A QUESTIONNAIRE SURVEY AMONG DENTISTS ON THE USE OF INTRACANAL MEDICAMENTS IN ORTHOGRADE ENDODONTIC TREATMENT

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ABSTRACT
Introduction: The endodontic therapy is performed with appropriate preparation techniques, irrigation solutions and intracanal medications, with the aim of eliminating residual microorganisms.

The purpose of the survey is to evaluate the level of awareness and clinical use of intracanal medications, and ways to remove them among dentists.

Material and methods: The subject of the survey is the opinion of 249 dentists with different work experience and work orientations. Questions to identify the most commonly used intracanal medicaments in the course of endodontic treatment by general dentists are included. Identify the clinical situations in which they are most commonly used, as well as the preferred techniques and solutions for their elimination. The data were processed with the statistical software IBM SPSS Statistics 26.

The results of the survey show that most of the respondents practice general dentistry and 98% of the respondents use intracanal medications in their practice. The most commonly used intracanal medicament is calcium hydroxide in single and combined form, 49% and 75%, respectively. According to 96.7%, medications affect the healing process. Syringe and needle irrigation with 2-5.25% NaOCI is one of the most commonly used methods for removing intracanal medicaments (96.3%). 74% of the respondents have difficulties in removing intracanal medications.

Conclusion: Based on their clinical experience, respondents indicated that they have difficulty in the complete removal of intracanal medications, and half of them believe that not all methods for their removal are available. At the same time, the respondents point out that the incomplete removal of intracanal drugs affects the adhesion of the canal filling material to the walls of the root canal.

Keywords: intracanal medicaments, survey, techniques for intracanal medicaments removing,
pared on electronic media, with dentists expressing their opinions electronically anonymously on issues related to:

- The most commonly used intracanal medicaments, and in what clinical situations they are used in the course of endodontic treatment.
- Preferred techniques for the removal of intracanal medicaments.
- Preferred irrigation solutions for chemical treatment of root canals and removal of intracanal medicaments.

The results of the survey were statistically performed, the methods used were descriptive statistics and statistical testing of hypotheses.

**RESULTS**

After analyzing the opinion of dentists, some important results can be derived regarding the applicability of intracanal medicaments and the problems arising from the use of various techniques for their removal.

Dentists were interviewed, of which 80 men (32.5%) and 166 women (67.5%) were divided into four categories of work experience (fig. 1).

![Fig. 1. Distribution of respondents by gender](image1)

The largest number of respondents 19.9% have work experience of between 15 and 25 years. In the other categories are distributed about 20% of dentists in the survey. This distribution by the length of service shows that from each group of respondents (young and old) there will be a sufficient number of persons and that the predominant group of dentists are people with long service in their field. The average length of service of the respondents is approximately 14 years (fig. 2).

![Fig. 2. Distribution of respondents depending on the work experience](image2)

The next question aims to study the speciality and work orientation of the respondents. Several options are listed from which one or more areas can be selected. As there is a possibility for more than one answer, the total response rate exceeds 100%. The most frequent respondents indicated that they practice general dentistry (73.1%). Almost half (40.8%) of dentists indicated surgical dentistry and endodontics. They are followed by prosthetic dentistry (26.1%), pediatric dentistry (16.7%) and parodontontology (13.1%). The least frequent are those majoring in oral and maxillofacial surgery (6.5%) and orthodontics (4.9%) (fig. 3).

![Fig. 3. Distribution of respondents depending on the field in which they work](image3)

About 61% of the respondents indicated that they work in general dentistry and only 1% are specialists in six of the seven listed specialities. There is not a single respondent who has listed all seven areas (fig. 4).
On average, one dentist has indicated two (1,8) areas in which he works, one of which is general dentistry. These results show that most of the respondents have and apply a general orientation and a narrowly specialized one (fig. 4).

When asked how often they perform endodontic treatment, only 2% of respondents answered that they do not perform endodontic treatment. The remaining 98% most often carry out such treatment up to 5 times a week (50%). This was followed by a frequency of - every day (34%) and at least gave an intermediate response more than 5 times a week (fig. 5).

Regarding the use of intracanal medications in dental practice, only 2% of the respondents indicated that they do not use them.

Dentists who use intracanal medications use them mainly for two reasons - whenever possible (49%) and for infected canals/periodontitis (46%). In the case of retreatment and pulpitis, the use of these medicaments is within 2-3% (fig. 7).

When asked whether they use optical zoom, 62% or 153 of the respondents do not use it. The remaining 38% use an optical device as follows: 31% use a magnifying glass and only 8% use a microscope (fig. 6).
In most cases, the decisive factor for the use of intracanal drugs is the objective finding of an infectious process. This factor was mentioned by 84% of the respondents. The next indicated factor is the use of subjective anamnestic data (15%), and a very small percentage indicated the presence of previous canal fillers (1%) as a factor (Fig. 8).

The most commonly used intracanal medicaments are calcium hydroxide in combination with iodoform, chlorhexidine and others (75%), followed by antibiotic pastes (63%) and calcium hydroxide alone (49%) (Fig. 9).

There is approximately normal distraction among the respondents on this issue. It can be said that they use intracanal medicaments and do not focus only on some of them. 41% of dentists use two of these medicaments, 23% use all three, and 36% use only one medicament, and on average dentists use about 2 medicaments (1.9). The sum of the percentages exceeds 100% because one respondent can indicate more than one medication.

A large percentage of respondents believe that intracanal medicaments affect the healing process (96.7%). Approximately 3% (2.7%) have no opinion on this issue and have preferred to point out that they cannot judge. And one of the respondents believes that these medicaments do not lead to a healing process (0.4%) (Fig. 10).

Respondents most often used syringes and needle irrigation to remove intracanal medications (96.3%). In second and third place are the use of files (58.1%) and ultrasonic irrigation (41.5%). The remaining methods occupy a total of 15% of the used methods for the removal of intracanal medicaments, and the least used of them is irrigation with negative pressure (2.8%). The sum of the percentages exceeds 100% because one respondent can indicate more than one method of removal (Fig. 11).

Only 1% of dentists indicated five of the six methods for removing intracanal medications. Nearly 22 (22%) indicated that they use only one method. Most often, dentists use two methods (50%). This is the average number of methods used (2.1) (Fig. 11).

When asked whether the methods for removing intracanal drugs are available for use, dentists are divided into two opposing opinions with a slight transfer of negative opinion (56%) over positive (44%).

Approximately ¾ (74%) of dentists have difficulty
in the complete removal of intracanal medications. The remaining 26% do not have such a problem. At the same time, 89% of respondents believe that incomplete removal of intracanal medicament affects the adhesion of the canal sealer to the walls of the root canal, while the remaining 11% think that incomplete removal has no effect. There is a part outside these percentages (6 respondents) that refrained from answering (2.4%) on this issue.

Fig. 12. Irrigation solutions for the removal of intracanal drugs

Regarding the irrigation solution used, the respondents reported that in 56% of the cases they used a solution of 2-5.25% NaOCl to remove intracanal drugs. The next most usable solution (22%) is 15-17% EDTA, followed by 3% H2O2 (16%). The rarest respondents indicated that they used 2% chlorhexidine (6%) to remove intracanal medications (Fig. 12). The survey method is one of the most common and convenient methods for collecting data from a group of people. It is a kind of digital questionnaire, widely used in scientific and pedagogical research and is used to clarify data, identify current problems and preferences of the target group.

DISCUSSION

The survey used in the present study provides an opportunity to objectively analyze and summarize the results of the data of dentists in Bulgaria regarding the used intracanal drugs, irrigation solutions, problems related to incomplete removal of intracanal medicaments, methods for their removal and the availability of these methods. The participation of clinicians with different clinical experience is important, which brings comprehensive information on the issues included in the questionnaire.

The work experience of the respondents is important for the full understanding and correct interpretation of the results of the survey. The various techniques for the removal of intracanal medicaments, especially the relatively newer and more difficult to access are aimed at clinicians seeking to improve the activities they perform. The average length of service of the participating dentists is approximately 14 years, with the largest number of respondents (92) having between 15 and 25 years of service. This distribution by the length of service gives us the certainty that the predominant group of dentists are people with extensive work experience in their field and extensive clinical experience. This extensive professional experience is very valuable because it allows dentists to make comparisons between different types of intracanal medicaments and techniques for their removal, while critically evaluating the positive and negative hand of a technique, and have a more objective opinion of the set in the survey questions. In contrast to our study in other study, 62.3% of respondents have less than 10 years of work experience, and nearly 18% have more than 20 years of experience. This shows the desire of younger colleagues for development and more knowledge [4].

In a descriptive study developed in Brazil, most of the professionals (56%) in the study had more than 20 years of experience [4].

The answers of the respondents to the question about the acquired speciality and the work orientation are impressive. The most frequent respondents practice general dentistry (73.1%), which is an indicator of the polyvalent orientation and the less frequent specialized orientation of the sample of dentists, which is analyzed using the survey method. The survey shows that about 61% of the respondents with a focus on general dentistry are very well represented. They usually have long work experience, respectively with a lot of clinical experience. It is noteworthy that most of the interviewed dentists have, in addition to a narrow focus of work, also have general dentistry, which makes a larger number of respondents with an attitude on the topic. This is evidenced by another study according to which 80.3% of the participants are general practitioners in dentistry, only 13.3% specialize in endodontics, and 4.6% others (including periodontists, orthodontists, and oral surgeons) [5].

Nearly 100% of dentists indicated that they perform endodontic treatment in their practice, half of them up to 5 times a week, and not a small percentage (34%) perform endodontic treatment every day. It follows that the respondents have a great commitment to the topic, and their answers can point us to the still existing problems and shortcomings regarding intracanal drugs and their removal from the root canal system. The results of the survey of other authors are contrary to our observation, in which 21% of dentists perform less than one treatment of root canals each week, 35% perform 1-2 treatments of the root canal per week, 31% perform 3-5 root canal treatments and 11% perform more than 5 root canals per week [6].

Another study is impressive, according to which 40.7% of participants receive 10 or more endodontic treatments per week [7].

Approximately 70% of respondents do not use any magnifying devices in order to better optimize the quality of work. Of those who use magnifying devices, only 7% use a microscope as an auxiliary device. This can be due to various reasons, but in all cases, it will affect good visibility, especially in an endodontic treatment, where it is of particular importance. And it would affect the quality and outcome of endodontic treatment. Approximately the same result was obtained by the authors of a study in which almost two-thirds (61%) do not use augmentation in their endodontic treatment. And of those who use one, 22% use magnifiers with light, 11% use magnifiers without a light source, and only 6% use an operating microscope.
The introduction of a microscope in the work of a dentist has a great impact on the outcome of root canal treatment. The use of magnification by respondents reported in the next study found that 25% used a microscope in each case, while 32% of respondents used a microscope only for special cases [8]. The results are similar to another study by Bhatti et al., In which 78.3% of practitioners did not use augmentation during root canal treatment [9].

The use of a microscope is not yet a widespread phenomenon, despite its proven advantages, as evidenced by another study, in which 1.8% of respondents use it, and 85.8% again do not use any magnification [8]. On the other hand, dentists in Switzerland use magnifiers 63.9% of and 13.7% use microscopes, the majority of which belong to those specializing in endodontics [10].

When asked whether they use intracanal drugs - 98% of respondents gave a positive answer. There is a consensus of the respondents on this issue, which shows the frequent use and importance of intracanal drugs for the healing processes in endodontic treatment. Therefore, for many practitioners, their use is an important step in successful endodontic treatment. It is also an important step for 60.6% of respondents in various surveys [11].

Quite logically, based on the widespread use of intracanal medicaments, is almost the same use of all three types of medicaments included in the survey. The combined calcium preparations with iodoform, chlorhexidine (75%) have a slight predominance, followed by the antibiotic pastes (63%) and the calcium preparations (49%). This leads to the conclusion that clinicians know the properties and indications of different drugs, and in what clinical situations to apply them, to optimal therapeutic effect.

Calcium hydroxide is the most widely used intracanal drug, according to several studies by various authors [5, 8]. In contrast, a study by Iqbal et al showed that 55% of doctors use Formocresol, while only 5% turn to Calcium hydroxide [9].

Calcium hydroxide is the most widely used intracanal medicament in most countries (Lithuania - 87%; India - 62%; Turkey - 53%; Saudi Arabia - 85.7%), according to another study in Brazil in which 74.3% of Doctors report using this material as their first choice for intracanal treatment, as is the case in Switzerland and Nepal [4, 10, 12].

This is quite logical from the fact that almost one hundred percent of clinicians use intracanal medicaments, in their various forms depending on the clinical situation.

The result of the answers to the next question concerning the methods of disposal of intracanal medicaments is quite expected. The highest percentage of respondents indicated that they use syringe and needle irrigation, followed by almost the same percentage of responses from clinicians who use different files for irrigation and ultrasonic irrigation. Irrigation with a syringe and needle remains the most commonly used method of medicament disposal. This is because it is the most easily applicable, economically accessible and applicable by all clinicians, regardless of the length of service and speciality (work orientation). In the current study, the percentage of clinicians who use five of the six methods for the removal of intracanal medicaments is very small, it is positive that, however, half of the respondents use two methods. It is advisable to increase the theoretical and practical knowledge of dentists in order to be more confident in the application of new and lesser-known techniques for the removal of intracanal medicaments.

The results of the answers to the next question regarding the availability of all methods for medicament removal is a consequence and further development of the previous answers of the respondents. They have two opposing opinions with almost the same percentage, with a slight predominance of negative opinions. Access to all methods and techniques is still insufficient and difficult, either for financial reasons or insufficient knowledge and willingness of clinicians to seek new approaches and methods in their work.

From the almost complete consensus regarding the use of intracanal medicaments, it logically follows that a large part of the respondents have difficulty in the complete removal of intracanal medicaments (74%), and a large percentage believe that their incomplete removal affects the quality of definitive obstruction. root canals (89%). Another study looked at respondents’ knowledge of the use of intracanal medicaments and reported little or insufficient knowledge about intracanal medicaments [13].

There is still no universal endodontic irrigant. Optimal disinfection of root canals and optimal removal of intracanal medicaments is achieved by the sequential use of two or more irrigation solutions. Our clinicians still do not often use chlorhexidine as a flushing agent, and it is represented by only 6% of respondents. Studies among different authors show large differences in the use of irrigation solutions. The decision to choose may be influenced by the practitioner’s knowledge, training, availability, and clinical diagnosis. Two studies report that saline is the most commonly used solution in the sample, mostly by general practitioners. As the literature shows that endodontic procedures are performed differently by specialists and general practitioners, it would be important to study the protocols of specialists [14].

In a study, the majority of participants (78.9%) used more than one irrigant in their practice, and in inflammatory diseases of the dental pulp in 65.1% of cases, respondents chose NaOCl as their first choice, while 28, 4% chose saline. In infected root canals, 79.9% of respondents chose NaOCl and 12% saline [14]. In the cases of retreatment, 69.9% chose NaOCl, and 12.9% saline. Although NaOCl was the most commonly chosen irrigant in general, significantly more endodontists chose NaOCl than general practitioners who preferred saline [14].

Similar to our study, NaOCl is recognized as the most commonly used irrigant in various countries. However, there are other commonly used solutions. A study in northern Jordan showed that one-third of their respondents used hydrogen peroxide as the basic solution, followed by NaOCl, followed by saline. A study from the United Kingdom showed that the local anaesthetic, as an irrigant, was most commonly used in endodontic practice (63%), followed by NaOCl (55%) and saline (20%) [14].

Ethylendiaminetetraacetic acid (EDTA) solutions of 62% and a chlorhexidine (CHX) were used regularly by 38% of respondents. Almost a quarter of respondents (23.3%) use...
saline or ethanol as irrigation before or after using other irrigation solutions. Many dentists use sodium hypochlorite in various studies, followed by saline [4, 7, 8, 10, 11].

In contrast, another study conducted in Iran by Raoof et al. shows that 42.9% of doctors use sodium hypochlorite given that 61.8% use saline. These findings are further supported by studies conducted by Bhatti et al in Pakistan, which reported 39.1%, while Gaikwad et al. in India, only 12.5% of physicians using sodium hypochlorite have reported it [9].

CONCLUSION

The analysis of the responses concerning the usage of intracanal medicaments showed that general dental practitioners in 98% use them in their daily dental practice. Based on their clinical experience, respondents indicated that they have difficulty in the complete removal of intracanal medications, and half of them believe that not all removal methods are available. The most commonly used medication among respondents was calcium hydroxide with iodoform, and the most commonly used method of removing intracanal medications was the use of a syringe and needle, followed by the use of ultrasound and other files. It is advisable to increase the theoretical and practical knowledge of dentists in order to be more confident in the application of new and lesser-known techniques for the removal of intracanal medicaments.

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