

Clinical assessment of identification of symptomatic tooth by the patients and the clinicians in various endodontic emergencies: A cross-sectional hospital-based study

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Abstract

Introduction: Pain of endodontic origin is the major cause to seek emergency dental services. Identification of the offending tooth is very crucial for its emergency management and to maintain a healthy Doctor-patient relationship.

Aim: This study was conducted to evaluate the frequency of identification of the painful tooth by the patient and the clinician in various Endodontic Emergencies (EE).

Methodology: 352 patients with EE who had given voluntary consent for the study were evaluated in this study. Identification of offending painful tooth was done by the patient and it was also identified and diagnosed by Endodontists using a standard clinical protocol and Visual Numeric Analogue Scale (VNAS). The frequency of identification of painful tooth by patients and clinicians was assessed and compared.

Results: The results of this study showed that patients were less accurate than the clinicians in identification of painful tooth in EE especially in Symptomatic Irreversible Pulpitis (SIP).

Conclusion: Clinician's knowledge, judgement and experience helps to locate the offending tooth precisely in EE. The spread of the infection to the periradicular area significantly increases the probability of identification of the painful tooth by the patients and clinicians.

Keywords: Dentist, Doctor-patient relationship, Endodontic Emergencies, Painful tooth.

Introduction

In day to day dental practice, the pain of endodontic origin is the common cause which often requires the patient to visit the dentist on emergency basis.¹ International Association for the Study of Pain defines pain as, "Pain is an unpleasant sensory and emotional experience associated

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with actual or potential tissue damage or described in terms of such damage."² Endodontic Emergency (EE) may be observed as an acute pulpal pain, acute apical abscess, phoenix abscess or the trauma causing the pulpal injury.

When the patient visits the dentist in emergency, the quick and prompt diagnosis is vital and the treatment should be directed to relieve the painful episode. In that visit, the patient narrates the history of spontaneous or continuous, throbbing pain or swelling or trauma associated with a particular tooth or teeth. Often, the patient may not always be able to locate the involved tooth which causes severe odontalgia. Thus, the patient may demand treatment of wrong tooth by their mis-judgement. Different EE have presented clinically such as; Symptomatic Reversible Pulpitis (SRP), Symptomatic Irreversible Pulpitis (SIP), Symptomatic Acute Apical Periodontitis (SAAP) or Acute Apical Abscess (AAA).¹

In a dental emergency, the identification of a painful tooth is also important to gain the patient's confidence in the dentist. Improper diagnosis may not cause the relief, rather it would degenerate the patient's trust and confidence in the treating dentist. The fundamental of this study was based on

whether the dentist should blindly trust patient in identification of painful tooth in EE or to carry out the diagnosis using their clinical knowledge, experience and clinical protocol. Thus, this study was conducted to evaluate, whether the patients reported with the EE could correctly identify the offending tooth as per the clinician's diagnosis and their pain severity was measured using Verbal Numerical Rating Scale (VNRS).⁴

Methodology

For this purpose, a pilot study was carried out including 30 patients aged between 21-60 years. Patients were selected randomly, who were reported with EE in the Emergency unit of Department of Conservative Dentistry and Endodontics of the Government Dental College and Hospital, Mumbai; from the Out-Patient Department section (OPD) of the hospital. Selected patients were diagnosed by two experienced Endodontists based on the case history questionnaire, clinical evaluation and the radiographic examination. Identification of the painful tooth with its clinical diagnosis was established by both the clinicians separately for all the patients. When there was a disagreement of opinion, the inter-operator bias was eliminated by arriving at the final diagnosis through discussion by both the clinicians. In this pilot study, 17 (56.66%) patients identified the painful tooth correctly whereas; the clinicians identify the correct tooth in 29 (96.66%) patients.

In the present study 4000 adult patients, aged between 21 to 60 years (mean age 35.7 years); referred to the Department of Conservative Dentistry and Endodontics from a period of 01/06/2016 to 30/06/2018 (24 months) were screened. Among the screened patients, 400 patients irrespective of their gender exhibited EE were randomly

selected. Out of 400 patients, 352 patients; who were willing to participate voluntarily in the study were evaluated. They were divided into four groups according to the age as 21-30, 31-40-, 41-50 and 51-60 years.

Inclusion criteria

- 1) Any male or female with the age between 21 to 60 years.
- 2) The patient diagnosed with EE.
- 3) The patient who gave the consent voluntarily for the study.

Exclusion criteria

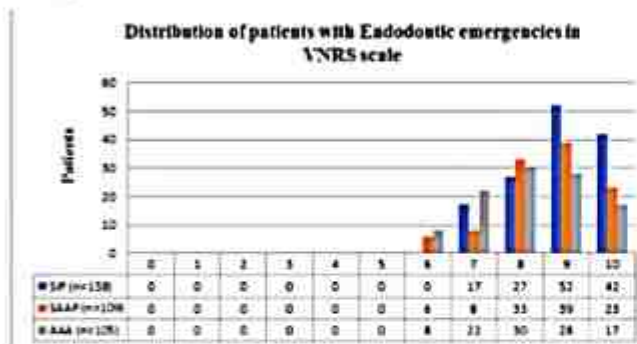
- 1) Patients having pain of non-endodontic origin.
- 2) All third molar teeth with EE.
- 3) Patients diagnosed with symptomatic reversible pulpitis, phoenix abscess and endodontic failure cases.
- 4) Patients on analgesic or antibiotic medications since a week.

The aim of the study was to assess whether the patients could precisely identify the troublesome tooth during their first endodontic emergency visit and compared it with the identification done by a team of two clinicians i.e. Endodontists. Diagnosis for each patient such as Symptomatic Irreversible Pulpitis (SIP), Symptomatic Acute Apical Periodontitis (SAAP) or Acute Alveolar Abscess (AAA) was done after thorough case history, clinical and radiographic examinations. All patients were scheduled immediately for EE management after the diagnosis irrespective of their participation in the study. The severity of pain was measured from 0 to 10 using VNRS Scale rating as 0-No pain to 10-Worst pain imaginable (Table I & Graph 1).⁴ The correct frequency of identifying the painful tooth by the patient using their tongue, finger or

Table I : Distribution of patients with Endodontic emergencies with VNRS scale

VNRS Scale	SIP (n=138)	SAAP (n=109)	AAA (n=105)
0 (No pain)	0	0	0
1	0	0	0
2	0	0	0
3	0	0	0
4	0	0	0
5 (Moderate pain)	0	0	0
6	0	6	8
7	17	8	22
8	27	33	30
9	52	39	28
10 (Extreme pain)	42	23	17

Graph I: Distribution of patients with Endodontic emergencies in VNRS scale



the expression with the operator's diagnosis of the EE condition was noted and compared.

For the present study, a hypothesis was made, that the patients with symptomatic EE could identify the painful tooth more accurately when the disease advances from dental pulp to the periradicular tissues. Data obtained was

like, disease-wise and gender-wise distribution was depicted. Comparison of frequencies of the patients to identify the correct painful tooth and pain severity and affecting teeth was done using Chi-square test. For all the statistical tests, $p < 0.05$ was considered to be statistically significant.

Results

Out of 352 selected patients with EE, 203 (57.7%) were males and 149 (42.3%) were females. Out of evaluated EE, 138 (39.2%), 109 (30.9%) and 105 (29.9%) patients were diagnosed as SIP, SAAP and AAA respectively. Results showed that the clinicians were more accurate in painful tooth identification than the patients. It was also observed that in SAAP or AAA when the disease progressed apically, the patients and the clinicians could identify the affected tooth more significantly than patients diagnosed with SIP (Table II, III & Graph II, III). It was also observed that the

Table II : Age and gender-wise distribution of Endodontic emergencies identified by patients

Age groups (n=352)		SIP (n=138)		SAAP (n=109)		AAA (n=105)	
M (n=203)	F (n=149)	M(n=76)	F(n=62)	M(n=68)	F(n=41)	M(n=59)	F(n=46)
20-30 yrs		18/30 (60%)	17/24 (70.8%)	20/22 (90.9%)	8/14 (57.1%)	14/26 (53.8%)	10/18 (55.5%)
31- 40 yrs		13/22 (59.0%)	6/12 (50%)	17/27 (62.9%)	6/12 (50%)	13/21 (61.9%)	5/10 (50%)
41-50 yrs		9/18 (50%)	9/15 (60%)	4/8 (50%)	3/8 (37.5%)	3/7 (42.8%)	5/9 (55.5%)
51-60 yrs		2/6 (33.3%)	7/11 (63.6%)	5/11 (45.4%)	4/7 (57.1%)	5/5 (100%)	4/9 (44.4%)

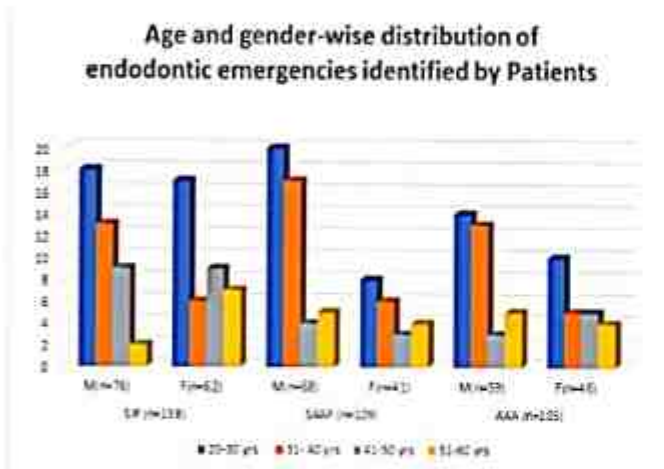
Table III : Age and gender-wise distribution of Endodontic emergencies identified by Clinicians

Age groups (n=352)		SIP (n=138) 39.2%		SAAP (n=109) 30.9%		AAA (n=105) 29.5%	
M (n=203)	F (n=149)	M(n=76)	F(n=62)	M(n=68)	F(n=41)	M(n=59)	F(n=46)
20-30 yrs (n=134)		27/30 (90%)	23/24 (95.8%)	22/22 (100%)	14/14 (100%)	26/26 (100%)	18/18 (100%)
31- 40 yrs (n= 104)		20/22 (90%)	12/12 (100%)	26/27 (96.2%)	12/12 (100%)	21/21 (100%)	10/10 (100%)
41-50 yrs (n= 65)		18/18 (100%)	14/15 (93.33%)	8/8 (100%)	7/8 (87.5%)	6/7 (85.7)	8/9 (88.8%)
51-60 yrs (n= 49)		6/6 (100%)	10/11 (90.9%)	10/11 (90.9%)	7/7 (100%)	5/5 (100%)	9/9 (100%)

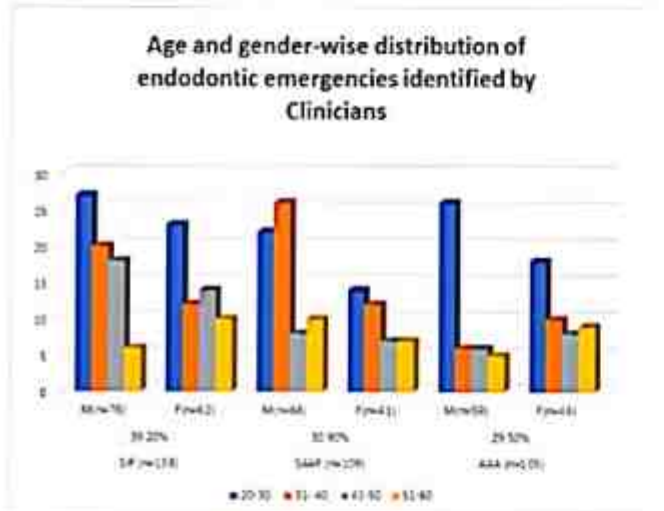
compiled on MS Office Excel Sheet (v 2010) and was subject to statistical analysis using Statistical package for social sciences (SPSS v 21.0, IBM). Descriptive statistics

maxillary and mandibular molars were the most commonly affected teeth in EE (Table IV). Similarly, patients were more precise in the identification of painful teeth of the maxillary region than the mandibular molars.

Graph II : Age and gender-wise distribution of endodontic emergencies identified by Patients



Graph III : Age and gender-wise distribution of endodontic emergencies identified by Clinicians



Discussion

EE is an unpleasant and unexpected event in which a patient with odontalgia may visit the dental office at any time. In underdeveloped or developing countries due to inadequate health awareness regarding general as well as the oral health; people may visit the dentist usually when the pain is severe or when their routine functional life is disturbed. In a developing country like India; the oral health awareness has been increased drastically in urban sectors, leading to an increased number of patients visiting the dentist regularly. Some of the factors are still restraining the exposure of oral health services to the common masses including lack of education, poor economy, lack of time and the self oral health care negligence etc.

In the management of any EE, knowledge of such emergency and its diagnosis has a vital role. Academic emphasis on management of EE like imparting the knowledge, live doctor-patient communication, demonstration of various clinical examination, tests and investigations help to improve the patient management skills among the budding clinicians. Thus, it is recommended that before arriving at a diagnosis and initiating any endodontic treatment the patient's chief complaint must be reproduced. It is crucial, particularly when the patient may not be able to point out the offending tooth and may misguide the clinician. Thus, for successful endodontic practice standard clinical protocol has been adopted for diagnosis and treatment plan which includes; taking the detail case history, history of medications, thorough clinical examination, carrying out necessary clinical tests and the radiographic investigation of

Table IV : Quadrant-wise distribution of Endodontic emergencies identified by Clinicians

Age groups 352	Maxillary right side							Maxillary left side							Mandibular left side							Mandibular right side							
	Tooth no.	11	12	13	14	15	16	17	21	22	23	24	25	26	27	31	32	33	34	35	36	37	41	42	43	44	45	46	47
20-30 yrs		6	4	3	3	3	6	6	6	4	3	4	5	7	6	4	3	4	5	5	8	7	3	3	3	5	6	7	5
31-40 yrs		3	3	4	4	3	5	5	3	5	2	3	2	5	6	5	2	1	2	4	6	4	3	4	3	5	6	6	5
41-50 yrs		1	2	2	1	1	2	5	5	2	1	2	2	3	3	3	3	1	2	1	4	3	2	2	1	3	1	4	3
51-60 yrs		1	2	1	1	2	1	2	1	2	2	2	1	3	3	1	2	2	2	3	2	3	2	1	1	1	1	2	2

the patient.² Usually, diagnosis depends on the clinical symptoms and intraoral radiographs but Cone Beam Computed Tomography (CBCT) is superior to conventional radiographs in diagnosing the periapical pathosis when there are no signs or symptoms to conclude the correct diagnosis.⁸ Similarly, the patients on analgesic or antibiotic medications were excluded from this study as these drugs may mask the symptoms and lead to incorrect diagnosis.⁷

In clinical point of view, the diagnosis of EE essential not only to manage the painful episode but also; to prevent the systemic spread of the infection leading to life-threatening conditions like space infection or Ludwig's angina.⁹ A rare complication was reported in a case where patient died because of the cavernous sinus thrombophlebitis following the root canal treatment where; the most the suspected route for the spread of the infection was from the tooth to the maxillary sinus, the eye and the brain.¹⁰ Thus, dilemma or wrong identification of affected tooth by the patient or the clinician may lead to wrong diagnosis, treatment or life threatening complications. It may also result in the persistence of the pain which leads to loss of the trust in the operating dentist.

Sometimes in clinical practice, diagnosing the SAAP and the SIP is confusing because of similar clinical symptoms whereas; the diagnosis of AAA is much simpler due to the obvious or visible swelling associated with the carious tooth. SIP is usually presented as severe, sharp-shooting, continuous pain associated with irreversible inflammation of the pulp whereas; SAAP indicates the spread of infection to periradicular tissue and the tooth becomes tender to percussion. Relief from the pain after a cold application in SIP is the key feature to distinguish between SIP and SAP. Also, SAP diagnosed teeth may present with a history of severe pain to cold stimuli for less than a week and the probability of diagnosed SAP was 72%.¹¹ In a study, the clinical diagnosis of healthy pulp and reversible pulpitis were coincident with the histologic finding in 96.6% teeth whereas; the clinical and histologic finding of irreversible pulpitis coincided in only 84.4% cases.¹²

In the complicated cases when such infection remained undiagnosed and untreated, it leads to the formation of the periapical lesion and may cause systemic infection.⁹ It is well documented that in the majority of the painful conditions of teeth involving EE; could be diagnosed using electric and cold stimuli. Painful tooth identification in the maxillary or

mandibular arch may also vary and it may depend on the type of teeth involved. Results of our study indicated that patients may not correctly identify the offending tooth diagnosed with SIP but as the infection advanced to the periradicular area, the identification of painful tooth becomes more specific as in cases of SAAP or AAA.

The diagnosis is important in various EE; as the management also varies from case to case.¹¹ Removal of a major portion or complete inflamed pulp tissue relieves the patient's pain in SIP whereas; thorough cleaning-shaping with or without occlusal grinding is recommended to relieve the pain in patients with SAAP.¹⁴ The patient with AAA, usually requires drainage either through root canal or through fluctuant and dependent soft tissues. The complication may arise when the spread of infection occurs from the infected tooth to the other vital structures or facial spaces present in the proximity. SAAP or AAA may also endanger the life of the patient if not treated appropriately and timely due to bacteraemia, septicaemia and the systemic involvement.¹⁵

In a busy schedule of modern dental practice; when unexpected EE case has reported to the dentist, where there may be limited time permitted for the treatment, the procedures for relieving the pain in SAAP and SIP may also vary. In a short time, the EE management for single-rooted and multi-rooted teeth may also differ. In SIP or SAAP of the single-rooted tooth, removal of the complete pulp tissue is advised whereas; in multi-rooted tooth with SIP, removal of coronal inflamed pulp i.e. pulpotomy may relieve the pain. In case of SAAP when the time does not permit the pulpectomy; the removal of pulp tissue from the largest root canal is generally recommended.

Treating the EE is a challenging task as the patient's sensibility is altered due to severe pain and difficulty in achieving anaesthesia especially in 'Hot Tooth' as in SIP or SAAP. Teeth with AAA usually do not require anaesthesia to get access to the pulp chamber. But, sometimes one or the other canal may exhibit partially vital pulp tissue which may need the pulpal anaesthesia for complete pulp extirpation and the debridement.

Diagnosis of EE is a critical issue as it requires skill and knowledge to identify the offending tooth and to gain the patient's confidence. The dentist-patient relationship relies on the trust in doctor's knowledge, skills, communication as well as correct diagnosis and treatment rendered by the doctor, especially critical situations like EE. In our study, the

gender and age of the patients have not shown any significant difference in the identification of painful tooth when compared to different EE. Diagnosis made by the clinicians was also consistent and there exists no statistically significant difference. Among all emergencies, the large number of patients diagnosed with AAA could be able to identify the painful tooth, followed by SAAP and SIP conditions. Identification of the offending tooth by clinicians and tooth identified by patients may not be the same in more than half of the cases of SIP; but as the diseases progress, identification of painful tooth becomes accurate for the patient especially in AAA cases and was similar to the observations of the clinician.

Literature search shows that very few studies were published which discussed the localization of pain in the oral cavity region.¹⁶⁻¹⁸ A major study was carried out by McCarthy et al. in 2010 discussing the importance of identification of painful tooth in an EE by patients in its diagnosis and emergency management. The study showed similar results as in our study and exhibited that the patient could identify the arch more accurately than identifying the correct painful tooth in SIP or SAAP cases.¹⁶ Friend and Glenwright found that 79.3% patients could identify the offending tooth when one tooth mesial or distal side was considered as correct.¹⁷ In a study by McCarthy, the tooth localization probability was observed to be 90.7% when one tooth on either side of the identified tooth would have been considered as correct.¹⁸

For assessing the pain severity, response to pain usually measured in verbal-numerical observation.¹⁹ VNRS scale has been used in this study as it has been regarded as an acceptable and practical method for initial pain assessment (Table I).⁹ As pain is a subjective phenomenon, it often varies from individual to individual, time to time and sometimes also differs in the same patient. Thus, initial pain scale reading would act as primary reading which may be used as a reference to compare with post-emergency management.

In our study, none of the patients have reported the pain crossing the midline and the results were same as in the study by Van Hassel and Harrington.¹⁸ Conversely, in another study it was reported that pain has crossed the midline in 1.5% of the examined population may be due to cross-innervation.¹⁷ Seltzer et al. in their study concluded that mandibular posterior teeth may cause pain in ear and temporal region on the ipsi-lateral side and usually cause referred pain to the other jaw.²¹ Our study reported that there

was a significant difference between tooth identified by patients and by the clinicians. In some situations where the patient is in severe pain, may confuse and misguide the dentist. If the clinician relies on the patient's chief complaint without carrying out necessary examinations and investigations; it may render the wrong treatment.

Conclusion

Identification of pain source in the EE is a vital issue in the pain management. VNRS scale is a simple, quick and reproducible tool in pain assessment. Patient's certainty about the painful tooth may not always guide the clinician to conclude the diagnosis, especially in EE. Though, in some critical cases where patients could not identify painful tooth; the clinician's knowledge, judgement and experience would help to identify the offending tooth. Also, the spread of odontogenic infection to the periradicular area significantly increases the probability of identification of the painful tooth by the patients with severe odontalgia.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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