

A Clinical study to evaluate post-obturation pain related to method of treatment-single-visit verses two-visit root canal therapy.

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Abstract

Aim: To compare and evaluate post Obturation pain after single visit and two visit root canal treatment for anterior single canal teeth with diseased pulp.

Method: A total of 90 male patients, estimated sample size, between 19 to 70 years were included that required root canal therapy, fulfilling the inclusion criterion, with only one of an anterior tooth-incisor or canine, with vital pulp. These selected patients were randomly assigned to single visit RCT group (GS1) or to the two visit RCT group (GT2). In each group, out of 90 patients, were equally allotted into 45 each to the GS1 and GT2 groups. Following standard Protocol for patient care, Step-back technique and lateral condensation obturation was used. Wilcoxon signed rank test and Sample T- test was used for comparisons of pain incidence and pain intensity after post obturation in single and two visit root canal therapy.

Results: There was no significant difference in post obturation pain at observation- follow up time interval of 6hours, 24hours and 48hours after single-visit and Two-visit root canal treatment, However, significantly ($p < 0.05$) at 12hours time interval for single visit RCT there was slightly more pain incidence and intensity when compared to Two visit RCT.

Conclusion: The pre-operative pain, which was in the range 6---strong to 8---severe, significantly reduced after pulp extirpation in Two visit root canal treatment (GT2) and after root canal obturation in single visit root canal treatment(GS1). Significantly, there was slightly more pain in single visit root canal treatment at time interval of 12hours post obturation.

There was no significant difference at 6hours, 24hours and 48hours in post obturation pain when compared between single-visit and Two-visit root canal therapy diseased vital pulp. Recommendations in choice of treatment for root canal therapy should be based on the effective regimens that will benefit both the patient and the Dentist.

Key word:Single visit RCT, Two visit RCT, Obturation, Pain.

Introduction

Root canal treatment either in one visit or two visit the outcome results remains ambiguous, radiographically clinically and the incidence of post obturation complications would there be any difference in these two techniques remains an uncertainty (1). Pain, irreversible pulpitis and root canal therapy are linked with each other in one or the other form. for the reasons like: Post-obturation pain-bacterial and microorganism disinfection-periapical healing -as well as patients preference for faster

single visit or two-visit endodontic treatment are more recent trends. (2-6).

Post operative pain may be defined as pain in varying intensity and degree due to initiation of root canal therapy and a painful flare-up associated with or without swelling is a symptomatic reaction after an endodontic treatment (7).

Discomfort and post obturation pain onset or continuation after initiation or completion of root canal therapy will be an unpleasant symptom for the patient and unpleasing for the endodontist, however, pain is not a measure or indicator for the successful outcome for endodontic therapy (8). The factors that may contribute or influence post obturation pain are as follows (9), Number of appointment visits (2,10,11), Intra-canal medicaments (12-14), and location of the tooth in the arch (14).

In the undergraduate level two or multi visit endodontic root canal treatment was, and may it is taught in many dental schools as it is also regarded and considered as a safe clinical procedure than one-visit root canal therapy (15-16). To teach and develop One, or as more commonly called as, single visit root canal treatment, in an opinion survey Lander and Calhoun have drawn attention to inculcate one visit technique in undergraduate endodontics. (17).

Pioneering work by Fox et al. on post-operative pain in one-visit and multi-visit root canal therapy comparison found not-many differences (18). One visit root canal therapy is indicated for traumatic pulp exposure, pulpal necrosis tooth associated with sinus tract (19). The root canal treatment is an invention into the pulp space following strict aseptic protocols and highest standards of patient care, however discomfort or mild pain is a very common expected and well know that even patients anticipate fear of pain with endodontic therapy (9).

As root canal treatment is a microsurgical procedure it may have few complications. Post-operative pain, discomfort and swelling will be an indication requiring anti-inflammatory analgesics or may even require endodontic emergency treatment urgent unscheduled visit. Few of the studies have reported flare-up associated with single visit root canal treatment (20). Whereas other studies have reported no difference in single or two visit root canal treatment outcome. (2)

The purpose of this present clinical study was to investigate the effectiveness of single visit verses two visit root canal treatment protocol for incidence and severity of post-obturation pain.

Materials and Methods

Patients / Subject selection

The detailed study project was presented to the ethical committee, college of dentistry, Qassim University. The endo subject was recruited from the out (Endo clinics) patient department of the Dental center 2017 to 2018. Patients /Subject were informed about the research and consent forms were signed by them. Exclusion criterion was for patients with medically compromised, systemic diseases, immunological deficiencies, pregnancies and therapeutics medications like antibiotic, narcotic analgesics or corticosteroids and children to young under 17 years.

A total of 90 male patients, estimated sample size, between 19 to 70 years were included that required root canal therapy, fulfilling the inclusion criterion, with only one of an anterior tooth-incisor or canine, with vital pulp. These selected patients were randomly assigned to single visit RCT group (GS1) or to the two visit RCT group (GT2). In each group, 90 patients were equally allotted into 45 each to the GS1 and GT2 groups. Exclusion criterion was necrotic pulp, calcified canals, open apex,

incomplete apex formation, grade III mobility, periapical lesions and periodontally involved teeth.

In each subject/ patient; only single tooth indicated for the root canal therapy was included for the study. To confirm and check pupal vitality thermal test with Endo frost cold spray (Coltene/Whaledent G mbH Langenue, Germany), electrical pulp test with vitality scanner (SybronEndo, Glendora, CA 91740 USA) and direct clinical observation with bleeding pulp was done.

Structured pain measurement scale

The operators in the endo clinics were calibrated and trained for the use of pain measurement with modified verbal descriptor scale for the present study. Patients in each group GS1 and GT2 were explained and instructed to indicate mark on the horizontal intensity scale to express the pain intensity experienced and were instructed to utilize verbal modified measurement scale (VASm) (3).

The following patients discomfort pain levels were rated as given below:

No discomfort no pain: the RC treated tooth felt comfortable.

Slight pain and discomfort: the RC treated tooth was associated slight pain and discomfort for a little period of time but without analgesic need.

Moderate pain: the RC treated tooth was painful and discomfort required analgesic for pain relief.

Strong pain: the RC treated tooth caused pain causing disturbed sleep and required centrally acting /narcotic analgesic for pain relief.

Severe pain: the RC treated tooth was very painful disrupting patients routine activity along with disturbed sleep and the analgesic medication was ineffective.

Excruciating / Maximum Pain: the RC treated tooth was extremely pain with no sleep associated other general body symptoms.

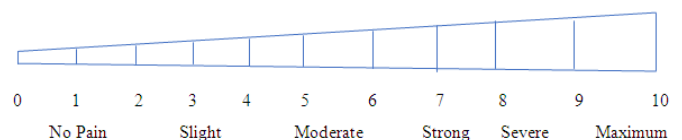
Operators educated each patient and Every patient, included in the treatment procedure, to understand VASm scale and was asked to mark a number value, depending on the pain intensity he perceived between 0 through 10 on the verbal modified measurement scale. Following root canal treatment with standard root canal treatment protocol local anesthesia---Rubber dam application---step-back technique--- 2.6% sodium hypochlorite irrigation solution and obturation using lateral condensation technique for both study groups, no intracanal medicament was used in two-visit RCT. Ibuprofen 600mg prescription was given to each patient and were instructed to record pain, if any, and consume the medicine as advised on experiencing pain.

All patients were handed the VASm patient response form to mark on the value for post obturation pain at the given period of times 6hours, 12 hrs, 24 hrs, 5days. After marking the value, completed forms were taken back from the patients.

The statistical analysis of the data was done with Wilcoxon signed rank test and I independent T test. Software SPSS (Version 11, Inc. Chicago, USA) was used for analyses.

Patient Response form

Please mark on the scale below for the type of pain you are experiencing on RCT treated tooth {(Pre-operative) [Post- Obturation—6hours, 12hours, 24hours and 48hours]}



A) You will tick a mark on the line to indicate as to how much pain

You are experiencing **before any** root canal treatment

B) You will tick a mark on the line to indicate as to how much pain

You are experiencing **6 hours after** root canal treatment

C) You will tick a mark on the line to indicate as to how much pain

You are experiencing **12 hours after** root canal treatment

D) You will tick a mark on the line to indicate as to how much pain

You are experiencing **24 hours after** root canal treatment

E) You will tick a mark on the line to indicate as to how much pain

You are experiencing **48 hours after** root canal treatment

If you have taken medication for pain, please tick mark in the box.

Results of Pre And Post Obturation Pain

In group1 (GS1) forty-two patients reported and in group2 (GT2) forty-one patients reported pre-Operative pain, that is, about 93.33% to 91.11% were having pain and discomfort, ranging from Moderate to severe, from the offending tooth, indicated for root canal treatment.

Table 1: Teeth distribution for Single visit and Two-visit RCT and pre-operative pain percentage.

| Root Canal treatment | Anterior teeth (upper/Lower) | Pre-Operative Pain | Percentage |
|----------------------|------------------------------|--------------------|------------|
| Single-visit | 45 | 42 | 93.33% |
| Two-visit | 45 | 41 | 91.11% |

Forty-five patients received root canal therapy in one-visit and another 45 patients root canal therapy was performed in Two-visits. After the root canal obturation, in group1 (GS1) 45 patients and in group2 (GT2) equal number of patients have reported back for follow-up along with the VAS form marked the intensity of the pain and incidence of pain at 6hours, 12hours, 24hours and 48hours. The data was analyzed with SPSS 11.5 software (Chicago, USA).

Wilcoxon signed rank test revealed statistically significant difference for pre-operative pain and post obturation pain,

at 12hours interval there was drastic reduction of pain in both one-visit and Two-visit root canal treatment, however, there was no significant difference for the incidence of pain in other follow-up observation period of time interval.

Table 2: Independent sample T test for Verbal analogous scale (VASm) pain measurement for both study groups (Single visit and Two Visit root canal treatment (RCT))

| | | Mean | N | Std. Deviation | z-value | p-value |
|--------|----------------|------|----|----------------|---------|---------|
| Pair 1 | Pre-GS1 (n=45) | 6.53 | 45 | 1.949 | -5.531 | 0.000* |
| | 6hours-GS1 | 3.04 | 45 | .928 | | |
| Pair 2 | Pre-GS1 (n=45) | 6.53 | 45 | 1.949 | -5.770 | 0.000* |
| | 12hours-GS1 | 2.00 | 45 | .953 | | |
| Pair 3 | Pre-GS1 (n=45) | 6.53 | 45 | 1.949 | -5.810 | 0.000* |
| | 24hours-GS1 | .76 | 45 | .609 | | |
| Pair 4 | Pre-GS1 (n=45) | 6.53 | 45 | 1.949 | -5.746 | 0.000* |

*p ≤ 0.05

Table 3

| | | Mean | N | Std. Deviation | z-value | p-value |
|--------|----------------|------|----|----------------|---------|---------|
| Pair 1 | Pre-GT2 (n=45) | 6.24 | 45 | 2.347 | -5.239 | 0.000* |
| | 6hours-GT2 | 2.84 | 45 | .976 | | |
| Pair 2 | Pre-GT2 (n=45) | 6.24 | 45 | 2.347 | -5.711 | 0.000* |
| | 12hours-GT2 | 1.58 | 45 | .812 | | |
| Pair 3 | Pre-GT2 (n=45) | 6.24 | 45 | 2.347 | -5.689 | 0.000* |
| | 24hours-GT2 | .71 | 45 | .589 | | |
| Pair 4 | Pre-GT2 (n=45) | 6.24 | 45 | 2.347 | -5.700 | 0.000* |

*p ≤ 0.05

Table 4

| | GROUPS | N | Mean | Std. Deviation | z-value | P-value |
|--------------|--------|----|------|----------------|---------|---------|
| Pre- GS1 | 1 | 45 | 6.53 | 1.949 | -0.813 | 0.416 |
| Pre-GT2 | 2 | 45 | 6.23 | 2.371 | | |
| 6hours- GS1 | 1 | 45 | 3.04 | 0.928 | -1.139 | 0.255 |
| GT2 | 2 | 45 | 2.84 | 0.976 | | |
| 12hours- GS1 | 1 | 45 | 2.00 | 0.953 | -2.438 | 0.015* |
| GT2 | 2 | 45 | 1.58 | 0.812 | | |
| 24hours- GS1 | 1 | 45 | 0.73 | 0.585 | -0.202 | 0.840 |
| GT2 | 2 | 45 | 0.71 | 0.589 | | |
| 48hours- GS1 | 1 | 45 | 0.40 | 0.580 | -1.859 | 0.063 |
| GT2 | 2 | 45 | 0.62 | 0.490 | | |

Statistical significant difference ($P \leq 0.05$) was evident in 12 hours follow-up time interval others were not significant. The VASm range measurement was from 0 (No Pain) to 10 (Maximum Pain).

In the present study was conducted at college of dentistry Qassim university, Saudi Arabia. Total of 90 study participants were enrolled in study which were further divided in groups by simple random method. Out of 90 participants 45 were subjected to single seating root canal treatment while remaining were undergone two seating root canal treatment.

Both the groups were evaluated for pre and post-operative pain intensity Before the start of treatment mean VAS score was recorded for the groups and no significant difference was found. Further, the incidence of post-operative pain was assessed at regular interval of 6 hours, 12 hours, 24 hours and 48 hours among both the groups. Incidence and intensity of postoperative pain among both the groups was reduced gradually over the 24 hours. The mean difference in intensity of intragroup preoperative and postoperative pain was evaluated at all intervals and was found statistically significant (**Table 2 and Table 3**).

Intergroup comparison was carried out by using Wilcoxon

signed ranks test to assess the significance difference at different intervals. A significant difference in pain intensity was recorded between groups at 12 hours' interval but no significant difference was recorded at 6 hours, 24 hours and 48 hours. (**Table 4**)

When compared with pre-operative pain, there was considerable reduction in pain after root canal treatment, but in first 6 hours patients recorded slight to moderate pain in both one-visit as well as two-visit RCT. However at time interval of 24- and 48 hours time interval most of patients had very slight or No pain in both the groups. In both the root canal treated groups the incidence of post-obturation pain and similarly the intensity of pain was almost similar.

Discussion

The main investigation of this present clinical study was to evaluate and compare the influence of one-visit and two-visit root canal therapy the post obturation pain for irreversible vital pulp RCT treated anterior teeth. In our clinical practice routinely when patients will experience dental pain they will seek dentist care. When pulp get infected superficially, the choice to for excision of the irreversibly damaged pulp with aseptic microsurgical procedure in a single treatment appointment along with complete root canal obturation advocated. It is dictated most probable by the technical skill to finish the procedure in one visit. In cases where the pulp necrosis occurs along with the periapical complications, the root dentine will be highly possibly infected, in such cases there is a great need for thorough root canal disinfection. Root canal cleaning and shaping, sodium hypochlorite irrigation and intracanal medicaments between appointment are all contributing factors for a complete canal disinfection.

Therefore, for necrotic pulps with microorganisms and biological reason these disease pulp conditions will need and probably essential to treat in more than just one

treatment sessions, though, technically with good skill can be a one visit, considering only technical and not biological reason. (21).

For the diagnostic test methods, with some of the shortcoming, it can measure only just neural response, however, the patients responses may vary due to the psychological factor, the ethnical and cultural backgrounds and also the age, previous treatments and restoration, trauma and the interpretation of the results all these factor can influence the patient response.(22) Various methods and different pain measurement scales have been used for the root canal treated clinical studies.(23-25) The modified visual analogous scale was used for the post obturation pain associated with one visit and two visit root canal therapy.(3) With proper design and understandable descriptive pain response words for the patients will give very valid and reliable pain experience responses in terms of intensity of pain.(26) At each give time interval the incidence of pain will also be recorded. In the present clinical study simple verbal understandable categorization of the word were utilized for the patients response form- ranging from 0 to 10 with five pain categories 0 No pain, 2-slight pain, 4-Moderate pain, 6-stronge pain, 8- sevsere pain and 10- Maximum pain. The specific description of each of the pain category were well understood by our study patients after educating each patient along with written feedback response form. One of the most reliable and very effective method for the evaluation of pain is by self-reporting. As mentioned above pain perception is an individual highly subjective and are influenced by many other factor. (27)

The pain measurement visual analogous scalewith 0---no pain, 1---slight pain, 4---moderate pain, 6---stronge pain, 8---severe pain and 10---maximum pain, coupled with modification included the visual descriptor scale with No pain—slight pain—moderate pain—stronge pain—severe

pain-maximum pain. Patients were to tick-mark on the feedback response form the most appropriate pain intensity rate in numerical or descriptive scale. Both pain measurement scale are in clinical practice, depending on the choice preference from the clinical practitioner and the responding patients. (28)

In endodontics, for root canal therapy, the number of visits for complete canal obturation and the post obturation pain there are controversies concerning the relationship between one-visit, two visit and post obturation pain. A number of studies have been done to analysed pain at various time intervals, short and long intervals. (10, 24, 29)

Considering the variation in meticulous working length measurements, rubber dam isolation, cleaning and shaping technique, irrigation protocol, inter-appointment temporary dressing, intra canal medicaments, obturation technique, vital and necrotic pulps, etc. all these factors will affect the post-operative pain in various studies, However, in most of the clinical studies results for post obturation pain in patients with vital pulps root canal treatment either in one visit or two visit RCT showed almost similar pain perception experience. (3, 24, 30, 31). Present study results also agree with these previous study results.

When comparing the results of post obturation pain with single visit verses two visit root canal treatment, in general the post obturation pain for both the groups was almost similar, however, at 12hours the single visit RCT patients recorded significant difference with slightly more post obturation pain as compared to the two-visit RCT. The reason might be that pain at 6hours continued still further, as in single visit RCT the canals were obturated and there was pressure that might have build-up on excision of pulp at apical region. In contrast, with Two-visit RCT there was No pressure build-up after excision of pulp, as the

canal was not yet obturated. The preoperative pain in ~95% in both the study group was 6---strong to 8---severe. In two-visit RCT group with pulp extirpation and in one-visit RCT group with complete canal obturation caused most significant reduction in pain intensity. However, post obturation pain for the time interval of 6hours was 3---slight for one-visit, 2---slight for two-visit here most of the patients experienced slight pain or discomfort but vast majority of both study group reported and scored less than 0 to 0.75---no pain or very slight pain in the time interval of 24hours and 48hours of the root canal treatment.

Conclusion

1. The pre-operative pain, which was in the ranged 6---strong to 8---severe, significantly reduced after pulp extirpation in Two visit root canal treatment (GT2) and after root canal obturation in single visit root canal treatment(GS1).
2. Significantly, there was slightly more pain in single visit root canal treatment at time interval of 12hours post obturation.
3. There was no significant difference at 6hours, 24hours and 48hours in post obturation pain when compared between single-visit and Two-visit root canal therapy diseased vital pulp.
4. Recommendations in choice of treatment for root canal therapy should be based on the effective regimens that will benefit both the patient and the Dentist.

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