

Frequency and nature of pain following single visit root canal treatment

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Article Info

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Abstract

The purpose of this study was to compare the frequency and nature of pain between the vital inflamed (n=55) and non-vital (n=55) teeth that received single visit root canal treatment. The frequency and nature of pain were assessed as no pain, mild, moderate and severe pain on day 2 and day 7. The results showed that 76.4 and 85.5% participants felt no pain in vital inflamed teeth on day 2 and day 7, respectively. On the other hand, 63.6 and 74.5% participants felt no pain in non-vital teeth on day 2 and day 7, respectively. The remaining participants only felt mild to moderate pain. There were no significant difference between the two groups ($p=0.435$ on day 2 and $p=0.371$ on day 7). The results suggested that single visit root canal treatment is equally effective in both vital inflamed and non-vital teeth.

Introduction

Dental pulp infection generally occurs as a consequence to dental caries, trauma and operative procedures whereby bacteria enter into the pulpal space.^{1,2} Pulpal infection commonly progresses to pulp necrosis with subsequent apical periodontitis.³ On radiological examination, a radiolucent area was recognized around the main canal or lateral and/or accessory canal. Therefore, successful treatment depends on the effectiveness of removing root canal contents, and then establishes a fluid tight seal at the apical foramen which will obliterate the total root canal system, and promotes healing or repair the periapical pathosis.⁴ Another important factor is the appointment during root canal therapy. It is generally said that at least two visits are needed to ensure a symptom-free condition before obturation of the root canal. However, several factors are responsible for re-infection that include leakage from the apical and coronal filling, failure to eliminate the intra-canal or intra-tubular bacteria.⁵ Furthermore, post-obturation pain following root canal treatment indicates an inadequate prognosis of the treatment that reduces long-term success.⁶ The occurrence of pain and swelling following root canal therapy varied between 0 to 65%,⁷ and these cases usually constitute a true emergency and very often require unscheduled visit for management.

Completion of root canal treatment can be reduced by single visit technique.⁸ It has been expected in the dental clinic with promising

result. Furthermore, patient is interested with this technique because of minimum time required, and more economical.^{9,10} Based on the previous studies, it can be considered that this technique could be equally effective in vital inflamed and non-vital teeth. Therefore, in the present study, the frequency and nature of pain following single visit root canal therapy in vital teeth was compared to that of non-vital teeth with or without periapical radiolucency.

Materials and Methods

Subjects

A total of 110 teeth were selected from the patients who attended at the Military Dental Centre, Savar Cantonment, Dhaka. Teeth with or without periapical radiolucency (less than 5 mm in diameter) as diagnosed by periapical radiograph and require endodontic treatment were selected for this study. A prospective cross sectional study was carried out during the period from March 2016 to February 2017. The exclusion criteria includes patient having any systemic disease, pregnancy and immune-compromised. In addition, teeth with calcified canals and retreatment were excluded. Each participant was well-versed about the scenery of the study and a written consent was taken. Subsequently, through clinical and radiological examinations were performed. Each tooth was subjected to pulp vitality test using electric pulp tester and a pre-operative periapical X-ray was taken to check the canal morphology,



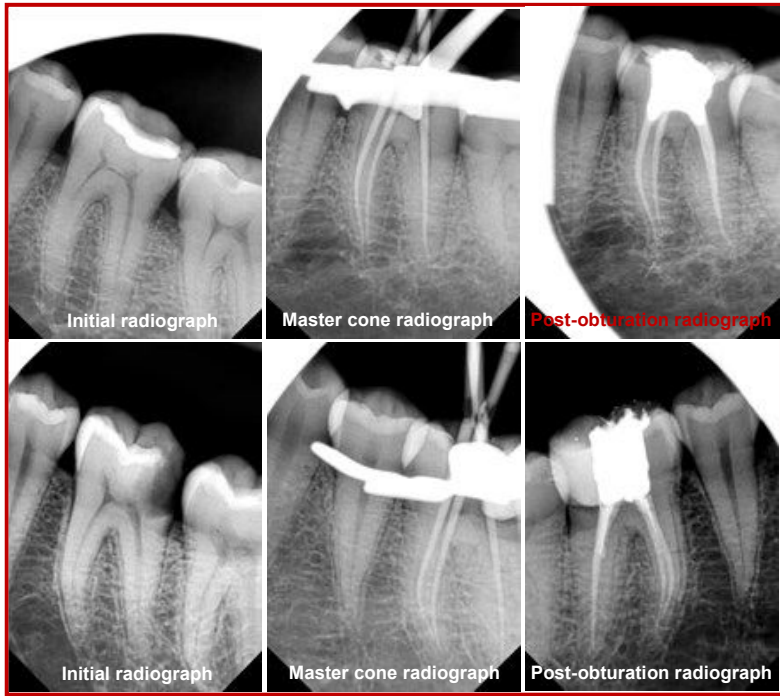


Figure 1: Shows representative radiographic photographs of the treatment procedure of vital (upper row) and non-vital tooth (lower row)

Table I

Comparison of pain status between treatment groups

Follow-up	Vital (n=55)	Non-vital (n=55)	Total (n=110)	p value
	n	n	n	
Second post obturation day				
No pain	42	35	77	0.435
Mild	6	12	18	
Moderate	5	6	11	
Severe	2	2	4	
Seventh post obturation day				
No pain	47	41	88	0.371
Mild	8	11	19	
Moderate	0	3	3	

P value reached using Student's test

periodontal status as well as presence or absence of periapical radiolucency. Fifty five vital inflamed teeth were subjected to single visit root canal treatment (Group I) and 55 non-vital teeth with or without periapical radiolucency also received single visit root canal treatment (Group II).

Treatment procedure

Figure 1 showed the treatment procedure of vital and non-vital tooth. After tooth preparation and proper isolation, straight line access cavity was

prepared and removed coronal necrossed tissue remnants. After negotiation, the canal patency was checked and the working length was determined. Biomechanical preparation of the canal was performed with protaper files and irrigated with 2.5% NaOCl and EDTA. Finally, the smear layer was removed with liquid EDTA and then 2% chlorhexidine was used. The canal was dehydrated with sterile paper points and obturated with protaper GP cones using calcium hydroxide based sealer (Sealapex). The access cavity was filled with permanent restoration. Each patient was recalled to assess the pain experience day 2 and day 7 after completion of the treatment. The pain perception was recorded in terms of feeling of discomfort irrespective of duration, requirement of analgesics, tolerance of pain, trouble in normal activity or sleep and impairment of masticatory function.^{11,12}

The frequency and degree of pain was recorded by Verbal descriptive scale¹³ as: Grade 0: No pain; Grade I: Mild pain or discomfort but not require medication; Grade II: Pain was tolerable with analgesics; Grade III: Severe pain and not respond to analgesics. The results were analyzed by SPSS version 17 and p value <0.05 was considered as significant.

Results

A total sample of 110 patients (62 male and 48 female) were treated with single visit therapy. The sex of the patient was as follows: 28 male and 23 female in Group I and 34 male and 25 female in Group II. The difference between two groups were not statistically significant ($p>0.05$).

The age of the patient was ranged from 15 to 45 years. The mean age was 29.8 ± 8.1 (range: 16 to 45 years) and 29.3 ± 9.0 years (range between 15 to 45 years, in Group I and II, respectively). The difference between mean age of two groups were not significant ($p>0.05$). However, all baseline characteristics like occupation, position of involved teeth, history and periodontal conditions were non-significant.

Table I showed the comparison of pain status between two groups. Among the 110 treated teeth, 18 patients felt mild pain, 11 moderate, 4 severe and 77 patient did not experience any pain at second post-obturation day. On the other hand, at seven post-obturation day, 88 patient felt no pain and the remaining showed mild and moderate pain which were 19 and 3, respectively. When the differences of pain between the two groups were assessed, it was found that at second post-obturation, mild pain (10.9 vs 21.8%), moderate pain (9.1 vs 10.9%) and severe pain (3.6 vs 3.6%) were found in both groups (Table I). Furthermore, no experienced of pain was found in 76.4 and 63.6% in Group I and II, respectively. The differences between two groups

were non-significant ($p=0.435$). On day 7 post-obturation day, both groups had experienced mild pain (14.5 vs 20%), moderate pain (0.0 vs 5.5%). The experienced of feeling no pain was 85.5 and 74.5% in Group I and II, respectively. Again the result of frequency of pain between the two groups were non-significant ($p=0.371$).

Discussion

There are variations in study designs, different pain measurement scales, pre-operative conditions of the teeth, different techniques of preparation and obturation, and methods of collecting and analyzing the post-obturation pain data. Hence, the comparison between the studies of pain is not easy. Therefore, the long-term evaluation is needed to assess the clinical actual success of endodontic treatment which is not possible by short-term investigation using criteria of presence or absence of post-operative pain. A previous study reported that post-operative pain can be an indication of clinical success of root canal treatment.¹⁴

In the case of single root canal treatment in vital inflamed pulp, 76.4% participants felt no pain on day 2 followed by 8.5% on day 7. The remaining tooth had pulp to moderate pain day 2 which was disappearing day 7. There were several studies correspondent to that of the present study that although 90% treated teeth with single visit root canal treatment had little or no pain at the end of 1 day followed by 99% at one week.¹⁵ Furthermore, another study revealed 90% success rate after one week.¹¹ However, the success rate was decreased in the group where single visit root canal treatment was performed in non-vital tooth. The present study showed that no pain was felt by 35 and 45 participants on day 2 and day 7 post-obturation. The remaining teeth had mild (12 on day 2 and 11 on day 7) and moderate pain in 6 and 3 cases in both observation periods. Mulhern et al. (1982)¹⁶ reported that 26.7% participants felt pain after 1 day followed by 6.7% after 1 week. Furthermore, Pekruhnet et al.(1981)⁹ reported 15.6% of cases had relatively painful condition whereas Kane et al. (1999)¹⁷ found prolonged discomfort in two cases of 80 teeth. Although higher percentages of post-obturation pain were found at the second post-obturation day in both groups of the present study, it was gradually decreased with increase of the observation period. A similar results were also reported by Al-Negrish and Al Habahbeh,(2006)⁷ Mulhern et al. (1982).¹⁶ Re-treatment or extraction of the tooth should be perform in the case where pain is persisted even after seven day observation period.

The present study showed that the pain was significantly higher in older patient than younger

patient (at and below 25 years of age), which is also supported by Torabinejad et al. (1998)¹⁸ and Cheng et al. (2006)¹⁹ It was found that the frequency of post-obturation pain in the elderly group was high which might be due to their previous pain experience or reduce to tolerate of pain. There are also several reasons of post-operative pain in the vital tooth following obturation. These includes remaining pulp tissue into the root canal, leakage of irritant through the apex, high occlusion and the patient fail to maintain the post-operative instructions.^{20,21} On the other hand, in the case of non-vital teeth, post-obturation pain may occur due to inadequate healing to the lesion, constant anaerobic infection or root resorption.^{22,23} Moreover, some microorganisms are said to have the ability to defend against the immune defenses and persist in the periradicular tissues. Sometimes they may produce an extracellular matrix or protective plaque.²⁴ Two species of microorganisms such as *Actinomyces israeli* and propionicum have the capability to prevent healing after root canal treatment.²⁴

Conclusion

Single visit root canal treatment is promising option for both in vital inflamed and non-vital teeth with or without periapical lesion.

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