

Choice of Intracanal Medication and Obturation Techniques Amongst Jordanian Dentists

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Abstract

Objective: To gather information about root canal treatment performed by Jordanian dentists.

Methods: A questionnaire was distributed to dental practitioners randomly regarding the provision of endodontic treatment in their practices. The collected data were analyzed using the statistical package SPSS version 12, simple descriptive statistics together with Chi-square (x²) test were used.

Results: A total of 201 questionnaires were collected, three of the questionnaires were not completed because the respondents did not perform endodontic treatment, giving a completion rate of 98.5 %. The most commonly used inter-appointment medicament was Tricresol formaline (55.4 %). Gutta-percha was used by the majority of the respondents (92.4 %); the most commonly used obturation technique was cold lateral condensation (70.4%). The majority (52 %) of the respondents used Sealapex root canal sealer. While the most commonly used temporary filling material was Zinc oxide-eugenol (71.5 %). Almost all the respondents (99 %) restored the access cavity by themselves and 59.2 % of them did the restoration one week after the obturation. Majority of the respondents (75.4%) don't take a post-operative radiograph for their patients or follow them up. The main cause, which predominated among 51.1% of the respondents, was the lack of motivation of the patients. The most common reason for referral to specialist treatment was retreatment. About half of the respondents believed that their endodontic treatment should be improved.

Conclusions: Current practice lies below the international standards and quality assurance guidelines. More emphasis should be placed on undergraduate endodontic teaching, also, establishing a postgraduate education is needed.

Keywords: Endodontic treatment, Intracanal medicament, Jordan, Obturation techniques.

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Introduction

Endodontic success or failure is related to the absence or presence of signs and symptoms of apical periodontitis.¹ Root canal therapy is therefore essentially directed toward the prevention or cure of this disease.

Microorganisms and their byproducts are major etiological agents of apical periodontitis.² Total elimination of microorganisms from the root canal system is the goal of endodontic treatment. This is achieved by a thorough biomechanical cleaning of the root canal system. However, even after careful cleaning and shaping of the root canal system, residual bacteria or fungi will often remain in dentinal tubules and in the crevices, fins, and ramifications of the root canal system.^{3,4}

Therefore, the use of antibacterial intra-canal medicaments between appointments during root canal therapy has been recommended,⁵ it is also essential that root canal treatment must include sealing of the entire root canal system. In an early radiographic study of success or failure, Ingle indicated that 58% of treatment failures were due to incomplete obturation.⁶ Epidemiological studies suggest that the failure rate is distinctly higher for the teeth treated by dentists who are not endodontic specialists.^{7,8}

Unfortunately root canal retreatment is becoming common. Retreatment is not only time-consuming; but also the success rates are considerably lower than the first-attempt root canal fillings. Therefore, it must be the goal of all who undertake root canal therapy to get it right from the first time. In a survey held amongst general practitioners, it was shown that the decision to refer for endodontic specialists was influenced by certain factors, of which the most important is the presence of a perforation followed by the need for retreatment and periradicular surgery.⁹

In addition, whilst information regarding current accepted practice may be readily available to the dental undergraduate, it is clear that not everyone finds such information valuable.

Indeed, whilst new ideas may all too quickly lose favour, there is much anecdotal and some scientific evidence to suggest that, once qualified, many dentists fail to practice techniques regarded by clinical teachers as fundamental to any successful treatment.¹⁰⁻¹²

The purpose of the present study is to investigate the current opinions of dentists in Jordan regarding fundamental aspects of routine endodontic treatment, and to compare them to academic standards of treatment and established quality assurance guidelines. Furthermore, it was hoped to gain an insight into the potential problems regarding endodontic treatment procedures.

Material and Methods

A questionnaire was developed and handed with a covering letter to dental practitioners at random in different regions in Jordan, regarding the provision of endodontic treatment in their practices. A week after passing the questionnaires, they were collected anonymously each in a sealed envelope. The questionnaire was fully piloted and refined for clarity and scope before being issued.

The practitioners who did not engage in endodontics were asked to indicate this on the questionnaire and return it uncompleted. Practitioners who stated they did carry out root canal treatment on permanent teeth were asked to complete all questions.

The questionnaire consisted of 48 questions with multiple choice answers, the questionnaire can be divided into four main parts according to the covered topics.

Part one of the questionnaire requested general information regarding gender, qualification, years of professional activity, type of practice (either as a general dental practitioner or a specialist) & full time or part time, frequency of root canal treatment, and number of visits per treatment.

Part two of the questionnaire covered information related to cleaning and shaping: isolation methods, methods for establishing working length, methods and instruments used to prepare the canal and choice of irrigants and chelators.

Part three of the questionnaire gathered information about the use of intra-canal medication, choice of obturation material and technique, choice of sealers, and choice of temporary filling material.

In part four, the practitioners were asked about restoration of coronal access cavity, satisfaction with the treatment provided to the patients, follow up, and referrals.

When a list of possible answers was given, the practitioners were invited to choose the answer that best fitted their clinical practice. In most of these cases, the range of answers was well defined so that there was no need to make additional responses. Space was provided when additional comments were necessary in the event of the usual practice not being adequately covered by the choice given.

In order to make more detailed comparison of the data, the sample was divided into six groups according to the number of years of practice, as following: group1: 1-5 years, group2: 6-10 years, group3: 11-15 years , group4: 16-20 years, group5: 21-25 years, and group6: >25 years.

The author opened the sealed envelopes and the collected data were entered to a personal computer and analyzed using the statistical package SPSS version 12, simple descriptive statistics together with Chi-square (χ^2) test were used . Results with a P value <0.05 were considered significant. Unanswered questions were treated as missing values.

Results

A total of 201 questionnaires were collected, three of the questionnaires were not completed

because the respondents did not perform endodontic treatment, giving a completion rate of 98.5 %. Results related to part three and four are presented in this paper. The results are given as absolute frequencies as well as percentages in table 1-3.

Choice of Intra-canal Medicament

Table (1) gives an overview of the choice of intra-canal medication by the respondents. The most commonly used inter-appointment medicament was Tricresol formaline, used by 55.4 % of the respondents, 6.2 % of the respondents used it along with Calcium hydroxide, while Calcium hydroxide was used by 26.1% of the practitioners solely or along with other medicaments, and 6.2 % used Formaldehyde, 3.1 % used Dexamethasone, 2.1% used Iodophore and 6.7 % didn't use any inter-appointment medicament.

Choice of Obturation Technique and Temporary Filling Material

Table (2) shows the choice of obturation techniques, sealer and temporary filling material. Gutta-percha was used by the majority of the respondents (92.4 %), 5.6 % used paste only, 1 % used silver points, and 1 % of the practitioners used soft-core materials.

About the technique used for obturation of root canals, the most commonly used technique was cold lateral condensation, which was used by 70.4 % Of the respondents. Of the new techniques thermafil was the most familiar 20.9 %, whereas 59.2 % never heard about any of the new techniques. About the sealers used during obturation, the majority of the respondents (52 %) used Sealapex, followed by AH26 (16 %) and Zinc oxide- eugenol (13.7 %). About the temporary coronal-filling materials used by the respondents, the most commonly used material was Zinc oxide-eugenol (71.5 %), 17.1% of the respondents used Cavit, 3.6 % used Glass ionomer, and 4.1 used IRM.

Table 1: The distribution of respondents according to their choice of intra-canal medication.

<i>Intra-canal medicament</i>	<i>frequency</i>	<i>%</i>
<i>Calcium hydroxide</i>	34	17.4
<i>Tricresol formalin</i>	108	55.4
<i>Dexamethasone</i>	6	3.1
<i>Formaldehyde</i>	12	6.2
<i>Iodophore</i>	4	2.1
<i>None</i>	13	6.7
<i>Calcium hydroxide & monochloroaminophenol</i>	1	0.5
<i>Calcium hydroxide & tricresol formalin</i>	12	6.2
<i>Calcium hydroxide & formaldehyde</i>	1	0.5
<i>Calcium hydroxide & dexamethasone</i>	2	1
<i>Calcium hydroxide & iodophore</i>	2	1
<i>Total</i>	195	100

Table 2: The distribution of the respondents according to the obturation technique, choice of sealer and temporary filling material.

<i>Obturation technique</i>	<i>Frequency</i>	<i>%</i>	<i>Choice of sealer</i>	<i>Frequency</i>	<i>%</i>	<i>Temporary filling</i>	<i>Frequency</i>	<i>%</i>
<i>Cold lateral condensation</i>	130	70.2%	<i>AH plus</i>	1	0.6	<i>cavit</i>	33	17.1
<i>Hot lateral condensation</i>	15	8.1%	<i>AH26</i>	28	16.0	<i>GI filling</i>	7	3.6
<i>Thermafil</i>	2	1.1%	<i>Topseal</i>	5	2.9	<i>zinc oxide-eugenol</i>	138	71.5
<i>Vertical condensation</i>	13	7%	<i>Sealapex</i>	91	52.0	<i>IRM</i>	8	4.1
<i>Single cone</i>	12	6.5%	<i>Endomethas one</i>	8	4.6	<i>zinc oxide - eugenol & IRM</i>	3	1.6
<i>Thermomechanical compaction</i>	1	0.5%	<i>Zinc oxide eugenol</i>	24	13.7	<i>cavit & IRM</i>	1	.5
<i>Cold and hot lateral condensation</i>	5	2.7%	<i>N2</i>	3	1.7	<i>cavit and zinc oxide-eugenol</i>	1	.5
<i>Cold & thermafil</i>	1	0.5%	<i>Grossmans sealer</i>	1	0.6	<i>polycarboxylate cement</i>	1	.5
<i>Cold & vertical</i>	4	2.2%	<i>Iodoform</i>	1	0.6	<i>zinc oxide & GI</i>	1	.5
<i>Cold & hot & vertical</i>	2	1.1%	<i>Sealapex & ZnOE</i>	4	2.3	<i>Total</i>	193	100%
<i>Total</i>	185	100%	<i>Sealapex & AH26</i>	3	1.7			
			<i>Sealapex & AH plus</i>	1	0.6			
			<i>Sealapex & endomethas one</i>	3	1.7			
			<i>Endomethas one & ZnOE</i>	2	1.1			
			<i>total</i>	175	100			

Table 3: Summary of the reasons of not following-up the patients and the reasons for referral.

<i>Reasons</i>	<i>Frequency</i>	<i>%</i>	<i>Reason for referral</i>	<i>Frequency</i>	<i>%</i>
<i>Lack of time</i>	23	17.0	<i>Re-treatment</i>	84	54.2
<i>unmotivated pt</i>	69	51.1	<i>Broken instrument</i>	82	52.9
<i>cost of radiograph</i>	8	5.9	<i>Post removal</i>	46	29.7
<i>Unmotivated pt & lack of time</i>	6	4.4	<i>Difficult anatomy and calcified canals</i>	24	15.5
<i>unmotivated pt and cost</i>	16	11.9	<i>Hemisectioning, amputation and apicectomy</i>	15	9.7
<i>Lack of the time & cost</i>	5	3.7	<i>Limited mouth opening & lack of time</i>	1	0.6
<i>all the mentioned reasons</i>	8	5.9	<i>Limited facilities</i>	1	0.6
<i>Total</i>	135	100.0	<i>Always</i>	1	0.6
			<i>None</i>	30	19.4

Restoration of the Coronal Access Cavity

Almost all the respondents (99%), restored the access cavity by themselves. 59.2 % of the respondents did the restoration one week after the obturation, 34.6% restored it immediately after root canal treatment completion, while 3.7% performed it 1-3 days after the obturation, and 2.6% of the respondents restored the coronal access cavity 2 weeks after the obturation. For the anterior teeth, the most commonly used filling material was composite which was used by 90.7% of the respondents, glass ionomer used by 3.1% of the respondents, another 3.1% of the respondents used a combination of composite and glass ionomer, 2.1% used either composite or compomer, and 1% used amalgam. For posterior teeth, the most commonly used filling material, was amalgam used by 72.7% of the respondents, followed by composite that was used by 10.2% of the respondents, 5.9% used either amalgam or composite, 4.3% used glass ionomer, 2.8% used either amalgam or glass ionomer, 1.6% of the respondents used compomer, and 1.1% of the respondents used glass ionomer either with composite or with compomer.

Postoperative Radiograph, Follow-up and Referral

Table (3) summarizes the reasons for not following-up the patients and the reasons behind

referral for specialist endodontic treatment.

Majority of the respondents (75.4%) didn't take a postoperative radiograph or follow-up their patients, less than quarter (24.6%) of the respondents followed their patients up radiographically on regular basis for a period that ranged from 4 months to 4 years. Of those, 42.6% followed their patients up for 6 months, 31.9% for one year, while 23.4% of the respondents followed their patients up for 4 months, and 2.1% of the respondents followed their patients up to approximately 4 years. Reasons for which respondents didn't follow their patients were variable. The main cause which predominated among 51.1% of the respondents was lack of motivation on the side of the patients.

Respondents were asked for the cases in which they refer patients for an endodontist, in the questionnaire there were 3 choices: retreatment, broken instrument, and post removal. In addition, respondents were asked to specify other reasons in which they would refer their patients to an endodontist, among these were: difficult anatomy and calcified canals, hemisectioning, amputation, apicectomy, limited mouth opening, lack of time, and limited facilities.

Satisfaction with Treatment

Forty-eight percent of the respondents were satisfied with their endodontic treatment, while 46.2 % thought that their endodontic treatment should be improved, and 5.8 % of the respondents were dissatisfied with their endodontic treatment.

Discussion

Intra-canal medicaments are intended to reduce bacteria, control pain and reduce inflammation. Tricresol formaline was the most commonly used inter-appointment medicament (61.6 % of the respondents), similar results were demonstrated by the study done by Al-Omari.¹³ This medicament and similar formaldehyde preparations have the potential to be widely distributed in the body,¹⁴ and it may have mutagenic and carcinogenic potential.¹⁵ Considering the outright toxic and tissue-destructive effects, no clinical reason exists to use such preparation as an antimicrobial agent in endodontic treatment. Currently, biocompatible dressings such as calcium hydroxide pastes are favoured.⁵ In this study, calcium hydroxide was used by 26.6%, this figure was much lower than what was found in a survey among a Flemish dentists (69.7 %) ¹⁶ and higher than what was found among Sudanese dentists (5.8%).¹⁷ The practitioners must be encouraged to use it in place of phenolic and formaldehyde derivatives.

Canal obturation was generally undertaken with gutta-percha and sealer with more than three-quarter of the practitioners using cold lateral condensation. The cold lateral condensation technique is widely practiced throughout the world,¹⁸ it is a relatively simple, versatile technique that does not require expensive equipment, and can be accomplished with any of the acceptable sealers. Single cone technique can not reliably fill all the root canal in three dimensions and is not recommended. Similarly, paste only root canal filling is difficult to control with obvious risk of under or over filling of the canal.

According to European Society of Endodontology (ESE) (1994) guidelines,¹⁹ sealers should be biocompatible. Sealapex was the most commonly used sealer in this study with the percentage of 51.7 % of the respondents using it. Pitt Ford et al. found that in England most private practitioners used non-medicated Zinc oxide-eugenol root canal sealers,¹⁰ whereas the majority of the National Health Services practitioners used one particular sealer, Endomethasone. In a survey amongst Flemish general dental practitioners, AH26 was the most popular root canal sealer.²⁰ These differences among countries can be attributed to the variability in teaching methods in dental schools. Sealers containing Paraformaldehyde such as N2, Endomethasone and SPAD are contraindicated in endodontic treatment. These sealers are not approved by the U.S. food and Drug administration²¹ and are unacceptable under any circumstances in clinical treatment.

Temporary restorative materials used in endodontics must provide a high quality seal of access preparation to prevent coronal leakage.²² Studies have shown that Cavit adequately sealed access cavities of endodontically treated teeth.²³ In this study, only a minority used Cavit (17.1 %), whilst it was the product most favoured by Belgian practitioners.^{16, 20} The majority of respondents in this study used zinc oxide and eugenol cement between visits (71.5 %), this may be due to its availability at a lower cost.

The completion of the root canal filling does not mean that treatment has been completed. Considerable evidence now exists to support the necessity to restore the tooth with a good quality coronal restoration as soon as practical.²⁴ In this study, almost all the respondents (99 %), restored the access cavity by themselves. About third of the respondents choose to restore the access cavity immediately after root canal treatment, whilst about 60 % preferred to restore it one week after the completion of treatment. This is consistent with the Sudanese dentists, where 70 % of the practitioners preferred waiting for 1-2 weeks before restoration to check the quality of root canal filling.¹⁷

A postoperative radiograph is important as a medico legal record. It is also a good practice because it provides baseline information for follow-up and assessment of the outcome of treatment. In the present study, less than quarter of the respondents took a postoperative radiograph, this is in contrast to the results found in a survey within UK, where the majority of practitioners took a postoperative radiograph.²⁵ This may be attributed to several factors like cost of radiographs coupled with the low fee provided for root canal treatment, lack of time, and unmotivated patients. Those factors also attributed to the attitude of not following up the patients as recorded by the respondents. In addition, there might be a problem in record keeping and recall system in Jordan as in other developing countries.

Several studies have investigated the reasons for referring a patient for expert endodontic therapy.²⁶⁻²⁸ This study shows that the most common reason for referral was re-treatment (54.2 %) followed by broken instrument (52.9 %) and post removal (29.7 %). A survey in England showed that the most common reason for referral to practices limited to endodontics was for retreatment of previous root fillings (20 %), followed by the inability to control pain (14 %), and inability to diagnose the cause of the endodontic problem (13 %).²⁶

A similar study in Western Australia found the diagnosis and management of pain as the major reason for referral (24 % of patients), followed by calcified canals (18 %), endodontic retreatment (15 %), trauma (13 %), surgery (7 %), and perforations (6 %).²⁷

Conclusions

This paper described the endodontic treatment which is currently practiced by dental practitioners in Jordan. A large proportion of the practitioners used techniques and materials which are not currently favoured by expert opinion, especially in the frequent use of formaldehyde containing disinfectants.

Most of the practitioners used conventional obturation techniques. The lack of endodontic specialists, the absence of both postgraduate endodontic programs and continuing educational courses, in addition to economic restrictions all may explain the reasons why dentists in Jordan are not performing their endodontic treatment in accordance with the acceptable international standards. The practices of endodontic treatment can be improved by placing more emphasis on undergraduate endodontic teaching and establishing a postgraduate education.

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اختيار المواد المستخدمة داخل أقبية الجذور وطرق حشو القنوات بين أطباء الأسنان في الأردن

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الملخص:

الهدف:

جمع المعلومات حول ممارسات أطباء الأسنان داخل الأردن فيما يتعلق بمعالجة أقبية جذور الأسنان.

طريقة البحث:

توزيع استبانة تحتوي على أسئلة موضوعية حول المعالجة اللبية، ومن ثم إدخال المعلومات وتحليلها بواسطة برنامج (SPSS).

النتائج:

تم جمع 201 استبانة، ثلاث منها لم تكتمل لعدم ممارسة المعالجة اللبية، وأظهرت النتائج أن 55.4% من أطباء الأسنان يستعملون مادة تراكريزول فورمالين كمادة معقمة للقنوات، وأن أقماع الرزن (الكوتا) هي المادة المستخدمة لحشو القنوات من قبل الأغلبية (92.4%)، وأن طريقة الحشو عن طريق التكتيف الجانبي هي الأكثر استعمالاً (70.4%)، كما أن مادة سيل أبكس هي المادة الأكثر استخداماً (52%) كمادة سادة للأقبية، وأن مادة الحشوة المؤقتة الشائع استعمالها بين الجلسات هي مادة زنك أوكسيد أوجينول (71.5%). كما تبين أن معظم الأطباء يقومون بعمل الحشوة الدائمة بأنفسهم (99%)، وأن 59.2% منهم يقومون بذلك بعد مرور أسبوع على حشو القنوات، كما أظهرت النتائج أن معظم المشاركين (75.4%) لا يقومون بأخذ صورة شعاعية بعد انتهاء المعالجة ولا يقومون بمتابعة المرضى، وهم يعزرون ذلك إلى عدم وجود حافظ لدى المرضى، وأن السبب الرئيسي لتحويل الحالات للمعالجة من قبل الأخصائي هو لإعادة المعالجة بعد فشلها، وأن حوالي نصف المشاركين يعتقدون بأن طرق ممارستهم يجب أن تتحسن.

الاستنتاجات:

الممارسة الحالية هي دون المستويات العالمية وتعليمات ضبط الجودة، خاصة فيما يتعلق بالإكثار من استعمال مادة تراكريزول فورمالين وعدم أخذ صورة شعاعية بعد انتهاء المعالجة وعدم متابعة المرضى. كما أنهم يستخدمون طرقاً تقليدية في حشو القنوات. إن ممارسات أطباء الأسنان يمكن تحسينها من خلال إنشاء برامج للدراسات العليا والتعليم الطبي المستمر.

الكلمات الدالة:

معالجة أقبية جذور الأسنان، المعالجة اللبية، طرق حشو القنوات، الأردن.