

Approaches toward the Management of Endodontic Emergencies by Dentists in Al-Madinah Al-Munawwarah, Saudi Arabia

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Received: September 14, 2021; **Published:** September 29, 2021

Abstract

Introduction: The management of endodontic emergencies is an essential and challenging part of the emergency dental treatment protocol and is greatly dependent on the expertise of the endodontist. This study aimed to assess and compare the level of knowledge between general dentists and dental interns with regard to the approaches toward the management of endodontic emergency cases in Al-Madinah Al-Munawwarah, Saudi Arabia.

Materials and Methods: A cross-sectional descriptive survey-based study was conducted using a questionnaire that was distributed among the two groups of participants. The questionnaire consisted of two main sections: one pertaining to the demographics and the second comprising seven different endodontic emergency scenarios with different treatment protocols. The participants were required to select the most appropriate treatment option.

Results: A total number of 150 dentists (96 dental interns and 54 general practitioners) participated in the study. The Chi-squared test was used to determine the relationships between the qualitative variables. No statistically significant difference in the management of most of the endodontic emergencies was observed between the two groups. However, a significantly higher proportion of dental interns compared to general dentists ($P = 0.0452$) selected complete instrumentation and intra-canal medicament placement as a treatment option for symptomatic irreversible pulpitis with symptomatic apical periodontitis; alternatively, the option "other" was selected for the same scenario by a higher number of general dentists ($P = 0.05$). For emergencies involving a necrotic pulp with diffuse facial swelling and no drainage through the canal, the standard protocol recommended in the reference textbook and a surgical incision for drainage along with antibiotic and analgesic prescriptions were selected, with no statistically significant differences between the two groups.

Conclusion: The dental practitioners demonstrated sufficient knowledge regarding the management of endodontic emergencies. Dental clinics in hospitals and dental centers should focus on clarifying the indications for certain clinical treatments, such as the use of a surgical incision for drainage and the prescription of antibiotics, during the management of endodontic emergencies. This information can be provided via continuing dental education programs to update and improve the clinical skills and knowledge of the dentists.

Keywords: Emergency; Dental Interns; General Practitioner; Level of Knowledge; Management

Abbreviation

N: Number of Participants

Introduction

The management of endodontic emergencies, such as cases with acute pain, is an essential part of the emergency dental treatment protocol; it involves, to a greater extent, the expertise of the endodontist in addressing the most distressing symptoms and providing the patient with optimum supportive measures both morally and therapeutically [1-3].

The patient might experience persistent and acute pain at any given period of time, before, during, or after root canal treatment, and place the patient in a state of emergency. As most of these patients do not have a scheduled appointment, an emergency treatment measure has to be administered immediately by the dental practitioner/endodontists at the emergency care clinic [4,5].

Prompt emergency treatment will reassure the patient, effectively eliminate the main cause of the distressing signs and symptoms and improve the unfavorable condition. In some instances, it might be necessary to postpone the permanent treatment based on the condition of the patient. All dental practitioners must reach a correct diagnosis in order to effectively treat the underlying cause immediately in a manner that complies with the desires and expectations of the patient [4,5].

Objectives of the Study

There is a dearth of studies on the views and opinions of dentists with regard to the appropriate management of endodontic emergencies in Saudi Arabia. Therefore, the objective of this study was to evaluate and compare the level of knowledge about the various approaches toward the handling and management of different emergency endodontic cases among general dentists and dental interns working in different government and private dental sectors. Updated endodontic references were used to assess the comparisons.

Research Question

Is there a difference in the level of knowledge between general dentists and dental interns regarding the management of endodontic emergencies?

Materials and Methods

This study was approved by the Research Ethics Committee of the College of Dentistry Taibah University (University Protocol No. TUCDREC/20190310/AYMaqnss) and conducted in accordance with the guidelines of the Helsinki Declaration. The study was conducted mainly for research purposes; patient participation was voluntary, and all data were confidentially secured.

This cross-sectional descriptive observational study was conducted at the Taibah University Dental College and Hospital and other government hospitals as well as private dental centers in Al-Madinah Al-Munawwarah, Saudi Arabia. An anonymous descriptive self-administered questionnaire was used to evaluate and compare the approaches of the general dentists and dental interns toward the management of various endodontic emergencies. A pilot study was performed to pre-test the level of convenience of the questionnaire and the effectiveness of the sample size. The sample size was calculated using a tool provided online by the Center for Disease Control at www.openepi.com. The minimum number of dentists required for this study was approximately 150 with a confidence level of 95% [6]. A convenience sample comprising general dentists and dental interns practicing at the Taibah University Dental College and Hospital and other government hospitals and private dental clinics was obtained. Dental specialists and undergraduate dental students were excluded from the study.

Two independent variables were used in this study: the first was nominal because it included the age, sex, place of practice, and years of experience of the participants, while the second was ordinal and included the different educational levels of the participants. The participant’s approaches toward the management of endodontic emergencies were considered as the dependent variable.

The research tool was based on an electronic questionnaire that has been validated, relied upon, and used in previous studies [4,7,8], with mild modifications to fulfill the criteria in the current study. The questionnaire consisted of four sections comprising the following: an introductory page; demographic information about the participants (age, sex, specialty, place of practice, years of experience, and degree); a brief explanation about the seven different endodontic emergency clinical scenarios with multiple management options for each scenario (the participants were instructed to select the most appropriate one); and illustrations of the seven clinical scenarios with several types of pulpal and periapical endodontic emergencies.

Two hundred electronic questionnaires were distributed among the participants (dental interns and general dentists), and a convenience sample was obtained from those who successfully completed and anonymously returned the questionnaires. The data obtained from the two groups were statistically analyzed using SPSS v.21 (IBM, Armonk, NY, USA). The Chi-squared test was used for the analysis, and the P-value was set at 0.05.

Results

Of the 150 participants who successfully completed the online questionnaire, 96 (64%) were dental interns and 54 (36%) were general dentists (Table 1). The sample size included a higher number of females (79; 52.7%) compared to males (71; 47.3%). Most of the respondents (101; 67.3%) worked and practiced at the Taibah University Dental College and Hospital, followed by the private dental clinics (34; 22.7%) and governmental hospitals (15; 10%). The majority of the participants (145; 96.7%) had < 5 years of clinical experience, 4 (2.7%) participants had > 10 years of experience, and only 1 (0.7%) had 5 - 10 years of experience.

Variables	F (%)
Title	
Dental Intern	96 (64)
General Dentist	54 (36)
Sex	
Female	79 (52.7)
Male	71 (47.3)
Primary place of practice	
Governmental hospitals	15 (10)
Private dental clinics	34 (22.7)
Taibah University Dental College and Hospital	101 (67.3)
Years of experience	
<5 years	145 (96.7)
>10 years	4 (2.7)
5 - 10 years	1 (0.7)

Table 1: Demographic characteristics of the 150 participants who successfully completed the self-administered questionnaire.

The descriptive statistics of the responses of each dental intern and general dentist to the different emergencies are illustrated in table 2. The best management for each type of emergency was pointed by a higher descriptive statistical value for that particular treatment selection as shown in table 3.

Treatment of Choice Type of Emergency	N (%)			
	1- Symptomatic Irreversible pulpitis with normal apical tissue	Pulpotomy	Complete instrumentation and intracanal medication	Partial pulpectomy
	26 (27.1)	53 (55.2)	17 (17.7)	0 (0)
2- Symptomatic Irreversible pulpitis with symptomatic apical periodontitis	Pulpotomy and analgesic	Complete instrumentation and intracanal medication	Partial pulpectomy and analgesic	Other
	9 (9.4)	72 (75)	15 (15.6)	0 (0)
3- Necrotic pulp with symptomatic apical periodontitis	Complete instrumentation and intracanal medication	Partial pulpectomy and intracanal medication	Pulpectomy and leave the tooth open	Other
	89 (92.7)	6 (6.3)	1 (1)	0 (0)
4- Necrotic pulp with fluctuant swelling and drainage obtained through the canal	Pulpectomy and surgical excision	Full debridement of pulp space to estimated working length and intracanal medication	Pulpectomy and leave the tooth open	Other
	8 (8.3)	75 (78.1)	13 (13.5)	0 (0)
5- Necrotic pulp with fluctuant swelling and no drainage obtained through the canal	Surgical incision and antibiotic	Pulpectomy and leave the tooth open	Complete instrumentation extending slightly beyond the apex and intracanal medication	Other
	32 (33.3)	3 (3.1)	59 (61.5)	2 (2.1)
6- Necrotic pulp with diffuse facial swelling and no drainage obtained through the canal	Surgical Incision for drainage, antibiotic, and analgesic	Full debridement of pulp space to estimated working length and antibiotic	Full debridement of pulp space extending slightly beyond the apex, intracanal medication, and antibiotic/analgesic	Other
	47 (49)	5 (5.2)	43 (44.8)	1 (1)
7- Severe pain in inter-appointment	Complete instrumentation and leave the tooth open	Complete instrumentation and occlusal adjustment	Occlusal adjustment and analgesic	Other
	9 (9.4)	62 (64.6)	25 (26)	0 (0)

Table 2: Descriptive statistics of the dental interns ($n = 96$) and their responses to the different emergency situations.
 n : Number of participants.

Treatment of Choice	n (%)			
Type of Emergency	n (%)			
1- Symptomatic Irreversible pulpitis with normal apical tissue	Pulpotomy	Complete instrumentation and intracanal medicament	Partial pulpectomy	Other
	15 (27.8)	30 (55.6)	8 (14.8)	1 (1.9)
2- Symptomatic Irreversible pulpitis with symptomatic apical periodontitis	Pulpotomy and analgesic	Complete instrumentation and intracanal medicament	Partial pulpectomy and analgesic	Other
	6 (11.1)	32 (59.3)	14 (25.9)	2 (3.7)
3- Necrotic pulp with symptomatic apical periodontitis	Complete instrumentation and intracanal medicament	Partial pulpectomy and intracanal medicament	Pulpectomy and leave the tooth open	Other
	48 (88.9)	6 (11.1)	0 (0)	0 (0)
4- Necrotic pulp with fluctuant swelling and drainage obtained through the canal	Pulpectomy and surgical excision	Full debridement of pulp space to estimated working length and intracanal medicament	Pulpectomy and leave the tooth open	Other
	5 (9.3)	43 (79.6)	6 (11.1)	0 (0)
5- Necrotic pulp with fluctuant swelling and no drainage obtained through the canal	Surgical incision and antibiotic	Pulpectomy and leave the tooth open	Complete instrumentation extending slightly beyond the apex and intracanal medicament	Other
	13 (24.1)	2 (3.7)	37 (68.5)	2 (3.7)
6- Necrotic pulp with diffuse facial swelling and no drainage obtained through the canal	Surgical Incision for drainage, antibiotic, and analgesic	Full debridement of pulp space to estimated working length and antibiotic	Full debridement of pulp space extending slightly beyond the apex, intracanal medicament, and antibiotic/analgesic	Other
	25 (46.3)	1 (1.9)	26 (48.1)	2 (3.7)
7- Severe pain in inter-appointment	Complete instrumentation and leave the tooth open	Complete instrumentation and occlusal adjustment	Occlusal adjustment and analgesic	Other
	2 (3.7)	36 (66.7)	16 (29.6)	0 (0)

Table 3: Descriptive statistics of the general dentists ($n = 54$) and their responses to the different emergency situations.
n: Number of participants.

A comparison of the responses between the dental interns and general dentists with regard to the management of the different endodontic emergency conditions was made in accordance with the standard protocol for emergency treatment modalities, which were referred to using updated endodontic references as shown in table 4.

Emergency condition	Standard protocol	Dental intern n (%)	General dentist n (%)	P-value
1. Symptomatic Irreversible pulpitis with normal apical tissue	Pulpotomy	26 (27.1)	15 (27.8)	0.9264
	Complete instrumentation and intracanal medicament	53 (55.2)	30 (55.6)	0.9622
	Partial pulpectomy	17 (17.7)	8 (14.8)	0.6472
	Other	0 (0)	1 (1.9)	0.1753
2. Symptomatic Irreversible pulpitis with symptomatic apical periodontitis	Pulpotomy and analgesic	9 (9.4)	6 (11.1)	0.7391
	Complete instrumentation and intracanal medicament	72 (75)	32 (59.3)	0.0452
	Partial pulpectomy and analgesic	15 (15.6)	14 (25.9)	0.1250
	Other	0 (0)	2 (3.7)	0.0577
3. Necrotic pulp with symptomatic apical periodontitis	Complete instrumentation and intracanal medicament	89 (92.7)	48 (88.9)	0.4272
	Partial pulpectomy and intracanal medicament	6 (6.3)	6 (11.1)	0.2990
	Pulpectomy and leave the tooth open	1 (1)	0 (0)	0.4609
	Other	0 (0)	0 (0)	-
4. Necrotic pulp with fluctuant swelling and drainage obtained through the canal	Pulpectomy and surgical excision	8 (8.3)	5 (9.3)	0.8344
	Full debridement of pulp space to estimated working length and intracanal medicament	75 (78.1)	43 (97.6)	0.8296
	Pulpectomy and leave the tooth open	13 (13.5)	6 (11.1)	0.6710
	Other	0 (0)	0 (0)	-
5. Necrotic pulp with fluctuant swelling and no drainage obtained through the canal	Surgical incision and antibiotic	32 (33.3)	13 (24.1)	0.2378
	Pulpectomy and leave the tooth open	3 (3.1)	2 (3.7)	0.8438
	Complete instrumentation extending slightly beyond the apex and intracanal medicament	59 (61.5)	37 (68.5)	0.3912
	Other	2 (2.1)	2 (3.7)	0.5599
6. Necrotic pulp with diffuse facial swelling and no drainage obtained through the canal	Surgical Incision for drainage, antibiotic, and analgesic	47 (49)	25 (46.3)	0.7507
	Full debridement of pulp space to estimated working length and antibiotic	5 (5.2)	1 (1.9)	0.3228
	Full debridement of pulp space extending slightly beyond the apex, intracanal medicament, and antibiotic/analgesic	43 (44.8)	26 (48.1)	0.6970
	Other	1 (1)	2 (3.7)	0.2536
7. Severe pain in inter-appointment	Complete instrumentation and leave the tooth open	9 (9.4)	2 (3.7)	0.1990
	Complete instrumentation and occlusal adjustment	62 (64.6)	36 (66.7)	0.7952
	Occlusal adjustment and analgesic	25 (26)	16 (29.6)	0.6347
	Other	0 (0)	0 (0)	-

Table 4: A comparison of the responses between the dental interns ($n = 96$) and general dentists ($n = 54$).
n: Number of participants.

No statistically significant difference in the management of most of the listed endodontic emergencies was observed between the two groups of participants, apart from a few exceptions. One of these exceptions involved the emergency management of symptomatic irreversible pulpitis with symptomatic apical periodontitis, for which a statistically higher percentage of dental interns compared to general dentists ($P = 0.0452$) selected complete instrumentation and intracanal medicament placement as a treatment option; for the same scenario, a higher number of general dentists compared to dental interns selected the treatment option "other," statistical significance notwithstanding. Another difference was found in the emergency case of a necrotic pulp with diffuse facial swelling and no drainage through the canal. In this situation, two different emergency treatment protocols were selected. The first treatment measure involved the standard protocol ($P = 0.6970$), while the other consisted of a surgical incision for drainage followed by the prescription of antibiotics and analgesics ($P = 0.7507$). Both treatment options had almost equal responses by the dental interns and general dentists with no statistically significant differences between the two groups.

Discussion

The aim of this study was to evaluate the level of knowledge and understanding about the management of common endodontic emergencies among dental interns and general dentists working at various hospital settings in Madinah, Saudi Arabia. Although a notable controversy occurred on the management of various emergency situations, limited studies have addressed this issue. It was difficult to select and standardize a single treatment option for each of the emergencies because multiple references provided different management approaches for different emergency scenarios. In the present study, the standard treatment option for each endodontic emergency was selected and evaluated on the basis of the main endodontic textbook referred to in this research and the American Association of Endodontics [1,3].

In cases of symptomatic irreversible pulpitis with or without apical periodontitis, the emergency line of treatment selected in this study consisted of full instrumentation and placement of intracanal medicament, which was introduced as the standard treatment of care. This treatment was recommended by a significantly higher number of interns than general dentists in the current study and was in accordance with that recommended in the references used in this study. As stated in the endodontic textbooks, this approach is ideal during emergency situations provided the time needed to complete the procedure is sufficient; however, if the time is limited, other treatment procedures such as partial pulpectomy for anterior teeth and pulpotomy for posterior teeth (largest canal for molars) should be considered [1,9]. Other treatment options such as occlusal reduction were also considered by few general dentists. This finding complied with other emergency treatment approaches to reduce postoperative-treatment pain reported in the literature [1].

Interestingly, emergency conditions involving necrotic pulps with symptomatic apical periodontitis require the same standard treatment of care as that for vital pulps with symptomatic irreversible pulpitis and apical periodontitis. This treatment protocol was suggested in a previous study and the endodontic references used in this study [1,4] and was recommended by a large number of interns and general dentists in the current study.

Based on the references used in this study, the standard management of a necrotic tooth with a fluctuant swelling that drains through the pulp canal included full debridement with instrumentation of the pulp space and placement of an intra-canal medicament, such as calcium hydroxide, particularly in cases where more than a single visit is required during the treatment process [1]. This standard treatment of care was selected and followed by most of the dental interns (78.1%) and general dentists (97.6%) in the present study. This is because the basic principle of managing any tooth swelling caused by an endodontic infection is through drainage and removal of the source of infection. In the presence of a localized swelling, the preferred management involves the drainage of the root canals. When the swelling is persistent, the drainage may be performed by applying gentle pressure on the mucosa covering the swelling.

In the case of a necrotic tooth with a fluctuant swelling that does not drain through the root canal, the emergency line of treatment is essentially the same as that for a swelling that drains through the canal, except for the fact that the instrumentation of the pulp space

should extend slightly beyond the apex without pushing the debris into the periapical area. This treatment option was selected by more than half of the interns (96.15%) and general dentists (68.5%) and was in accordance with the standard treatment measures in the reference used in this study as well as other textbooks [1,9]. However, a small percentage of interns (33.3%) and general practitioners (24.1%) selected surgical incision and the use of antibiotics as an emergency treatment measure for this condition. This selection was based on the fact that a surgical incision gives a pathway for drainage to prevent the further spread of infection and relieves the pain caused by the pressure of the tissues associated with the edema. In cases with insular and undiffused swelling, drainage by itself is considered sufficient without the need for additional medications, such as antibiotics, after surgical incision of a localized swelling was not in agreement with the reference-based findings of this study nor with a recent study [1,10-12]. This was because most endodontic infections can be treated without the use of antibiotics, and the most appropriate management is to remove the source of infection [1]. In cases of irreversible pulpitis, necrotic pulps, and localized acute apical abscesses, the use of antibiotics is not recommended [11,12]. Another treatment measure proposed by a few respondents in this study was to leave the tooth open when treating a necrotic tooth. However, this emergency approach was also prohibited by the reference-based book used in this study because leaving the tooth open between appointments would inhibit the resolution of the infection and complicate the treatment [1].

In cases with necrotic pulps and diffuse facial swelling without drainage through the root canal, approximately half the number of the interns (44.8%) and general dentists (48.1%) in this study opted for full debridement of the pulp space with slight extension beyond the apex, the placement of an intracanal medicament, and the prescription of antibiotics and analgesics. This emergency treatment of care was in accordance with the reference used in this study. On the other hand, the other half of the respondents, which included nearly equal proportions of interns (49%) and general dentists (46.3%), preferred the use of a surgical incision and the prescription of antibiotics and analgesics for this type of emergency. This treatment modality coincided with that proposed in a previous study based on the worldwide agreement with regard to the management of fluctuant swellings via incision and drainage [4,8]. Furthermore, this procedure was in agreement with the reference textbook used in this study, which considered incision for the drainage of a diffuse swelling as a life-saving measure. This is because a life-threatening medical condition may occur from a diffuse swelling leading to the spread of infection and resulting in cellulitis [1]. However, this issue is controversial, as reported by a previous author who indicated that the prescription of antibiotics was, at some point, necessary in such cases [9]. It is worth noting that the American Association of Endodontics stated that systemic antibiotics should not be recommended routinely, but their usage is dependent on the general medical status of the patient. When the patient presents with systemic signs and symptoms such as cellulitis, fever, and malaise as a result of an acute apical infection, prescribing systemic antibiotics orally or intravenously in conjunction with root canal system debridement is the treatment of choice [2].

In cases of severe inter-appointment pain, the standard emergency treatment in this study included re-instrumentation through complete cleaning and shaping procedures and occlusal adjustment, which was the treatment option selected by more than half of the interns (64.6%) and general dentists (66.7%). Treatment by occlusal reduction and prescription of analgesics was also considered by some of the respondents, particularly the general dentists (29.6%), which was consistent with the standard treatment of care; a previous study indicated that temporary fillings should be checked for traumatic occlusal contacts [4,8]. Other causes of inter-appointment pain may include cases of over instrumentation and overfilling of the root canals, which most often can be managed by either re-entering the tooth or performing a periapical surgery, followed by drainage through the root canals [4,8]. The standard treatment measures emphasized the use of analgesics rather than antibiotics for reducing the inter-appointment pain. It is very important to note that antibiotics should not be prescribed to reduce inter-appointment pain or to treat a swelling after the completion of the root canal therapy; this practice was not consistent with the standard treatment measures in the current study [1,9].

One of the limitations of this study is its cross-sectional design. Moreover, the anterior and posterior teeth were not separately evaluated. It was not possible to study all the treatment options because of the high number of variables, but when the option "other" was added, it provided more flexibility to select the appropriate option.

Conclusion

This study may serve as a guideline to help dental practitioners manage endodontic emergencies in their everyday practice. Dental practitioners in this study showed a prominent level of knowledge regarding the management of endodontic emergencies. Dental clinics in hospitals and dental centers should assess the indications for the use of a surgical incision for drainage in certain emergency situations and the basis on which antibiotics should be used during the management of endodontic emergencies. The findings of this study indicate the importance of including continuing education hours in the form of presentations and seminars in various dental settings to update and improve the clinical skills of the dentists. The use of antibiotics by dental interns and general dentists was in line with that recommended in the main references used in this study. However, in cases with necrotic pulps with fluctuant swellings and no drainage through the root canal, discrepancies in the selection of some options with regard to the prescription of antibiotics were observed. Therefore, increasing awareness about the standard emergency treatment methods and the need to routinely prescribe antibiotics is highly recommended.

Disclosure

The authors have no conflicts of interest, financial, or other personal interest of any nature or kind in any product, service, and/or company that is presented in this article. The study was not funded by any institution or organization.

Acknowledgment

We are thankful to Statistician Mr. Hani Ismail Ali Said for his assistance with the statistical analysis with a complete data acquisition system.

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Volume 20 Issue 10 October 2021

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