ORIGINAL ARTICLE

COMPARISON OF TWO INTRA-CANAL MEDICAMENTS ON THE INCIDENCE OF POST-OPERATIVE ENDODONTIC PAIN

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Background: Post-operative pain is the most annoying factor for the patients for which different intra-canal medicaments are used. The aim of this study was to compare calcium hydroxide mixed with dexamethasone and triple antibiotic paste as intra-canal medicaments on the incidence of post-operative endodontic pain. **Methods:** This was a randomized controlled trail in which a total of 120 patients presenting to the department of Operative Dentistry AFID, Rawalpindi from 20–50 years of age from both gender presenting with acute apical periodontitis in their maxillary and mandibular central incisors were selected and randomly divided into three equal groups of 40 patients with the help of scientific random number table. Group A patients were given calcium hydroxide mixed with dexamethasone, group B patients were given triple antibiotic paste and in group C patients only cotton pellet was placed in the pulp chamber as a placebo. Endodontic therapy was initiated, following pulpectomy and disinfection, canals were prepared and intra-canal dressings were placed according to the allotted group and restored with cavit. Pain was recorded at 24, 48 and 72 hours using the visual analogue scale. Data was analysed using SPSS 21. **Results:** After 72 hours, 55% of group A patients had no pain, 47.5% patients in group B while in group C 17.5% of the patients reported no pain. **Conclusion:** Both calcium hydroxide combined with dexamethasone and triple antibiotic paste are effective in reducing post-operative pain in teeth with symptomatic irreversible pulpitis while placebo showed little reduction in pain.

Keywords: Acute peri-apical periodontitis; Triple antibiotic paste; Post-operative pain

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INTRODUCTION

Post-operative pain after endodontic treatment is a common sensation and is unpleasant both for the patient and the dentist.[1] Endodontic pain can occur before, during or after endodontic treatment. A strong association between preoperative and postoperative pain has been reported. Patients experiencing moderate to severe pain before treatment were found to be five times more likely to experience post-treatment pain.[2] Certain factors may predispose the development of post-operative endodontic pain like the number of appointments, time between successive appointments and use of intra-canal medicament.[3] The chemo-mechanical debridement and preparation of root canal system is one of the most important step in endodontic therapy in which determination of correct working length is critical.[4] However several studies have shown that maintaining apical patency is not associated with decreased post- operative pain and healing.[5–7]

Various intracanal medicaments are used in dentistry with wide range of uses such as reducing the amount of residual bacteria after root canal instrumentation, decreasing post-operative inflammation and effectively managing pain.[8] Teeth with necrotic pulps usually require multiple sessions for complete debridement and disinfection of the root canals and as a result between successive appointments, an intracanal dressing is placed for approximately one to two weeks for the above mentioned purposes.[8]

To deal with the symptoms of post-operative endodontic pain, non-steroidal anti-inflammatory drugs, systemic antibiotics and corticosteroids could be given but a better approach would be to place these agents locally at the site of pain origin which is the root canal system. Many studies have advocated the use of Triamicinolone and Chloramphenicol suspended in a water-soluble cream to achieve relief of post-operative pain.[8] Corticosteroids help to control pain and inflammation associated with pulpal and periapical pathologies. Topical application of corticosteroids could effectively provide symptomatic relief from post-operative endodontic pain.[9] Mild pain can occur commonly after completion of treatment and patients should be informed about it.[10]

Root canal infections are polymicrobial consisting of both aerobic and anaerobic bacterial species, single antibiotic may not be effective in canal disinfection. Therefore, combination of antibiotics, mainly consisting of ciprofloxacin, metronidazole, and doxycycline, referred to as triple antibiotic paste (TAP) has been suggested for root

canal disinfection. Triple antibiotic paste can affect gram-negative, gram-positive, and anaerobic bacteria, and this combination can be effective against odontogenic microorganisms.[11,12]

MATERIAL AND METHODS

After taking approval from the ethical committee, a prospective study was done at operative department in Armed Forces Institute of Dentistry, Rawalpindi from 1st May to 31st December 2019. A total of 120 patients from 20–50 years of age from both gender with good general health were selected for this study and were randomly divided into three equal groups with the help of scientific random number table. A sample size of 120 patients was calculated by WHO calculator using the following population proportions.[13,14] Population proportion A= 18.3% and population proportion B= 0%.

The maxillary and mandibular central incisors with acutely inflamed periapical region without swelling or draining sinus were selected for this study. Patients on preoperative analgesics and antibiotics, teeth with calcified canals and previously treated teeth along with pregnant and lactating mothers were all excluded from this study. The patients were screened for inclusion by taking history, performing relevant clinical examination and necessary tests along with peri-apical radiographs. After selection, the procedure was explained to the patient and root canal treatment was initiated under local anaesthesia and rubber dam isolation. Working length was established with apex locator one mm from radiographic apex and the root canal was prepared using step-back technique. The canals were irrigated copiously with 2.5% sodium hypochlorite and the final irrigation was done with normal saline. Following instrumentation and irrigation, canals were dried and treated in the following manner according to the groups allotted.

Group A dressed with calcium hydroxide (CH) powder (EMSURE) mixed with dexamethasone (KAMEDEX containing Dexamethasone Phosphate 4 mg/1ml). Group B dressed with TAP

Group C dressed with only cotton pellet in the pulp chamber as a placebo

Intracanal medicaments were inserted into the dried canals of teeth in group A and group B by means of file that were at least two sizes smaller than the last file used to approximately two mm from the apex while in the group C only cotton pallet was placed in the pulp chamber as a placebo. Excess material was removed from the pulp chamber and a sterile cotton pellet was placed over the canal orifices. All the teeth were sealed temporarily with cavit. At the end of every appointment patient was given a visual analogue scale. It is a 10cm horizontal line with zero at one end which denotes 'no pain' and 10 on the other end which denotes 'unbearable pain'. VAS score zero was considered as having no pain response. VAS scores from one-three was considered a mild painful response, four-seven was considered a moderately painful response and eight-ten was considered a severely painful response. The patient was advised to mark the line corresponding with the intensity of his pain at 24, 48 and 72 hours after the first visit. The patient was recalled after one week for obturation and final full coverage restoration. Data was analysed using SPSS 21. Chi-Square test was used to compare post-operative endodontic pain for group A and group B at 24 hours, 48 hours and 72 hours after completion of the treatment. For age and gender percentages along with mean and SD were calculated and for pain, percentages along with p value was calculated. A *p*-value of less than 0.05 was considered significant.

RESULTS

Our study evaluated the frequency of pain at 24, 48- and 72-hours post-instrumentation. Both TAP and CH in combination with dexamethasone were effective for pain reduction but the results were not statistically significant as after 24 hours pain was reduced in all the three groups (p=0.76) as shown in Table 2 & 3. Demographic details are given in table 1. Tooth type was also taken as a variable and *p* values were collected for both maxillary and mandibular central incisor; the results showed that tooth type has no significant association with the level of pain (p<0.5) as shown in table 4.

Table-1: Frequency and percentages of age and gender distribution between group A, group B and group C

Variable	**Group A (n=40)**		**Group B (n=40)**		**Group C (n=40)**	
Gender	Frequency	Percentages	Frequency	Percentages	Frequency	Percentages
Male	13	32.5	20	50	17	42.5
Female	27	67.5	20	50	23	57.5
Mean±SD	1.6±0.47		1.50±0.51		1.57±0.50	
Age	**Group A**		**Group B**		**Group C**	
20–30	15	37.5	21	52.5	18	45
31–40	18	45	10	25	12	30
41–50	7	17.5	9	22.5	10	25
Mean±SD	36 years±5.6 years		37.5 years±6.5 years		35±6 years	

Table-2: Frequency and percentages of pain of group A, group B and group C post-instrumentation at 24, 48 and 72 hours

Pain	Group A (n=40) Dexamethasone + CH	Group B (n=40) TAP	Group C Placebo (n=40)
After 24 Hours			
No Pain	5 (12.5%)	2 (5%)	3 (7.5%)
Mild Pain	17 (42.5%)	18 (45%)	16 (40%)
Moderate Pain	5 (12.5%)	8 (20%)	11 (27.5%)
Severe Pain	13 (32.5%	12 (30%)	10 (25%)
After 48 hours			
No Pain	6 (15%)	5 (12.5%)	4 (10%)
Mild Pain	28 (70%)	29 (72.5%)	17 (42.5%)
Moderate Pain	5 (12.5%)	4 (10%)	15 (37.5%)
Severe Pain	1 (2.5%)	2 (5%)	4 (10%)
After 72 hours			
No Pain	22 (55%)	19 (47.5%)	7 (17.5%)
Mild Pain	16 (40%)	18 (45%)	15 (37.5%)
Moderate Pain	2 (5%)	3 (7.5%)	16 (40%)
Severe Pain	0 (0%)	0 (0%)	2 (5%)

Table-3: The *p*-values of pain of group A, group B and group C post-instrumentation at 48 and 72 hours

Duration	Intracanal Medicament	Comparison with another intracanal medicament	*p*-value
48 hours	Placebo	TAP	0.01
		CH +dexamethasone	0.02
	TAP	CH +dexamethasone	0.90
72 hours	Placebo	TAP	0.0
		CH +dexamethasone	0.0
	TAP	CH +dexamethasone	0.76

Table-4: Frequency & percentages of pain with different tooth types

	Group A (n=40)		Group B (n=40)		Group C (n=40)	
	Max Central Incisor	Mand Central Incisor	Max Central Incisor	Mand Central Incisor	Max Central Incisor	Mand Central Incisor
No Pain	2 (5%)	4 (10%)	3 (7.5%)	2 (5%)	3 (7.5)	1 (2.5%)
Mild	15 (37.5%)	13 (32.5%)	11 (27.5%)	18 (45%)	12 (30%)	8 (20%)
Moderate	4 (10%)	1 (2.5%)	2 (5%)	2 (5%)	4 (10%)	8 (20%)
Severe pain	1 (2.5%)	0 (0%)	1 (2.5%)	1 (2.5%)	1 (2.5%)	3 (7.5%)
***p*-value**	.076		.89		.05	

DISCUSSION

Postoperative pain during and after the completion of root canal is usually a poor indicator of the long term success of endodontic therapy.[11] Elimination of microorganisms from the root canal is an important determinant of the long term success of endodontic therapy; particularly in teeth with necrotic pulps and associated peri-radicular pathology.[15] In this study we compared TAP, CH mixed with dexamethasone and placebo as intracanal medicament for pain control after endodontic therapy. Both TAP and CH mixed with dexamethasone provided relief in pain symptoms in the patients. However, the difference between pain reductions between the two medicaments was not statistically significant. While the placebo showed little reduction in pain level compared to the other two intracanal medicaments and the results were statistically significant. Even during the follow up periods of 48 hours and 72 hours there was still no statistically significant difference. Therefore, we concluded from our study that both CH in combination with dexamethasone and TAP are effective in pain reduction after endodontic therapy in teeth with acute apical periodontitis. Calcium hydroxide is one of the most commonly used intra-canal medicaments in endodontic practice. A study comparing the effect of different combinations of CH on post-operative endodontic pain by Ghanbarzadegan *et al*[16] concluded that CH mixed with dexamethasone was superior in pain reliving compared to CH mixed with saline and chlorhexidine.

Triple antibiotic paste is a combination of three antibiotics; metronidazole, ciprofloxacin and minocycline and it is quite effective against anaerobic, gram positive and gram-negative bacteria.[8] According to one study TAP is even more effective than CH as an intracanal medicament for pain reduction and also metronidazole is superior to CH in inhibiting *E. faecalis*.[15] According to Hamid *et al*[17] TAP reduced post-treatment pain statistically more than corticosteroids. However there have been studies

that have concluded differently from our findings. A study by Swathi et al[18] comparing the incidence of post endodontic pain after using CH and TAP on diabetic patients found both medicaments to be effective in managing pain but TAP was found to be more effective than CH.

Corticosteroids have an immediate effect in reducing pain after endodontic therapy.[19] Corticosteroids have long been used in dentistry in various forms.[20] A study Rogers *et al*[21] compared the effect of intra-canal dexamethasone and ketorolac with ibuprofen and placebo; he concluded that both steroids were more effective in reducing the post-operative pain. Patients mostly experience pain during the initial 24–72 hours period.[22] Results of a systemic review concluded that the major effects of steroids on pain reduction occur during 24–72 hours period and this also coincides with our study.[23] In our study during the follow-up period of 24, 48 and 72 hours, steroids relieved the pain symptoms of the patient. Another study by Jindal *et al*[24] evaluated the pain symptoms after using steroid, CH and TAP as intra-canal medicaments concluded that all three reduced pain with steroid being the most effective showing statistically significant results. According to study conducted by Khalid *et al*[13] both prednisolone and dexamethasone are effective in reducing post-treatment pain but dexamethasone is significantly more effective. A study compared the effect of TAP, chlorhexidine and CH concluded that TAP is quite effective in reducing post-treatment pain which contradicts our study.[16]

The strength of this study was the presence of a control group. It has been shown that endodontic therapy including pulp extirpation and instrumentation is also enough to relieve the patient's pain symptoms especially in patients presenting with pre-operative pain.[25] In one study, placebo was used after endodontic therapy for evaluating its effects on managing post-operative pain. The study concluded that after six hours, 32.4% patients had no pain and after eight hours 41.2% patients were pain free.[26] Similarly in our study all the three groups showed decreased pain levels at different time intervals, making the patient believe that the medication was responsible for pain relief but the pain reduction may have been due to endodontic therapy alone. Placebo groups also had reduced level but less than the other two groups.

CONCLUSION

This clinical study concluded that TAP and CH mixed with dexamethasone have similar efficacy in controlling post-treatment endodontic pain while the placebo groups showed less reduction in pain levels compared to the other two groups. There was no statistically significant difference in postoperative endodontic pain at any of the time periods between TAP and CH mixed with dexamethasone. Thus, both intra-canal medicaments can be employed to manage the post-operative pain.

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AUTHORS' CONTRIBUTION

FA: Conceived the idea, planned the study and helped in manuscript writing. AY: Supervised the study, reviewed and done proof reading. ZD: Helped in data collection, analysis and interpretation. SMH: Substantial contribution to write-up, literature review and reference citation. MU, MJAR: Helped in data collection and proof reading.

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