retreatments such as instrument separation and calcified canals were referred to ENs. Lesser percentage of ENs opted for pretreatment antibiotic prescription as compared to ODs. Radiovisiography (RVG) was the most favored diagnostic imaging aid among all respondents (ENs – 94.12%, ODs – 85.53%). Our survey reported an increasing trend among all dentists relying on cone-beam computed tomography (CBCT) for better diagnosis of retreatment cases.

Dental loupe was the most favored magnification aid used (OD – 43.4%, EN – 35.2%). However, more than half of the ODs (59.7%) did not use magnification.

Most clinicians preferred to cut the crown before initiating the root canal procedure (45.6% – ENs and 47.2% – ODs).

Most practitioners affirmed the use of gutta-percha solvents for removing gutta-percha (88.7% – ODs, 80.9% – ENs).

Almost all respondents preferred calcium hydroxide as intracanal medicament (95.59% – ENs, 91.82% – ODs). This was followed by chlorhexidine (CHX) gel and triple antibiotic paste.

Table 1: Analyzed data in percentage

Parameter		MDS (EN %)	OD %
Number of retreatment cases done per month	10–20 cases	3.7	3.1
	5–10 cases	33.1	11.3
	<5 cases	61.8	84.3
	>20 cases	1.5	1.3
Number of visits for retreatment	Multiple visits only	77.9	76.1
	Single or multiple, depending on case	22.1	23.9
	Single visit only	0	0
Prescription of antibiotics before retreatment	Always	8.8	37.7
	Never	7.4	3.8
	Specific cases only	83.8	58.5
Diagnostic imaging aids used	RVG	94.12	85.53
	CBCT	76.47	34.59
	IOPA	25.00	38.36
	OPG	11.76	17.61
	Image plate scanners	2.94	2.52
Use of CBCT during retreatment	Yes	3.7	37.1
	No	76.5	56.0
	Sometimes	19.9	6.9
Use of magnification	Loupes	43.4	35.2
	Microscope	27.9	1.9
	Both of above	19.9	3.1
	No magnification	8.8	59.7
Use of gutta-percha solvents	No	19.1	11.3
	Yes	80.9	88.7
Intracanal medicaments used	10% metronidazole gel	5.88	19.50
	Calcium hydroxide	95.59	91.82
	CHX gel 2%	21.32	25.16
	DAP	8.82	1.26
	Intracanal steroids	0.00	1.89
	IKI	4.41	5.03
	Ledermix	2.94	1.26
	No medication	19.12	3.14
	Triple antibiotic paste	28.68	30.19
Irrigants used in retreatments	Sodium hypochlorite	91.91	87.42
	EDTA 17%	74.26	76.10
	Saline	63.97	72.96
	Chlorhexidine gluconate 2%	61.03	32.08
	Citric acid	0.74	0.63
	Distilled water	5.88	15.09
	Hydrogen peroxide	0.00	10.06
	Betadine	2.94	4.40
Concentration of sodium hypochlorite used	NaOCl not used	5.1	8.2
	NaOCl 1%	0.7	16.4
	NaOCl 3%	48.5	40.3
	NaOCl 5.25%	45.6	35.2
Endodontic file systems used	Hand files	50.74	77.36
	Rotary files	69.12	76.1
	Retreatment files	77.21	30.19
Instrument separation management	Only instrument bypass	14.7	11.9
	Try instrument retrieval or else bypass the instrument	84.55	28.3
	Refer the case to EN	0.0	59.7
	Instrument retrieval	0.7	0.0
Perforation repair material used	MTA	97.06	55.97
	Biodentine	48.53	11.95
	GIC	22.06	20.75
	Bioceramic based	16.91	2.52
	Calcium hydroxide	6.62	17.61
	Decalcified freeze-dried bone	0.00	0.63
	Do not carry out perforation repair procedures	0.74	33.33
	Gutta-percha	0.74	1.26
	Amalgam	2.21	1.26
	Zinc hydroxide	0.00	1.26
Post removal technique	Ultrasonic tips	76.5	33.3
	Ultrasonic tips, burs	11.8	10.1
	Refer to specialist	1.5	42.13
	Burs	3.6	5.03

Contd...

Table 1: Contd...

Parameter	Number of cases	MDS (EN %)	OD %
	Implant kit components	1.5	0.6
	Ultrasonic tips, burs, physical	2.9	1.9
	Physical	2.2	6.9
Obturation techniques for retreatments	Cold hydraulic condensation	3.68	2.52
	CLC	77.21	72.96
	Thermoplastic injection techniques	38.97	11.32
	Warm vertical compaction	42.65	57.23
	Squirt technique	2.94	0
Surgical endodontic retreatment attempted	Yes	22.1	52.5
	Sometimes	43.4	29.1
	No	34.6	18.3

CLC: Cold lateral compaction, EN: Endodontist, OD: Other dentists, IKI: Iodine potassium iodide, CHX: Chlorhexidine, RVG: Radiovisiography, CBCT: Cone-beam computed tomography, IOPA: Intraoral periapical radiograph, OPG: Orthopantomography, EDTA: Ethylenediaminetetraacetic acid, GIC: Glass ionomer cement, MTA: Mineral trioxide Aggregate, DAP: Double antibiotic paste

Sodium hypochlorite was the most preferred irrigant (ENs – 91.91%, ODs – 87.42%). The other preferences were ethylenediaminetetraacetic acid (EDTA) > saline > CHX. The most preferred concentration of NaOCl was 3%, followed by 5.25%.

More ENs preferred the specialized rotary retreatment files (77.21%) as compared to ODs (30.19%). ODs were more prone to using hand files (77.36%) and rotary files (76.1%) for retreatments.

More than half of the ODs (59.7%) preferred to refer retreatment cases with instrument separation to ENs. Most ENs (84.5%) managed instrument separation by bypassing or by retrieval.

MTA was the most preferred perforation repair material (97.06% – ENs, 55.9% – ODs). The other preferences were Biodentine > Glass ionomer cement (GIC) > bioceramics. One-third of ODs did not perform perforation repair procedures.

For post removal, 42.1% of ODs referred such cases to specialists. The use of ultrasonic tips for post removal was most preferred by ENs (76.5%) as well as ODs (33.3%).

Cold lateral compaction (CLC) technique of obturation was most preferred by all clinicians (EN – 77.21%, OD – 72.96%).

Most of the ODs (78.6%) did not prefer doing surgical endodontic retreatment. In ENs, 43.4% did surgical retreatments in specific cases.

DISCUSSION

Although numerous studies/surveys have been carried out to assess trends in endodontic treatment worldwide, there is none regarding endodontic retreatment trends among dentists. Ours was a preliminary study to assess the prevalence, knowledge, and practice protocols followed during endodontic retreatment by dental surgeons in and around Mumbai.

Number of retreatment cases being performed

Majority of the clinicians (73.9%) did <5 retreatment cases in a month. The low percentage of retreatments done by dentists can be attributed to a variety of reasons such as high success rate of Root canal treatments (RCTs) done, failed RCTs going for extraction because of dentist's inability to perform retreatments, extensive procedural errors during RCT which cannot be corrected with retreatment, extraction because of patient noncompliance, and patients' financial constraints. Tzimpoulas *et al*. reported through their study that 21% had to be retreated while 79% of endodontically treated teeth ended up getting extracted in coming years.[3]

Types of retreatment cases being treated

Most of the ODs opted to perform simpler retreatment cases, while complex retreatment cases were mainly managed by ENs. This could be due to factors such as ENs being trained specially to deal with endodontic mishaps during their postgraduate training as well as the quantitative exposure of ENs to these cases.

Number of visits

Maximum practitioners preferred multi-visit endodontic retreatments. None performed exclusive single-visit retreatments, whereas a few decided to do single- or multiple-visit retreatment based on the complexity of the case. A study by Yoldas *et al*. reported that the two visit root canal treatment with interappointment $Ca(OH)_2$ and CHX dressing was more effective in completely eliminating pain than the one visit root canal treatment in previously symptomatic retreatment cases.[4]

Antibiotic usage

In our study, lesser percentage of ENs opted for pre-treatment antibiotic prescription as compared to ODs.

The American Association of Endodontics guideline indicates that the use of supplemental antibiotics following adequate debridement and drainage in cases of localized endodontic infections is ineffective. Similar studies done by researchers have also concluded with similar results. In endodontic retreatment cases with localized pathological conditions, the root canal has no blood flow; hence, antibiotics are unable to reach the target site, thus rendering them ineffective.[5]

Diagnostic imaging

RVG was the most favored diagnostic imaging aid among all respondents. RVG has many advantages as an imaging device. It can capture, view, enhance, and store radiographic images in an easily reproducible format that does not degrade over time. It uses no X-ray film and requires no chemical processing. Radiation exposure is minimal as well. These qualities make it the imaging device of choice.

Statistical analysis indicated that there was a significant association between the qualification of the dentist and what diagnostic imaging aids they used ($P < 0.05$) [Table 2]. The imaging preference for ENs was RVG > CBCT > intraoral periapical radiograph (IOPA), whereas for ODs, it was RVG > IOPA > CBCT.

However, there was no significant association between years of practice and the use of diagnostic imaging aids as per the Chi-square test ($P < 0.05$) [Table 2]. The preference for diagnostic imaging aid use was similar across practitioners with varied years of practice.

Use of cone-beam computed tomography

Our survey reported an increasing trend among all dentists relying on CBCT for better diagnosis of retreatment cases. However, the prevalence was more in ENs than ODs. CBCT helps in providing a three-dimensional (3D) visualization of the pathologic area of interest and helps improving the diagnosis and treatment plan of the practitioner.[6] Other factors responsible may be increased awareness of the benefits of CBCT, as well as increased availability of CBCT centers throughout the city of Mumbai and its suburbs.

Studies have shown greater detection of undiagnosed pathology with CBCT in endodontically failed teeth.[7-9]

Magnification

Dental loupe was the most favored magnification aid used. A larger proportion of ENs relied on the use of magnification while performing retreatments as compared to ODs.

The use of microscopes and loupes enhances clinician's ability to visualize the operating area, thus refining and upgrading his/her clinical work. David J. Bowers through his study reported that magnification use did enhance the fine motor skills of clinicians. He concluded that dental loupes enhanced clinician's dexterity by 17.5% while operating microscope enhanced it by 57.7%.[10]

There was a statistically significant association found between qualification and the use of magnification by the dentist during endodontic retreatment cases ($P < 0.05$) [Table 2]. In our study, a higher percentage of ENs used magnification during endodontic retreatment. More than half of the ODs (59.7%) did not prefer any means of magnification.

There was a statistically significant association found between years of clinical practice and the use of magnification ($P < 0.05$). The younger clinicians with less clinical experience have shown increasing adaptability toward the use of dental microscope and dental loupes [Table 2].

Dental loupe was the most popular magnification device, favored by all clinicians, irrespective of qualification or years of experience. Although loupes are not as effective as a microscope, they have other advantages. Dental loupes are easier to use, are less expensive, and have a lower learning curve. They do not require intensive specialized training like in case of microscopes. Clinics with microscopes require trained assistants to help during procedures; this is not needed if the clinician is using loupes. Another important factor, especially in a metro like Mumbai is the space crunch. Due to the exorbitant real estate price, dental clinics in Mumbai are not as spacious as in the rest of India. Dental microscopes occupy a large amount of space, and that can also be a deciding factor in preferring loupes.

Table 2: Statistical analysis - Chi-square test results

Parameters association tested	χ^2	Df	*P*
Association between diagnostic imaging aids and qualification	71.821	17	0.000*
Association between diagnostic imaging aids and years of clinical experience	62.591	51	0.128
Association between magnification use and qualification	108.33	3	0.000*
Association between magnification use and years of clinical experience	30.787	9	0.000*
Association between qualification and instrument separation management	134.392	12	0.000*
Association between qualification and method of post removal	89.101	12	0.000*
Association between obturation techniques and years of clinical experience	87.062	36	0.000*
Association between obturation techniques and qualification	50.295	12	0.000*
Association between qualification and surgical endodontic retreatment	98.568	2	0.000*

*As $P<0.05$ indicates that there is a significant association

Crown removal

Maximum dentists preferred cutting the crown to remove it. Only 0.6% of ODs and no ENs prepared access cavity through the crown and not remove it during endodontic retreatment.

Several investigators have identified coronal leakage as a major factor in bacterial contamination and the subsequent failure of nonsurgical root canal therapy.[11] Hence, it is best to remove the crown by any means before resorting to retreatment. Crown removal allows us to visualize and assess the coronal structure, any presence of recurrent caries, or faulty restoration which needs to be removed. It also enables a second look at the coronal structure – whether the tooth is restorable, or should be extracted.

It was heartening to see that most of our respondents did not resort to shortcuts and followed the prescribed norms for crown removal.

Gutta-percha solvents

85.1% of ODs and 80.9% of ENs affirmed on using GP solvents during retreatment cases. High dependence on the use of gutta-percha solvents during endodontic retreatment may be attributed to the reduction in time of removing the old, infected gutta-percha fillings, thus providing more chair side time for chemomechanical preparation. GP solvents are also found useful by many clinicians since it is less technique sensitive and aids in faster removal of well compacted GP points.

19.1% of ENs and 11.3% of ODs avoided the use of gutta-percha solvents. This could be due to drawbacks of GP solvents, namely cytotoxicity to periapical tissue, reduction in bond strength of root canal sealers, and obstructing the contact of irrigants to the canal walls.

Intracanal medicaments

Almost all respondents preferred calcium hydroxide as intracanal medicament (95.59% – ENs, 91.82% – ODs). This was followed by CHX gel and triple antibiotic paste.

Calcium hydroxide is considered the gold standard for intracanal medicaments in the field of endodontics. Calcium hydroxide causes the denaturation of pro-inflammatory mediators and contributes to the resolution of periradicular periodontitis. Multiple studies have proven calcium hydroxide's effectiveness in neutralizing bacterial endotoxins and lipopolysaccharides within the canal and periapical area.[12,13]

Irrigants

Sodium hypochlorite was the most preferred irrigant (ENs – 91.91%, ODs – 87.42%). The other preferences were EDTA > saline > CHX.

Our survey revealed that although an almost equal number of ENs and ODs favored NaOCl, EDTA, and saline, ODs were reluctant to use CHX as an irrigant. Only 32.08% of ODs versus 61.03% of ENs used CHX during retreatments. CHX has a bactericidal effect due to precipitation and/or coagulation of the cytoplasm.[14] It also exhibits the property of substantivity which makes it popular among ENs as an irrigant, specially for retreatments.

The most preferred concentration of NaOCl was 3%, followed by 5.25%. ENs preferred higher concentration percentages of NaOCl as compared to ODs. Sodium hypochlorite is considered a gold standard irrigant having strong antibacterial and soft tissue dissolving capabilities. It is a proven fact that the best concentration of NaOCl is in the range of 2.5%–5.25%. The higher the concentration, the higher is its efficacy.

Various endodontic irrigation-related surveys from different countries unanimously conclude that NaOCl is the choice of irrigant.[15]

File systems

ENs used a combination of all file systems – hand, rotary, and retreatment files. The responses of the dentists clearly demonstrate greater adoption of advanced file systems by EN for retreatment cases while it does show some amount of reluctance of ODs toward the use of rotary and retreatment systems while performing the case. This can be explained due to lack of training, absence of exposure to newer file systems, or preestablished comfort associated with traditional file system use.

Instrument separation management

More than half of the ODs (59.7%) preferred to refer retreatment cases with instrument separation to ENs. Most ENs preferred instrument retrieval, or else bypass of the instrument. There was a significant association between the qualification of the practitioner and their instrument separation management ($P < 0.05$) [Table 2]. Instrument bypass and retrieval are highly technique-sensitive procedures and difficult to manage endodontic mishaps. ENs are trained for these procedures during their postgraduation; thus, instrument separation cases are not much attempted by non-ENs.

Perforation repair

MTA was the most preferred perforation repair material (97.06% – ENs, 55.9% – ODs). The other preferences of ENs were Biodentine > GIC > bioceramics. ODs preferred GIC > $Ca(OH)_2$ > Biodentine. One-third of ODs did not perform perforation repair procedures.

Both MTA and Biodentine have proven to be major breakthroughs in the field of endodontics providing

excellent biocompatibility with periapical tissues, good hermetic seal, and physical properties. This makes the two, the most sorted materials for perforation repair.

There have been extensive research and clinical studies that have proved the effectiveness of MTA as a perforation seal material.[16,17]

Relatively easier manipulation, low cost, and faster setting are the major advantages of Biodentine when compared to MTA. Studies have also proved that its compressive and flexural strength is superior to that of MTA.[18] The absence of long-term clinical studies regarding Biodentine use may explain the reason for majority of the ENs taking part in the survey preferring MTA over Biodentine.

GIC and calcium hydroxide were used for perforation repair before the advent of MTA and Biodentine. This may explain their use by some ODs, due to lack of exposure to the newer materials.

Post removal

The use of ultrasonic tips for post removal was most preferred by ENs (76.5%) as well as ODs (33.3%). A survey carried out by Castrisos and Abbott in 2000 reported ultrasonics to be the most commonly used method for removing post in a root canal-treated tooth as compared to post removal devices, trephine burs, and physical means.[19] Post removal with ultrasonics is safer and easier because of advantages such as minimal loss of tooth structure, less working time required, lower risk of root fractures, or perforations. 42.1% of ODs referred such cases to specialists. There was a significant association between qualification of the practitioner and how they manage post removal ($P < 0.05$) [Table 2].

Obturation techniques

CLC technique was the most favored by all clinicians. There was a significant association between years of practice of a clinician and the obturation techniques they used in retreatment cases ($P < 0.05$) [Table 2]. Although CLC was the first choice among all years of experience, the second choice of obturation technique was TI for those <5 years of experience (new practitioners), and warm vertical compaction (WVC) for the rest of the clinicians (senior practitioners).

There was a significant association between qualification of respondents and obturation techniques used in retreatment cases ($P < 0.05$) [Table 2].

CLC is undoubtedly the most preferred obturation technique by all clinicians. Although it is not the best technique available to achieve 3D seal, it remains popular due to fewer chances of error and eliminating the need for specialized equipment. It also is the primary technique of obturation taught in most of the colleges.[20-22]

CLC is as effective as any other technique involved in obturation. A meta-analysis conducted by Peng *et al*. concluded that there was no significant difference in postoperative pain prevalence, long-term outcomes, and obturation quality between CLC and WVC techniques.[23]

However, other studies claim CLC not as effective as other techniques.[24,25]

Endodontic surgery

More than half of the total respondents (52.5%) did not prefer doing surgical endodontic retreatment. Out of the remaining clinicians who performed endodontic surgeries, 77.9% were ENs as compared to 21.3% of ODs. There was a significant association between qualification of the practitioner and their preference in opting for surgical endodontic retreatment ($P < 0.05$) [Table 2].

Most dental practitioners do not prefer doing surgical endodontic retreatment. Even ENs, during their postgraduate training in India, do not treat sufficient patients needing surgical endodontic retreatment. They prefer referring the case to an oral and maxillofacial surgeon, or prefer extraction as a last resort. The emergence of implants as a popular and acceptable treatment modality by both clinicians and their patients also may have led to the abovementioned options.

In our study, since no oral and maxillofacial surgeons filled up the Part B form, that also may have led to the low percentage of respondents performing endodontic surgery.

CONCLUSION

Overall, this study aimed at understanding the knowledge and attitude of dentists undertaking endodontic retreatments while at the same time evaluating their practice trends. This study found some differences in practice trends among ENs and other dentists while tackling endodontic retreatment cases. But overall, most clinicians followed the international norms and are updated in terms of recent advances in materials and techniques used in endodontic retreatment. This study may serve as a reference for future studies of the changes continually taking place in endodontic retreatment therapy.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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