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A survey of root canal treatment of molar teeth by general dental practitioners in private practice in Saudi Arabia

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Abstract The purpose of this study was to evaluate the practice and depth of knowledge of root canal treatment by general dental practitioners working in private dental centers in different cities within the Kingdom of Saudi Arabia. A questionnaire was distributed to 400 general dental practitioners. Completed questionnaires were analyzed in term of simple summary statistics. A total of 252 (63%) practitioners responded. The majority of the respondents were Syrians (59%) and Egyptians (32%). Ninety-one per cent of the respondents indicated that they performed root canal treatment. Amongst those who carried out root canal treatment, only seven practitioners (3%) used rubber dam for isolation. More than half of the respondents (55%) used saline to irrigate canals during treatment. Forty-six per cent of practitioners used formocresol as an inter appointment medicament. The standardized and step-back preparation techniques were the method of choice for the majority of the respondents (91%). Ninety-seven per cent of the practitioners used stainless steel hand instruments to prepare root canals and the majority (92%) used gutta-percha for obturation. Seventy-four per cent of the respondent used cold lateral condensation. The average number of radiographs routinely taken for root canal treatment was four. Ninety-three per cent indicated that they usually completed a root canal treatment of molar teeth in three or more visits. Eighty-eight per cent of the practitioners preferred waiting for 1 or 2 weeks to restore the teeth

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permanently. Results of this study confirm that many general dental practitioners are not following quality guidelines for endodontic treatment.

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1. Introduction

Endodontic treatment is an essential part of comprehensive quality dental care. Controlled studies have shown that root canal treatment brings high success rates of more than 90% (Sjogren et al., 1990; Eriksen, 1991). However, most of these studies reported data from endodontic specialists and university clinics. These data may mislead in estimating the success rate of endodontic treatment in general practice that approximates to 65–75% (Eriksen, 1991). This discrepancy in success rate may reflect a difference in the technical quality of the endodontic treatment performed. However, very few data are available about the general dental practitioners approach to endodontic therapy (Gatewood et al., 1990; Jenkins et al., 2001). These studies mention that a majority of general dental practitioners do not confirm to academic standards of treatment and established quality guidelines set by the American Association of Endodontics or the European Society of Endodontology (American Association of Endodontics, 1994; European Society of Endodontology, 1994).

Although, modern dentistry was first introduced into the country of Saudi Arabia almost 50 years ago, it did not develop substantially until 1975, where the founding of the dental school in Riyadh, the capital city, took place (KSU Press, 1977). Highly specialized endodontic practices usually take place at the government health institutes and their affiliated dental schools. Such government institutes, usually adopt and governs well established endodontic training programs under the supervision of well trained endodontists. Due to lack number of endodontist, most of the endodontic therapy in the Kingdom is done in private dental practices by general dental practitioners.

The rationale of this study was to evaluate the practice and depth of knowledge of root canal treatment of molar teeth by general dental practitioners in different cities of the Kingdom of Saudi Arabia working in private dental centers.

2. Materials and methods

A questionnaire was developed and were distributed between May 12 and June 10, 2008 to 400 general dental practitioners working in private dental centers selected at random in five different major cities; in different provinces of the Kingdom of Saudi Arabia namely Riyadh, Jeddah, Mecca, Tabouk and Dammam regarding the provision of endodontic treatment in their practices. The questionnaire was made up of 21 questions with multiple-choice answers with an explanatory covering letter. The questionnaire was fully piloted and refined for clarity and scope before being distributed.

Completed questionnaires were collected and analyzed in terms of simple summary statistics. Blank or multiple answers were all treated as missing values, only single unequivocal replies were included in calculating frequencies and percentages.

3. Results

Completed questionnaires were obtained from two hundred fifty-two (252) general dental practitioners (63%). The majority of the respondents were Syrian (59%), the remaining were Egyptians (32%), Saudis (3%), Sudanese (2%), Filipinos (2%) and other countries (2%) of whom 229 (91%) performed root canal treatment.

3.1. Molar endodontics

Eighty-nine per cent of practitioners who performed root canal treatment included permanent molar teeth, whilst 6% referred patients. The reason was due to lack of enough skill, facilities and materials to perform such treatment. The remaining 5% preferred extraction.

3.2. Number of visits to complete root canal treatment of molar teeth

Sixty per cent indicated that they usually completed root canal treatment of molar teeth in more than three visits. One-third of the respondents (33%) indicated that they used three visits only. A minority of practitioners completed root canal treatment in one visit (2%).

Isolation methods. Ninety-seven per cent indicated that they isolated teeth with cotton wool rolls, only seven practitioners used rubber dam (3%).

3.3. Technique for root canal preparation

Almost half (49%) of the practitioners prepared the canal with standardized technique. However, 42% used the step back technique, and the remaining 9% used crown-down technique.

3.4. Types of instruments used for root canal preparation

A majority (97%) of practitioners prepared canals using stainless steel hand instruments. Only 3% used nickel titanium rotary instruments.

3.5. Canal irrigation solutions

Over 55% of respondents irrigated root canals with normal saline, the remainder used sodium hypochlorite (26%) or hydrogen peroxide (19%).

3.6. Methods of working length determination

The majority of the respondents (93%) used radiographs and tactile sensation with some kind of instrument in situ to determine working length. Only 7% used electronic apex locator in their practice, though this was sometimes used in conjunction with a radiograph.

3.7. Intracanal medicaments

Formocresol was the most common medicament used (46%). The remaining practitioners used different formulations including camphorated monochlorophenol (CMCP) (23%), calcium hydroxide (19%), iodoform (11%) and 1% indicated that they used no intracanal medication between appointments.

3.8. Obturation technique

The majority (92%) of the practitioners used gutta-percha points for obturation. Six per cent used paste filling materials and 2% used silver points. Seventy-four per cent used cold lateral condensation of gutta-percha, whilst 26% used a single-cone technique. None of the respondent used vertical condensation technique, Resilon or Thermafil in their practice.

3.9. Type of sealer

There was a wide variety of root canal sealers being used but tubliseal (36%), endomethasone (34%) and AH26 (30%) were the clear favorites.

Materials to seal the access cavity between visits. More than half (53%) of the practitioners used temporary filling materials including Cavit. IRM was used by 37% while the remaining used TERM between visits.

3.10. Number of radiographs in routine root canal treatment

Approximately 55% of practitioners indicated that they took four radiographs during root canal treatment, whilst 34% preferred to take three radiographs, 10% took either one or two radiographs and 1% took no radiographs during the root canal treatment. Only 3% used digital radiography.

3.11. Monitoring completed root canal treatment radiographically

Seventy-nine per cent of practitioners indicated that they do not recall their patient giving different reasons such as expense and further appointments.

3.12. Final restoration

All practitioners indicated that they completed the final restoration themselves. Most practitioners (88%) preferred waiting for 1 or 2 weeks after root canal filling to be asymptomatic before placing the final restoration.

4. Discussion

The responses rate (63%) ensured that this study was representative of the approach to endodontics by the general dental practitioners in the Kingdom of Saudi Arabia. The results obtained from this questionnaire can therefore be considered as a reliable method of evaluating the endodontic treatment procedures used in different cities (Bulman and Osborn, 1989).

The percentage of general dental practitioners who performed endodontic treatment is relatively high compared to other developing countries, e.g. 67% in Kenya (Maina and Ng'ang'a, 1991) and compared to some regions with better facilities such as 89% in Illinois, USA (Wasilkolf and Maurice,

1976). The results of this study show that most general dental practitioners in Saudi Arabia undertook molar root canal treatment (89%).

In USA, a definite trend towards single-appointment treatment is evident. Gatewood et al. (1990) in a survey of 568 actively practicing diplomats of the American Board of Endodontics reported that 34.7% would complete cases in one visit for teeth with a normal periapex and only 16.2% would do so if apical periodontitis were present. Whitten et al. (1996) found that endodontists preferred single-visit therapy, whereas general dental practitioners preferred multiple visits. This survey shows that general dental practitioners in Saudi Arabia do not practice single-visit root canal treatment, probably because it is not taught at different dental schools or it could be due to the lack of modern endodontic equipments like electronic measurement devices or rotary instruments. This technique could be of great value by reducing the number of appointments, cost and the contamination risks (Landers and Calhoun, 1980; Oliet, 1983).

Rubber dam isolation is considered the standard of care in endodontics. A survey amongst American general dental practitioners indicated that 59% always used rubber dam (Whitten et al., 1996). Marshall and Page (1990) reported (60%) not to use rubber dam for any procedure in the UK, whereas only 5% of the dentists working principally in the National Health Service (NHS) used rubber dam for endodontic treatment. General dental practitioners may equate rubber dam use with time loss, patient pain, extra cost, frustration and irritation (Christensen, 1994). The majority of general dental practitioners in this study used only cotton wool rolls for isolation; it is unfortunate that the percentage of those who used rubber dam was so low (3%). This can directly affect the standard of root canal treatment and decreases the success rate (Christensen, 1994).

Sodium hypochlorite has proven to be a most effective antimicrobial agent (Bystrom and Sundqvist, 1983). In a study of Whitten et al. (1996) 79% of the general dental practitioners used sodium hypochlorite as irrigant, whilst in the survey of Whitworth et al. (2000) in UK general dental practice; local anesthetic solution was the most commonly used endodontic irrigant. Possibly, the limited use of rubber dam was a factor in the choice of intra-canal irrigant. Saline is a poor substitute for sodium hypochlorite, as it has no antimicrobial action or tissue-digesting properties (Wennberg, 1980).

A high percentage (99%) of the general dental practitioners used intracanal medicaments. The routine intracanal medication was formocresol. Despite the superior diffusability of this group of medicaments, it may have adverse effects and has the potential to be widely distributed in the body (Block et al., 1983). In addition, formaldehyde type medicaments have mutagenic and carcinogenic potential (Spangberg, 1994). Although calcium hydroxide has reached a unique position as a dressing in endodontics, it is not commonly used among the non-Saudi general dental practitioners. The general dental practitioners must be encouraged to use it in place of formocresol since it has multiple biological functions (Abbott, 1990; Foreman and Barnes, 1990).

The traditional stainless steel hand instruments were the most commonly used. Minority of the general dental practitioners (3%) used nickel-titanium files, indicating that new developments were slowly being incorporated into daily practice.

Forty-nine per cent of the general dental practitioners used the standardized method of canal preparation (Ingle, 1961).

However this has some disadvantages; it may result in over-preparation forming an elliptically shaped defect at the end-point of preparation (Weine et al., 1975), which could make it difficult to obturate completely the root canal system. Preparation techniques involving initial coronal preparation have proved to result in a better shape and enhanced penetration of irrigant solution (Fava, 1983).

Over the years, numerous methods have been advocated to obturate the root canal system, each with their own claims of ease, efficiency or superiority. Most of the general dental practitioners (65%) used cold lateral condensation as a filling technique. In the survey of Qualtrough et al. (1999) cold lateral condensation remained the most popular undergraduate obturation technique. Single-cone/point techniques as well as ridged silver points can not reliably fill all the root canal space in three dimensions and are not recommended, although these techniques was taught at one time. Similarly, paste root fillings are difficult to control with the obvious risk of under or over filling of the canal. This is particularly problematic with paraformaldehyde-based sealers, as they can cause extensive damage to the periradicular tissues (Erison et al., 1993).

Temporary restorative materials used in endodontics must provide a high quality seal of the access preparation to prevent microbial contamination of the root canal. Fifty-three per cent of the respondents use Cavit as temporary filling material, which under experimental conditions provided superior resistance to bacterial leakage (Beach et al., 1996).

The number of radiographs exposed during treatment varied from two to four, with more than half of the practitioners taking four radiographs. The majority (93%) of the general dental practitioners used radiographs and tactile sensation to determine the working length. The use of the tactile sensation to determine the working length cannot be recommended, because the instruments may bind against the canal walls at any position along their length (Dummer et al., 1984). Modern electronic apex locators can be accurate (De Moor et al., 1999), but only 7% of the general dental practitioners in this study used electronic apex locator in their practice. The reliance on the preoperative radiograph and tactile sensation to determine the working length has no place in modern endodontics, and general dental practitioners should be aware of the serious complications that may arise from inappropriate methods of determining working length, such as perforations, incomplete instrumentation, underfilling and overfilling (Grieve and McAndrew, 1993).

A number of studies have revealed that much of the endodontic provision falls below international standards of care (Pitt Ford et al., 1983; Saunders et al., 1997). In a study of De Moor et al. (2000), in a Belgian subpopulation, 56.7% of the root-filled teeth were deemed inadequate.

The limited number of specialized endodontists as well as the low inclination of general dental practitioners to refer patients could be the reasons behind the endodontic treatment falls below the international standards of care in Saudi Arabia.

5. Conclusions

Owing to the limited number of endodontic specialist in private practice of Saudi Arabia, the results of this survey shows the importance of establishing higher level of credentialing examination and/or continuing dental education for general

dental practitioners to update their knowledge in the field of endodontics.

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