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Endodontic flare up: incidence and association of possible risk factors

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Abstract

Background: Endodontic emergency during root canal treatment (flare up) is a common occurrence in multi-visit root canal treatment (RCT) and it may be associated with many factors. The occurrence however can affect the prognosis of the tooth and the patient – clinician relationship.

Aim: To determine the incidence and risk factors associated with occurrence of flare up in a multi visit RCT.

Methodology: Patients planned for multi-visit (RCT) were recruited for the research. Standard protocol was followed in all cases. After the first visit, the patients were followed up for possible development of flare up. Patients' demographics, presence or absence of preoperative pain, status of the pulp and occurrence of flare up were among the data collected. Data was analyzed using SPSS version 20 with level of significance set at $P \leq 0.05$.

Result: A total of 106 root treated teeth were analyzed in patients aged 17 to 73years with a mean of 33±13.2 and male to female ratio of 1:1.5. Incidence of flare up was 8.5%. Prior to treatment, 47% of the cases had pain, 61.3% had apical radiolucency and 83% had pulpal necrosis. Majority (7, 77.8%) of the flare up occurred after the first visit (p=0.000). Only pre-treatment pain had a statistical significant relationship with occurrence of flare up (p=0.009).

Conclusion: Incidence of flare up was 8.5% and the major risk factor was preoperative pain. First visit in a multi visit RCT is an important stage which if well handled, can reduce the incidence of flare up.

Keywords: *flare up, risk factors, preoperative pain, incidence.*

Résumé

Contexte: L'urgence endodontique pendant le traitement du canal radiculaire (embrasement) est un phénomène courant rare dans multi visiteTCR et peut être associé à de nombreux facteurs. Cependant l'occurrence peut affecter le pronostic de la dent et la relation patient-clinicien.

Objectif: Pour déterminer l'incidence et les facteurs derisquesassociés à l'apparition de l'embrasement dans une multi visite TCR.

Méthodologie: Les patients prévus pour le traitement multi visite du canal radiculaire (TCR) ont été recrutés pour la recherche. Après la première visite TCR faite sous un protocole guidée pour TCR, les patients ont été suivis pour le développement possible d'embrasement. La démographiedes patients, la présence ou l'absence de douleur préopératoire, l'état de la pulpe et l'occurrence d'embrasementétaient parmi d'autres données recueillies. Les données ont été analysées à l'aide du logiciel SPSS version 20. Avec un niveau de signifiance fixé à $p \leq 0.05$.

Résultat: Un total de 106 dents traitées ont été analysées chez les patients âgés de 17 à 73 ans avec une moyenne de 33 ± 13,2 ans et ratio hommes-femmes de 1: 1,5. L'incidence de l'embrasement était à 8,5%. Traitement préalable, 47% des cas eu des douleurs, 61,3% avaient la radioluscencie apical et 83% avaient une nécrose pulpaire. La majorité (77.8%) des embrasements a eu lieu après la première visite (p = 0,000). Seule la douleur prétraitement avait une relation statistiquement significative avec l'embrasement(p = 0,009).

Conclusion: Le facteur de risque majeur trouvé en association avec embrasement était la douleur préopératoire. La première visite dans un traitement multi visite du canal radiculaire est une étape importante qui, si bien géré, peut réduire l'incidence d'embrasement.

Mots-clés: *embrasement, facteurs de risque, douleur préopératoire, incidence*

Introduction

The primary aim of endodontic treatment is to retain the affected tooth as a functional unit in the arch. This include cleaning, shaping, disinfection (biomechanical preparation) and obturation of the root canal to give fluid tight hermetic seal with no discomfort to the

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patient [1,2]. However, inter-appointment flare-up, which is a true complication of root canal treatment (RCT) characterized by acute exacerbation of asymptomatic pulp or periradicular pathology after the initiation or continuation of root canal treatment could occur. This leads to occurrence of pain and/or swelling during endodontic treatment that requires unintentional/ unscheduled review, including active intervention [3].

Frequency of flare up ranges from 1.5-20%, but can be as high as 50-90% [4-8]. Flare up may occur if, aseptic rules are not followed during the endodontic treatment, there's insufficient oral hygiene, treatment is done without rubber dam system or improper/ inadequate isolation, there's presence of residual carious tissue or non-hermetic filling and presence of secondary infection in the root canal [9]. It may also follow RCT even after it has been done under acceptable protocols [10]. Other factors include: pre treatment microbial infection, selective growth of certain bacteria and introduction of new micro organism following root canal treatment (RCT); use of intra canal medicament and number of visits of RCT [9,11]. Also over or under instrumentation, presence or absence of pretreatment pain and pretreatment pulpal status are amongst other factors that have been implicated in occurrence of flare up. [9,11-13]

This study aimed to determine the frequency/ occurrence of flare-ups amongst patients that had undergone multi visit RCT, to evaluate the possible risk factors that may be associated with the condition.

Materials and method

This was a prospective study of patients who had multi visit RCT at the Conservation Clinic, Dental Center University College Hospital Ibadan, between January and December 2014. Consecutive patients above age 16 scheduled for multi-visit RCT who agreed to participate in the study were recruited. Patients who declined participation and those undergoing other endodontic procedures other than multi-visit RCT were excluded.

The Conservative clinic provides endodontic treatment services amongst other treatments on regular basis. Multi-visit RCT is carried out as one of the major day to day procedures under standard protocol. Following the first visit, the patients were followed up for possible development of flare up. Flare up is diagnosed when patients present after commencement of non surgical root canal treatment, with severe pain with or without swelling before their scheduled visit which necessitated emergency intervention.

The demographics of the patients, status of the pulp prior to treatment (i.e whether necrotic or vital), presence or absence of pain prior to treatment, tooth type, diagnosis, and presence or absence of apical radiolucency and occurrence of flare up during the course of treatment were amongst data recorded. The conduct of the research was consistent with the

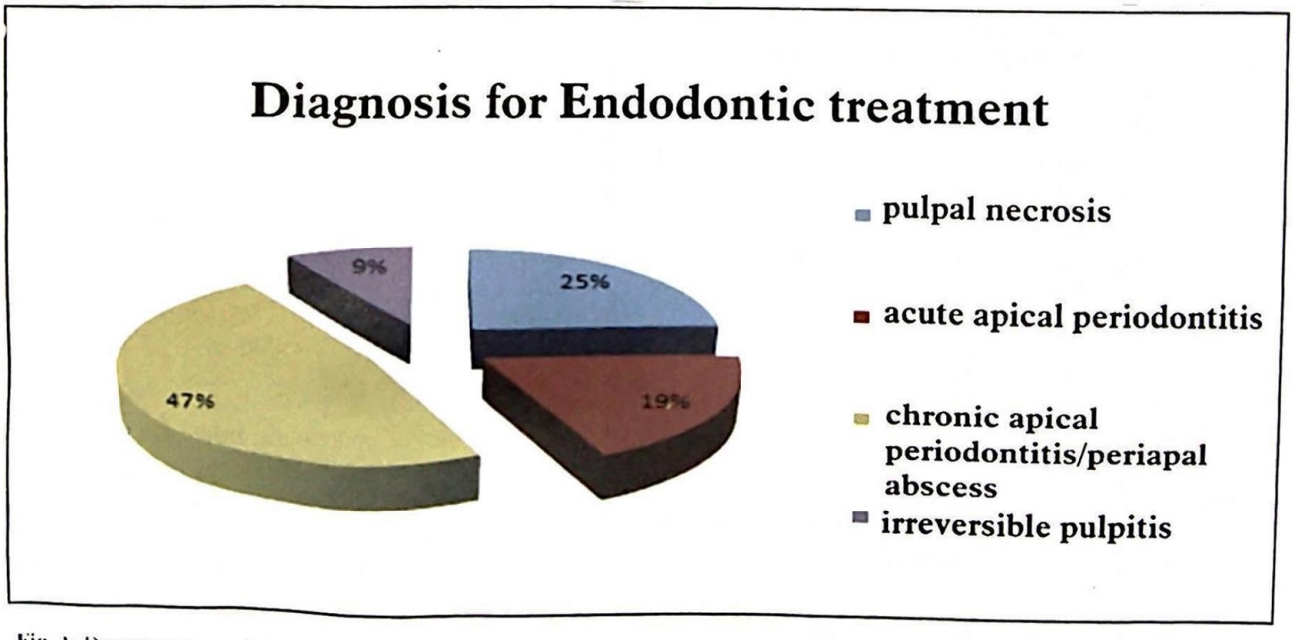

Fig. 1: Diagnosis for endodontic treatment

Declaration of Helsinki on ethical principles for research involving human subjects and informed consent was obtained from patients. Data was analyzed using SPSS version 20. pd"0.05.

Result

A total of 106 root treated teeth were analyzed in patients aged 17 to 73years with mean of 33±13.2 and male to female ratio of 1:1.5. Incidence of flare up was 8.5 % (table 1).

Table 1: Factors affecting endodontic flare up

	No	%
Tooth		
Maxillary centrals	63	59.4
Maxillary laterals	9	8.5
Mandibular centrals	9	8.5
Mandibular laterals	2	1.9
Maxillary premolars	10	9.4
Mandibular premolars	1	0.9
Mandibular canines	1	0.9
Maxillary molars	4	3.8
Mandibular molars	7	6.6
Total	106	100
Pulpal Status of treated teeth		
Tooth with necrotic pulp	88	83
Tooth with vital pulp	18	17
Total	106	100
Presence of Apical radioluscency		
Yes	65	61.3
No	41	38.7
Total	106	100
Presence of Pre-treatment pain		
Yes	50	47.2
No	56	52.8
Total	106	100
Presence of Flare up		
Yes	9	8.5
No	97	91.5
Total	106	100

About 47% of the cases were diagnosed with chronic apical/periapical abscess (Fig 1) While 83% of the teeth had necrotic pulp tissue, about 47% of the cases had pain prior treatment and 61.3% of the cases had apical radioluscency prior treatment. (table 1). About 89% of teeth with flare up had pre-treatment pain and this was statistically significant (p=0.009). Though 77.8% of the cases with flare up had necrotic pulp tissue, 88.8% had apical radioluscency, there was no significant statistical relationship between flare up and status of the pulp and presence of apical radioluscency (p=0.662, 0.076 respectively).

In addition, though more females (63, 58.5%) were treated, there was no significant relationship between gender and flare up (p= 0.332).

Majority of the flare up cases (66.7%) were seen in cases diagnosed with periapical abscess/chronic apical periodontitis but no significant positive correlation (p=0.603)

Majority (77.8%) of the flare up cases were seen in age group 21 to 40 years but this was not statistically significant (p=0.21). Most cases of flare up (77.8%) occurred after the first visit and this was statistically significant (0.000). Occurrence of flare up also increased the number of visits with 77.8% finished in 3 visits while 22.2% had 4 visits (p= 0.000). (table 2). Maxillary centrals constituted a higher percentage (59.4%) of the treated teeth and majority (77.8%) of the cases of flare up were seen in this set of teeth but this was not statistically significant (p= 0.903) (table 2)

Discussion

Incidence of flare up (8.5%) recorded in the study was within the documented range and in close agreement with 8.1% incidence of multi visit flare up in this environment as reported by Oginni *et al* [4] Tsesis *et al* [8] but lower than 10% reported by Udoye and Aguwa [14].

Majority of the teeth treated were maxillary centrals, this follows what has been documented previously by other researchers [15,16], these set of teeth were also the most involved in endodontic flare up in this study but this was not statistically significant. Due to their position, these teeth are often involved in trauma both domestic and road traffic accidents, sports etc and thus present more with pulpal pathology requiring endodontic treatment.

There was no significant relationship with flare up and gender though the study had more females which was in line with what has been documented by other studies [14,17,18]. This result is also supported by various studies [11,14,17] that have found that in general, female appeared to feel more pain. Females have also been found to seek treatment when there is experience of pain or discomfort [19]. Torabinejad *et al.*, [20] showed a significant positive correlation of flare-ups with patients' ages 40 to 59 years in contrary to this study that found non-significant negative relationship statistically between age group and flare

Table 2: Comparison of cases of flare up with the various factors

	Flare up cases					
	Yes		No		Total	P value
	N	%	N	%		
Tooth						
Maxillary centrals	7	77.8	56	57.7		
Maxillary laterals	0	0	9	9.3		
Mandibular centrals	1	11.1	8	8.3		
Mandibular laterals	0	0	2	2.1		
Maxillary premolars	0	0	10	10.3		
Mandibular premolars	0	0	1	1.0		0.903
Mandibular canines	0	0	1	1.0		
Maxillary molars	0	0	4	4.1		
Mandibular molars	1	11.1	6	6.2		
Total	9	100	97	100	106	
Gender						
Male	5	55.6	58	59.8	63	0.332
Female	4	44.4	39	40.2	43	
Total	9	100	97	100	106	
Pulpal status of treated teeth						
Tooth with necrotic pulp	7	77.8	81	83.5	88	0.662
Tooth with vital pulp	2	22.2	16	16.5	18	
Total	9	100	97	100	106	
Diagnosis						
Pulpal necrosis	1	11.1	25	25.8	26	0.073
Apical periodontitis	1	11.1	19	19.6	20	
Chronic apical periodontitis	6	66.7	44	45.4	50	
Irreversible pulpitis	1	11.1	9	9.3	10	
Total		9	100	97	100	106
Presence of Apical radioluscency						
Yes	8	88.9	57	58.8	65	0.076
No	1	11.1	40	41.2	41	
Total	9	100	97	100	106	
Presence of Pre-treatment pain						
Yes	8	88.9	42	43.3	9	0.009*
No	1	11.1	55	56.7	97	
Total	9	100	97	100	106	
Number of visits						
2	0	0	58	59.8	58	0.000*
3	7	77.8	38	39.2	45	
4	2	22.2	1	1.0	3	
Total	9	100	97	100	106	
Visit flare up occurred						
After first visit	7	77.8	0	0		0.000*
After 2nd visit	2	22.2	0	0		
No flare up	0	0	97	100		
Total	9	100	97	100	106	

*P ≤0.05

up. The age range of the subjects employed for this study was comparable to previous reports [5,14,11]in this regard. However, the age group of those that experienced flare up was lower than that reported by Torabinejab *et al* [20].

Pre operative symptoms have been found to affect flare up. This study also showed a significant relationship between preoperative pain and flare up, as previously reported by other investigators [4, 5,18,19] but in contrast to the study done by Udoye and Aguwa [14]. This pre operative pain has been associated with periodontal ligament being affected or inflamed before commencement of RCT [21]. Pain is also said to enhance stress level in the body and affects immune function in a negative way therefore increasing the probability of flare-up [21]. Though there is still some controversy over it, studies [11, 22] have documented that the teeth with vital pulp have lower incidence of flare up compared to those with necrotic pulp, this study however found no positive relationship between status of the pulp (whether the pulp is vital or necrotic before treatment) and incidence of flare up which is in agreement with Oginni *et al* [4] and Imura and Zuolo [5].

This study is in agreement with a Taiwan study [18] that showed an insignificant relationship between flare up and presence of periapical radiolusccncy. However, some other studies [5, 23] have shown a significantly higher incidence of flare-ups when there is presence of periapical radiolusccncy than when it is absent. Though majority of flare up was seen in cases with periapical abscess/ chronic apical periodontitis which also presented with periapical radiolusccncy on radiograph, this category of cases might have had their period of severe pain and gone into chronicity. However on instrumentation, there could be forceful extrusion of microorganisms into the periradicular tissues leading to acute inflammatory reaction, intensity of which is dependent on virulence of the micro organism present and other factors like host defense mechanism [24].

Significant relationship seen in the time of presentation of flare up (after 1st visit) is in agreement with the report of Genet *et al* [25] and could be due to change in the ecology of the canal through possible introduction of other microorganisms at the first visit, or making the present organism more virulent due to the intervention and introduction of chemical irrigants. First visit of root canal treatment in a multivisit RCT is the time in which complete biomechanical preparation of the canal(s) is done with placement of intracanal medicament, for further disinfection of the canal(s) prior to the obturation at the second visit. This is the period that most complications that can contribute to flare up in RCT would have occurred. Hence, maximum preparation of the canal and avoidance of complications at this visit can possibly reduce the incidence of flare up.

The treatment time of cases with flare up was prolonged in this study and this was significant. Multi-visit RCT requires 2 visits most of the time to allow for medication of canal and observation of symptom from the tooth. However, with occurrence of flare up, time required for treatment is increased to allow correction of possible cause and resolution of symptoms before final obturation.

Although the occurrence of flare up in multi visit RCT has no significant effect on final outcome of root canal treatment; it may prolong the treatment time as observed in this study. This gives undue stress and affects patient confidence in the clinician. Thus flare up should be avoided as much as possible to improve clinician-patient relationship. This is by following the appropriate guidelines of the procedure to reduce complications and thereby reducing and avoiding this inter appointment pain.

Conclusion

Incidence of flare up was 8.5% and the major risk factor was preoperative pain. First visit in a multi-visit RCT is an important stage which if well handled, can reduce the incidence of flare up.

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