GENERAL DENTAL PRACTITIONERS' KNOWLEDGE AND PRACTICE ON ROOT CANAL TREATMENT

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Original Article

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ABSTRACT

Background: Majority of root canal treatment in Malaysia was provided by general dental practitioner. The purpose of this study was to evaluate the knowledge and practice (canal's preparation, use of materials) by them.

Methods: A questionnaire was structured and distributed to 120 registered general dental practitioners in selected areas in Perak, Johor and Klang Valley regarding the provision of root canal therapy in their practices. The questionnaires were hand delivered and collected after 1 to 2 weeks.

Results: Reply rate was 95% (n=114). The result demonstrated that 62% respondents indicated that they performed the root canal therapy (RCT) themselves. Out of these only 26% included molars in the treatment. Three quarters of them (77%) used step-back technique and 54% used stainless steel instruments to prepare the canals. The majority of the respondents (69%) used calcium hydroxide as intracanal medicaments. Only 30% used rubber dam for isolation whereas the rest used cotton rolls. The numbers of routine radiographs taken were two for anterior teeth and three for molar. Half of the respondents indicated that they usually completed the RCT for the anterior tooth within two visits whereas three visits were needed for the molar tooth. The results were analyzed descriptively.

Conclusions: This study indicates that most of the general dental practitioners' do not comply with quality standards guidelines such as use of rubber dam as isolation. Cotton roll was the most popular isolation method. In spite of this, most of the respondents tend to update their knowledge and practices with current techniques and materials.

INTRODUCTION

Root canal therapy is gaining its popularity in this modern era. Thus many aspects of root canal treatment such as instruments, medicaments and materials used have been developed and modified. In accordance, the general dental practitioners' knowledge and practice varies greatly. Many studies regarding the cleaning and shaping techniques quoted that commonly applied techniques were step-back, crown-down and double-flare technique (1,2). These techniques were chosen as they removed the bulk of micro-organisms which harbour more at the coronal area. However, there are still doubts regarding the effectiveness of using intracanal medicament (3) although it was proved to eliminate micro-organisms from the root canal (4). Calcium hydroxide (5) and Ledermix (6) had been advocated as the most widely used medicament.

As for the endodontic files, conventionally they were made from stainless steel however since the end of 1980's, files made of nickel titanium are available which are claimed to lead to a better prognosis in root canal therapy (7,8,9). Nickel titanium rotary instruments are gaining in popularity nowadays (10). There are two aspects of procedures in roor canal therapy which need to be considered i.e mechanical (techniques and instruments used in removal of infected dentine) and microbiological aspect. Asepsis is very important during treatment procedure. The easiest and common method of achieving this condition is by using rubber dam. Its usage has been emphasized since the 1970's (11). Rubber dam is also used to protect the patients from irritants, irrigants and inhalation of fine instruments (12). Importantly, it acts as a physical barrier in reducing the contamination from the oral environment (13). Nevertheless other method for moisture control has been implicated by the general practitioners such as cotton rolls (2).

During World War II, single visit root canal therapy was popular due to time limitation. However as there is better understanding of the root canal infection and the importance of applying intracanal medicament, most dentists would prefer to spread the treatment session over several appointments (14).

Radiographs are usually used as an important diagnostic tool for working length measurement during root canal treatment. With the availability of the electronic apex locators, its use has been well accepted as it was proven to be equally accurate if not more (15).

Endodontic treatments in Malaysia are usually provided by the general dental practitioners due to limitation of endodontist available in this country. The purpose of this study was to investigate the knowledge and practices employed by the general dental practitioners in the root canal treatment in Klang Valley, Perak and Johor.

MATERIALS AND METHODS

The questionnaire

This study was conducted using a structured questionnaire. The structured questionnaire consisted of four main parts. Part 1 consisted of five questions regarding general dental practitioner's age, nationality, year of graduation, school of graduation and qualification. Part 2 comprised of five general questions including on who decides the root canal therapy, did the general dental practitioner refer his/her cases to endodontists and in what circumstances they will do so, and what are the criteria on their decision to treat the cases. Part 3 consisted of nine questions involving the general dental practitioner's knowledge on techniques and instruments used for canal cleaning and shaping and the usage of intracanal medicaments. The last part of this questionnaire consisted questions regarding their practices of the isolation method, number of appointment for each cases and usage of radiographs during the treatment.

The subjects and survey

One hundred and twenty copies of questionnaires were then distributed to general dental practitioners in Klang Valley, Perak and Johor equally. The questionnaires were hand delivered. The subjects were all the general dental practitioners who had registered with the Dental Council of Malaysia. Completed questionnaires were then collected after one to two weeks. All the subjects were equally cooperative. The responses were later coded and the data were entered and verified.

Pre-test survey

A pre-test of the questionnaire was conducted prior to the actual survey to test for ambiguity, content validity and reliability by doing a pilot study among dentists attached to the Faculty of Dentistry, University of Malaya. Ten subjects had participated in this pre-test. All ten subjects understood all the questions.

RESULTS

Of 120 questionnaires distributed, 114 were returned (95%). Fourteen returns were discarded as they did not answer some or all the questions stated. Only 100 questionnaires were accepted (n =100). They were divided into 4 age groups as presented in Table 1. Malaysians made up 93% (n = 93) of the total subjects while the minorities 7% (n = 7) were of other nationalities such as Indians, Indonesians and Burmese.

Table 1. Demographic data of the GDPs

DATA		PERCENTAGE %
Age group	26–35	34
	36–44	47
	46–55	9
	56–65	10
Nationality	Malaysian	93
	Others	7

More than three quarters of the general dental practitioners (GDPs) decided the root canal treatment for their patients, however almost all the patients (n = 90) were involved in the final decision. Sixty-two GDPs (62%) stated that they will do the root canal therapy for their patients on case selection basis; whereas 38 GDPs (38%) stated that they will do the treatment themselves, however they would refer the patients to the endodontists under certain conditions. Majority of the referral were because of technical difficulties followed by primary treatment failure and re-treatment cases. Overall, 74% (n = 74) GDPs tend to limit their root canal therapy cases to anteriors and premolars. (Table 2)

Majority of the GDPs (n = 77) opted to use step back technique when they prepared the canals while 20 of them preferred to use crown down technique. Three dentists indicated double flare as their choice of canal preparation technique. Their choice of techniques were mainly based on the number of years of experience they have been practicing (n = 42) and what had been taught during their undergraduate training (n=41). Nevertheless 17 GDPs stated that the main reason for employing the technique was the simplicity that they experience with it. This is in correspondence with the choice of instruments used in the canal preparation. Fifty-four of the GDPs mentioned that they use stainless steel instruments followed by 31 GDPs stated they prefer to use nickel titanium hand. Only 15 dentists stated they use nickel titanium rotary system. Their preferences on the instruments were mainly influenced by period of experience they had with the instruments (39%), method taught at the dental

Table 2. General data of cases performed by GDPs

DATA		PERCENTAGE %
Dentist decide for RCT	Yes	79
	No	21
Patient involvement in treatmentdecision making	Yes	90
	No	10
Who did the RCT?	Dentist	62
	Dentist & Endodontist	38
When the case was referred	Difficult case	42
	Retreatment	24
	Failure	28
	Others	6
Limitation of root canal treatment by dentist	Anteriors & Premolars	74
	All	26

RCT = root canal therapy

school (25%) and also because of the ease of using the instrument which also gave an acceptable result (23%). On the other hand, 13% of the respondents agreed the reason they choose the instrument because that is the only type of instrument available in their practice.

With increased knowledged about root canal infection, almost all the GDPs indicated that they utilized more than two visits for the root canal therapy of anterior and molar tooth. (Table 3). Some cases need more than usual number of appointments because of persistent infection (56%), difficult cases (32%) and patient factor (12%). Therefore 73% of them reported that they would use intracanal medicament between each visit while 27% felt it is unnecessary. Calcium hydroxide (69%) has become the most popular type of medicament used followed by Ledermix (27%) and others (4%) such as eugenol, antibiotics and polyantibiotics. These were mainly influenced by the price of the material and due to easy application and removal.

Majority of the participants (75%) mentioned that they would isolate the tooth during the treatment. 30% mentioned that they use rubber dam whereas the majority (70%) tend to use only cotton rolls as isolation. Figure 1 shows the factors that influence the use of cotton rolls by the GDPs.

Approximately 41-49% of GDPs took 2-3 radiographs for anterior and molar tooth. Only small percentage (4%) of GDPs took 4 radiographs per tooth. Nevertheless, one person mentioned that no radiographs were taken during the whole

Table 3. Number of visits taken for RCT

No.	Anterior & Premolar (%)	Molar (%)
2	78.0	8.0
3	21.0	66.0
4	1.0	20.0
5	–	6.0

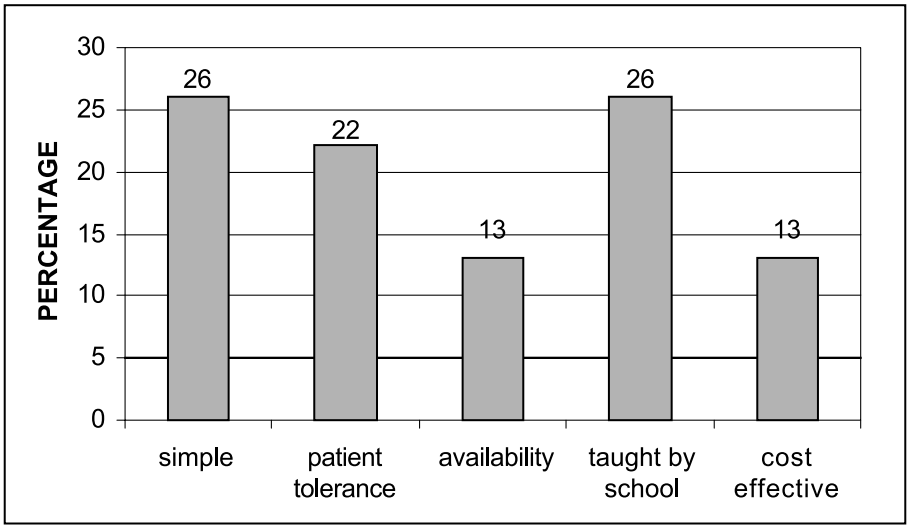

Figure 1: Factors influencing usage of cotton rolls by GDPs.

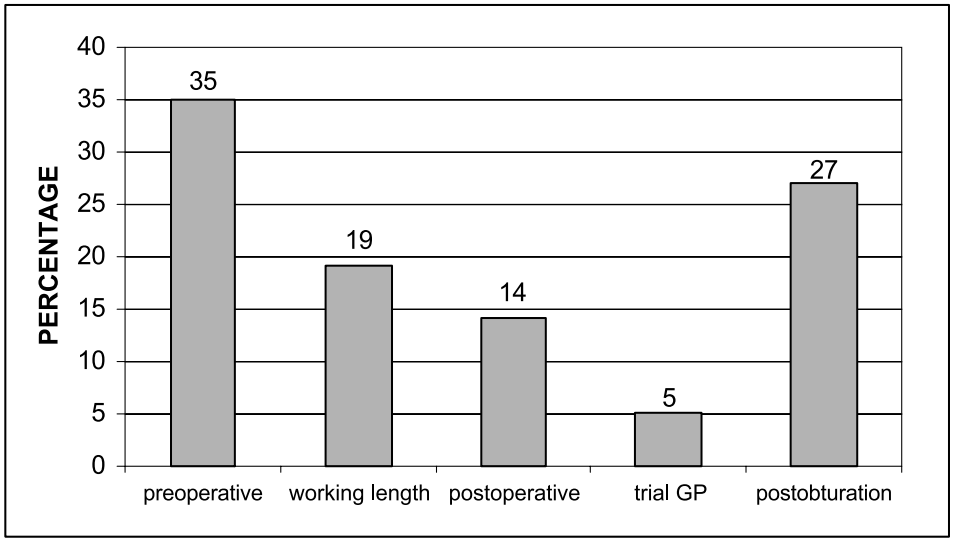

Figure 2: The percentage of GDPs who took radiographs at the various stages of RCT.

treatment. Figure 2 shows at what stages of treatment radiographs were taken. In addition, working length was mainly determined with radiographs (65%), whereas the rest used files and electronic apex locator (35%).

DISCUSSION

The reasonably high responses rate (95%) ensured that this study was representative of the general dental practitioners' (GDPs) knowledge and practices on the root canal treatment (RCT) in Klang Valley, Perak and Johor. Most of the GDPs involved in this survey were middle age group; 36-45 years old with clinical experience of about 15 years. Therefore the knowledge and the clinical skills regarding the RCT were those that were based from the undergraduate knowledge together with experiences.

Sixty-seven percent of the participants were graduates from overseas such as Singapore, India and United Kingdom, whereas the rest were graduates from Malaysia's oldest university, University of Malaya. Some of the graduates from India mentioned that the knowledge and skills were solely based on their theoretical aspects only as the school did not incorporate the practical aspect of root canal therapy in the curriculum. Whereas generally, schools in United Kingdom did teach both aspects to their undergraduate students as patients in that country are more aware of the importance of tooth preservation. This is also the same for GDPs who had their undergraduate's training in Singapore as their curriculum is more or less similar to University of Malaya.

High number of GDPs (65.8%) mentioned that they decide the root canal treatment for their patients. This may due to the lack of awareness of the available alternative treatment and the culture itself where the dentist will know what is the best treatment for the tooth. In spite of these, large numbers of patients still play a vital role on the final decision. This is because the cost RCT is considered expensive compared to the other treatment options. Majority of the GDPs tend to perform RCT themselves to their patients. The main reasons for referrals to the endodontists was due to, difficult cases especially molars where high clinical skills and adequate facilities are required such as microscope, technical difficulties such as could not locate canals, failure of previous treatment done by the dentist themself or in retreatment cases as it is time consuming to remove existing obturation materials. This is in accordance to why majority of the GDPs limited their tooth selection for RCT only for anteriors and premolars.

Most of the respondents (age 36-45 years old) mentioned that step back technique has been their choice of technique regardless from which universities they graduated whilst the younger age group local graduates tend to use crown down and double-flared techniques. This may be associated with the increased availability of nickel titanium type of instruments in the market. Although step back technique is widely used (16), it has some disadvantages. It may result in over-preparation forming an elliptically shaped defect at the end-point preparation (17) which could make it difficult to obturate completely the root canals and also more debris were pushed through the apical foramen (18,19). Extrusion of debris has been associated with post-op flare up (20). Preparation techniques involving initial coronal preparation have proved to result in a better shape and enhanced penetration of irrigant solution (21). This is in correspondance with the choice of instruments they used. More than half of the respondents preferred to use stainless steel

instruments especially the older group whereas some respondents from younger age group preferred to use nickel titanium instrument, either hand or rotary. Nickel titanium was first introduced in 1988 to overcome the limitations of stainless steel hand instruments and facilitate the preparation of curved root canals (22). Today, it is accepted that it had revolutionized endodontic technique with consistent canal shapes, good centering, less debris extrusion and faster preparation time (23). The survey also showed that nickel titanium instrument, both hand and rotary, were mainly used by practitioners in Kuala Lumpur. This may due to the frequent exposure and availability of hands-on courses on nickel titanium instruments.

Most of the practitioners practice multiple visits RCT due to a better understanding of the microbiological aspect of root canal infection (24). It also allowed the use of intracanal medicament, which brought about better prognosis and healing (13). Papworth (1998) found through his study that success rate for the necrotic teeth treated with intracanal medicaments were higher (100%) compared with necrotic teeth treated without intracanal medicament (60%) (25). However, a study from US (25) demonstrated a clear inclination to single visit endodontics, especially in cases without apical periodontitis. The main choice of medicament was calcium hydroxide as it is inexpensive and has multiple biological functions (27). The majority of GDPs who used this type of medicament were local graduates while a steroid base medicament was used mainly by graduates from India. Steroid (Ledermix / Endopaste) was used as anti-inflammatory agents in RCT to reduce the pain (28). This finding was in agreement with a study conducted in England among GDPs where most of them used calcium hydroxide (29).

Although the application of rubber dam is always recommended as a standard during root canal treatment procedures' to provide isolation, protection and improve visual access, only thirty dentists reported using rubber dam. However, 60% of dentists in UK (29) reported using rubber dam routinely in RCT. The reasons for not using rubber dam could be extra cost, additional time, lack of adequate skills or training or absence of patient's acceptability. The most popular method of isolation reported was using cotton rolls. This is in agreement with a study done in Sudan, where most of the GDPs used cotton rolls to isolate the tooth during RCT procedures (2). A study done by Elderton (1971) proved that the success rate increased significantly with the use of rubber dam (11). Based on the factors associated with success in RCT, The European Society of Endodontology (1994) recommended the use of rubber dam for all the procedures (31).

In the current survey, most GDPs reported that they took radiographs during the RCT. In an isolated case one person mentioned that no radiograph was taken at any stage of the procedure. Majority of them took it as a pre-operative radiograph to act as an aid in the diagnosis, followed by post-obturation to assess the quality of it. Only 19 dentists mentioned that they took radiograph for working length determination. Other methods such as the use of apex locators and hand files have been reported in this procedure. Foud and Reid (2000) mentioned that electronic apex locators are good supplement to working length radiographs and may improve length determination in a root canal; however it is not a substitute of radiographs (30). Inaccuracy in working length may contribute to insufficient root canal cleaning and prevents healing. As a result the RCT becomes a failure (32).

CONCLUSIONS

This paper has described the root canal treatment which is currently practiced by general dental practitioners in three cities in Malaysia. It demonstrated that dentists performed procedures which often deviated from standard root canal treatment quality guidelines such as the lack of rubber dam usage. In addition, majority of them rely on radiograph solely for working length determination. In spite of this, most of the dentists tend to keep up with recently introduced techniques and materials.

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