

Original Research Article

Frequency of post obturation pain by using ibuprofen and ibuprofen/dexamethasone infiltration in single visit root canal treatment cases

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Received: 28 November 2017

Revised: 08 January 2018

Accepted: 09 January 2018

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ABSTRACT

Background: Pain after root canal treatment is a challenging problem for the operative dentists over the last few years. The development of pain is dependent on the intensity of tissue damage. Inflammation is characterized by a series of vascular events in response to tissue injury. The release of mediators is responsible for much of the pain. The rationale of this study is to use NSAIDs alone or in combination with dexamethasone to reduce post treatment swelling and pain following endodontic therapy. The objective of the study was to compare the frequency of post obturation pain by using ibuprofen or ibuprofen/ dexamethasone infiltration in single visit endodontic cases.

Methods: This study was carried out in the Operative Dentistry, Department (AFID), Rawalpindi, Pakistan from December 2015 to May 2016 after approval from the Institutional Ethical Review Board. After an informed consent, 128 patients fulfilling inclusion criteria were divided in to two equal groups. In Group A, after root canal treatment, an additional single shot local infiltration of 0.5 mg dexamethasone was given in periapical area. Both the patient groups were prescribed ibuprofen 400 mg three times a day. Patient's pain response was recorded after 24 hours of treatment, using visual analogue scale. Data was analyzed using SPSS version 17.

Results: After 24 hours, 6 (9.4%) patients showed the pain in group A while 16 (25.0%) patients complained of pain in group B.

Conclusions: The results of this study showed, group A showed less postoperative pain as compared to group B where only ibuprofen was given.

Keywords: Post obturation pain, Lateral condensation technique, Dexamethasone, Ibuprofen

INTRODUCTION

Root canal treatment (RCT) or endodontic treatment is a common procedure in dentistry. Postoperative pain is defined as pain of any degree that occurs after initiation of RCT, whereas flare-up has been defined as the onset or continuation of pain and/or swelling after endodontic treatment. The development of postoperative pain after

RCT is usually due to acute inflammatory response in the peri-radicular tissues. It commences within few hours or days after endodontic treatment.¹⁻³

Patients might consider postoperative pain and flare-up as a benchmark against which the clinician's skills are measured. It might undermine patient's confidence in their dentists or patient satisfaction with the treatment.

The development of pain is more dependent on the intensity of tissue damage, and the outcome of RCT is influenced by the persistence of the source of injury.⁴

A variety of approaches have been used to reduce the severity of post treatment pain. Such treatment may include intracanal medicament or systemic medications such as narcotic analgesics, steroids, or nonsteroidal anti-inflammatory agents.⁵⁻⁷ Root canal therapy does not immediately eliminate this periapical inflammation, thus the pain may persist postoperatively.⁶

Inflammation is characterized by a series of vascular events in response to tissue injury. The release of mediators is responsible for much of the pain. Prostaglandins, leukotrienes, bradykinin, substance P, and serotonin have been linked to this vascular response and the elicitation of pain.³ The potential for glucocorticoids to directly and/or indirectly prevent pain is evidenced by their ability to suppress the formation of the precursors for these mediators to suppress tissue levels of bradykinin.⁴⁻⁵ Because of this property, dexamethasone has been used to reduce post treatment swelling and pain following endodontic therapy. No adverse drug responses have been reported.⁶⁻⁸ Marshall and Walton reported that 4 mg of dexamethasone injected intramuscularly significantly reduced post treatment endodontic pain when compared with a placebo.⁷ Krasner and Jackson also reported a statistically significant reduction in post treatment pain in the patients given dexamethasone.⁶ Dexamethasone or other synthetic glucocorticoids are still not widely accepted by the dental profession as therapeutic modalities for the management or prevention of postoperative endodontic pain.⁵⁻⁷

Dental pain is now an emerging public health problem in people of different ages and also is the important reason of seeking dental treatment. But in most of the cases, the people are afraid from dental treatment because of the pain associated, during or after the treatment. Now because of the advanced concepts of management and better treatment planning, this dental treatment has become the means of removing the pain, rather than the cause of pain. In such cases, ideal management of toothache needs the combination of correct diagnosis, followed by comprehensive treatment plan. In the field of endodontics, the pain is relieved by chemo-mechanical preparation for the effective cleaning of causative organisms and obturation of the root canals that prevents and discourages the re-entry of infected flora into the root canal system.^{1,2}

In cases of irreversible pulpitis or pulp necrosis, the treatment of choice is root canal treatment. Irreversible pulpitis is characterized by the presence of severe pain that can be throbbing or stabbing. That nature of pain is poorly localized. The intensity of pain is increased by the application of hot or cold stimuli. The duration of pain may take hours to days. And if this state of tooth is wrongly treated, left untreated or ignored, the tooth

becomes necrosied, that is an asymptomatic state of tooth. In this case, the root canal treatment is indicated and can save the tooth from extraction.³

Root canal treatment consists of preparation of the canals that include, cleaning and shaping of the root canals followed by the obturation. Now the latest concept of preparation is changed from cleaning and shaping to, shaping and cleaning. This process of shaping and cleaning allows the effective and efficient cleaning of the root canal system from the infected micro-organisms that make the environment aseptic and is needed to cure the disease state. Copious amount of irrigation is required during preparation of canals to get the maximum beneficial results. Obturation is to fill the canals with biocompatible material. Gutta percha is used commonly. Obturation needs ideal funnel shaped preparation of the root canals, which ease the placement of gutta percha. A good obturation eliminates the chances of re-infection, by sealing the canal system both apically and coronally.

Different obturation techniques are available which include cold lateral condensation, warm vertical condensation, Guttaflow technique and carrier cone technique-thermafill.⁴⁻⁷ Two most common techniques are conventional lateral condensation and warm vertical condensation techniques.

Pain after endodontic treatment is because of multiple factors that involve inadequate pulp removal, insufficient canal preparation, improper obturation, infection, immunological response, damage to the peri-apical tissue, reaction to medication or a combination of all these factors.⁸

Menhinick et al found that a combination of acetaminophen and ibuprofen was more effective than ibuprofen alone in managing postoperative pain.⁴ However, their investigation included numerous pulpal conditions that might have differing postoperative courses. The study conducted showed that 31.2% (n=20) patients reported mild pain, 56.6% (n=35) moderate and 14.4% (n=9) reported sever pain. While in study group 64% (n=41) reported mild pain 32.8% (n=21) moderate and 3.1% (n=2) reported sever pain.⁹

Therefore, the purpose of this study will be to determine ibuprofen versus ibuprofen/ dexamethasone infiltration use for postoperative endodontic pain in asymptomatic single visit endodontic patients diagnoses with pulpal pathosis and associated no periapical radiolucency. This treatment modality will benefit patients in term of short time as single visit root canal treatment with minimum or no post-operative pain.

METHODS

This clinical trial was carried out from July 2016 to January 2017, in the Department of Operative Dentistry, AFID, Rawalpindi, Pakistan.

Inclusion criteria

Patients of both genders aged 16-45 years with non-vital asymptomatic premolar teeth with necrotic pulp. The diagnosis of non-vital pulps was made by history, clinical examination, lack of response to thermal and electrical pulp tests and no periapical radiolucency.

Exclusion criteria

Patients with following conditions would be excluded.

- Teeth having extensive intra canal calcification.
- Teeth with incompletely formed apices.
- Teeth requiring retreatment.
- Taking analgesics, anti-inflammatory or tri-cyclic anti-depressants.
- Allergy to endodontic medication.
- Teeth with grade II or III mobility (more than 2 mm)

Data collection procedure

Patients visiting the Operative Dentistry Department, Armed forces Institute of Dentistry (AFID), Rawalpindi, fulfilling the inclusion criteria, were informed about the study and informed written consent for participation in the study were requested. Ethical committee of AFID for dental research approved the trial. The diagnosis of non-vital pulps were made by history, clinical examination, lack of response to thermal and electrical pulp tests, cavity tests and radio-graphs.

All patients were divided randomly into two equal groups, group A and group B, using lottery method. Teeth were isolated using rubber dam and access cavities were made by sterile round bur in high speed hand-piece. Canals were prepared with H files (MANI INC JAPAN, LOT H07017200) using 2.6% sodium hypochlorite as an irrigant. The step back canal preparation technique was used in all cases and canals were obturated with cold lateral gutta-percha obturation technique.

In Group A, after root canal treatment, single shot local infiltration of 0.5 mg dexamethasone was given in periapical area. In Group B, after root canal treatment no local infiltration of dexamethasone was given. Both the patient groups were prescribed ibuprofen 400 mg three times a day. All the procedures were completed by the

same operator under the supervision of my supervisor. All the patients were recalled after 24 hours. The patient's pain response before and after treatment were recorded by the patient himself or herself in Performa (A) after 24 hours of treatment using visual analogue scale (VAS). The telephone contacts of the patients were obtained to ensure follow up.

Data analysis procedure

Data was analyzed by using SPSS 17.0. Descriptive statistics was presented for both qualitative and quantitative variables. Mean±S.D was calculated for age and VAS score. Frequency and percentages for gender and pain was calculated. Stratification with respect to age was considered for post-operative pain measurements. Post stratification Chi-square test was applied. Chi-square test was used to compare pain at 24 hours after treatment. $P \leq 0.05$ was considered as statistically significant.

RESULTS

In the present study, 128 teeth were treated for the root canal therapy in both groups. Patients were divided into two equal groups A and B. All patients were treated by single operator in single visit. In group A, after completion of the RCT, single shot local infiltration of 0.5 mg dexamethasone was given in periapical area. In Group B, after root canal treatment no local infiltration of dexamethasone was given. Both the patient groups were prescribed ibuprofen 400mg three times a day. In group A, 64 patients participated with minimum age 16 years to maximum age 45 years. Mean age was 28.00 ± 6.718 . In group B, 64 patients participated with minimum age 16 years to maximum age 43 years. Mean age was 26.484 ± 6.060 .

When both the groups were compared according to the postoperative medication in relation to the pain after 24 hours, it was observed that in group A, 6 (9.4%) patients showed the pain after 24 hours and 58 (90.6%) patients showed no pain. In group B, 16 (25.0%) patients showed the pain and 48 (75%) patients showed no pain after 24 hours. All the results are tabulated in Table 1.

In Table 2, stratification of pain after 24 hours in both groups with reference to gender is given.

Table 1: Comparison of pain after 24 hours in both the groups.

		Pain after 24 hours		Total	P value
		Yes	No		
Groups according to post-operative medications	Group A	6	58	64	0.019
		9.4%	90.6%	100.0%	
	Group B	16	48	64	
		25.0%	75.0%	100.0%	
Total		22	106	128	
		17.2%	82.8%	100.0%	

Table 2: Comparison of pain after 24 hours in both groups with reference to gender.

Gender	Group according to post-operative medications	Pain after 24 hours		P value
		Yes	No	
Male	A	3 9.1%	30 90.9%	0.936
	B	7 25.0%	21 75.0%	
Female	A	3 9.7%	28 90.3%	1.000
	B	9 25.0%	24 75.0%	
Total		22	106	

DISCUSSION

Management of postoperative pain is a problem for dentist. The inhibition of inflammatory process is one of the methods employed to reduce or prevent the pain during and after treatment. As the tissue is injured during the biomechanical instrumentation, local chemical mediators (such as bradykinin, histamine, prostaglandin and leukotrienes) can be released at the site of injury subsequently causing vascular changes, inducing the postoperative sequelae of pain and/or swelling.¹⁰

Arachidonic acid is released from the damaged cell membrane leads to formation of prostaglandins in the presence of cyclo-oxygenase enzyme. This prostaglandin has a significant role in initiating pain by sensitizing nociceptors. Recently, prostaglandins and the interleukins were detected in acute and chronic inflammations.^{3,11,12} On the other word, the interleukin-1 was considered a proinflammatory cytokine that potentially activate synthesis of prostaglandins.¹³

An important finding of the present study was that patients with no evidence of periapical lesion who exhibited the most post endodontic pain than those with periapical radiolucency. It is in agreement with other studies.^{1,14} During the statistical analysis, there was a significant reduction in pain incidence in patients received prophylactic intra-oral infiltration dexamethasone infiltration and oral Ibuprofen versus the only oral administration of nonsteroidal antiinflammatory drug (ibuprofen).

The intra oral injection of corticosteroid is not a new approach in dentistry. It has been used previously to reduce the post-operative swelling and trismus following surgical removal of impacted third molar.⁸ It was able to produce a significant reduction of edema in the first 4 postoperative days as compared to systemic administration of the drug. Recently, dexamethasone was reported to be a potent inhibitor of prostaglandins and interleukins in inflamed gingival and periodontal tissues, to almost control level.¹²

The ability of steroid to eliminate the post endodontic inflammation and pain may be impaired by its danger of causing adrenal suppression and masking some signs of infection.^{9,15} However, the single or short term use at high dose was proved to be safe procedures in the absence of contraindication to its use.^{2,16} This seems to support the present results where there was no evidence of infection subsequent to intraoral local injection of dexamethasone. Only one case exhibited pus oozing after root canal instrumentation. This patient had previous history of repeated flaring-up. This observation may be attributed to the presence of obligate anaerobic organisms that activated with the root canal instrumentation.⁵ The same result was obtained previously.

It was detected that dexamethasone is a powerful anti-inflammatory agent when immediately injected intraorally. While only one case recorded with postoperative infection.⁸

Covington et al suggested that the parenteral injection of steroids may cause atrophy at the site of injection, depending on the size of dose, its duration and repeated injection in the same site. There was no complication in the present study where the drug was used in small single dose (0.8 mg) diluted with local anesthetic solution.

According to Brown and Pearson, 0.75mg of dexamethasone was needed to induce a metabolic effect.⁴ Williamson et al demonstrated that the use of 2ml of 4 mg/ml solution of dexamethasone (total of 8mg) produced initial suppression of hypothalamic pituitary system that was responsible for preventing postoperative sequelae.¹⁶ A complete return to normal function has occurred with one week of short term of dexamethasone. While the undesirable hormonal effects were reversible and disappeared by discontinuity of steroids.¹⁷

Using nonsteroidal anti-inflammatory drug (Ibuprofen) was also effective for pain control. However, the single oral administration of the drug failed to reduce the pain incidence. 50% of this group exhibited pain in the first 24 hours following endodontic treatment. This percent was reduced to a significant level after 3 days. The oral

administration of Ibuprofen along with the intraoral injection of dexamethasone was insignificantly reducing the post endodontic pain versus only oral administration of Ibuprofen tablets.

Krasner et al. also determined that the oral administration of dexamethasone significantly reduced the postoperative pain than those of placebos, when 7 tablets were taken along the first day.¹⁸ The regular oral administration of piroxicam was able to reduce the severity of pain incidence. However, some patients complained of gastrointestinal pain.

Morse et al. reported that the post-treatment prophylactic administration of diflunisal resulted in a statistically significant reduction in endodontic postoperative pain than that of on-demand usage of diflunisal.¹⁹ It was also suggested that the nonsteroidal anti-inflammatory drugs inhibited the cyclo-oxygenase enzyme preventing the formation of prostaglandins.^{9,20} While the medication must be extended for 3 days to obtain successful results.²¹ Recently, it has been reported that indomethacin could also inhibit the interleukins and prostaglandins with subsequent inflammatory process.¹³

The intraoral injection of Ketorolac was proven to be a useful adjunct in management of endodontic pain patients. It reduced the pain for 60 minutes; however, it combined with intramuscular injection of either ketorolac or placebo.²¹

CONCLUSION

From this study we can conclude that periapical infiltration of 0.5 ml of 4 mg/ml dexamethasone with oral administration of ibuprofen tablets after endodontic treatment was significantly effective for relieving the post endodontic pain.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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Cite this article as: Rana MA, Rana SAA, Akhtar M, Rana MJA, Kashif M. Frequency of post obturation pain by using ibuprofen and ibuprofen/dexamethasone infiltration in single visit root canal treatment cases. *Int J Clin Trials* 2018;5(1):54-9.