Original Article

INCIDENCE OF ENDODONTIC FLARE-UPS USING EITHER CALCIUM HYDROXIDE OR CREOSOTE AS INTRACANAL MEDICAMENT IN SYMPTOMATIC TEETH

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ABSTRACT

Objective: *To enhance our knowledge about the superior intracanal medicament available for reducing the interappointment pain in endodontic treatment.*

Methodology: *Hundred symptomatic teeth presenting to the Department of Operative Dentistry, Khyber College of Dentistry were included in this study. All teeth underwent conventional root canal treatment. The canals were dried and one of the following two medicaments was inserted into the canal in random sequence: Group 1: Calcium Hydroxide paste; Group 2: Creosote. Before dismissal, the preoperative pain experienced on the previous night was recorded using a visual analogue pain scale. Patients were instructed to record the degree of pain experienced 4 hours, 12 hours, 24 hours and 48 hours after the treatment.*

Results: *Patients who received Calcium Hydroxide have a lower incidence of flare-up when compared to Creosote.*

Conclusion: *Based on this study, Calcium Hydroxide is the superior intracanal medicament in terms of postoperative pain.*

Key Words: *Inter-appointment flare-up, Intracanal medicaments, Creosote, Calcium Hydroxide.*

INTRODUCTION

A well-known postoperative complication of endodontic treatment is the acute exacerbation of symptoms or "flare-up", after the debridement of the root canals and provisional restoration.[1] Flare-up is the term commonly used to describe the characteristic symptoms of pain and swelling that may arise following endodontic treatment. In the mind of a lay person, there is an association between undergoing root canal treatment and the occurrence of pain.[2,3]

The development of postoperative pain of mild intensity is not a rare event, even when endodontic treatment has followed acceptable standards. For the most part, mild pain after chemomechanical preparation can develop in about 10-30% of the cases,[4,5] and mostly the patient can bear the discomfort or uses the common analgesics. The development of mild to severe intensity pain, with or without swelling, is a rare occurrence. However, these cases usually constitute a true emergency and often require unscheduled visit for treatment. Such cases are classified as "flare-up" cases.[6]

The incidence of flare-up increases in direct relationship to the severity of the patient's preoperative pathosis and signs/symptoms. The lowest frequency of occurrence is generally with a vital pulp without periapical pathosis; the highest frequency is with patients who present with more severe pain and swelling, particularly with pulp necrosis and acute apical abscess.

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Flare-ups have a multi-factorial etiology; including mechanical, chemical and/or microbial injury to the pulp or periradicular tissues.[7] Microbial injury to the periradicular tissue is probably the commonest cause of flare-ups.[7] According to Chavez de Paz, F. nucleatum, Prevotella species and Porphyromonas species were frequently isolated from flare-up cases.[8] Microbial insult, coupled with iatrogenic factors such as apical extrusion of contaminated debris, instruments, irrigants, medicaments and filling materials, is one of the principal causes of postoperative pain.[7, 9]

The use of an intracanal medication with antimicrobial activity between therapy sessions has been recommended to eliminate possible persistent microorganisms[10], particularly in cases of pulp necrosis with periradicular bone loss.[11] In the treatment of apical periodontitis, intracanal medication has been recommended to eradicate the microbes that survive instrumentation and irrigation. A variety of medicaments have been used for this purpose. Intracanal medicaments can be divided into Antiseptic Medicaments such as phenol compounds(creosote, cresophene, eugenol and camphorated parachlorophenol (CMCP), iodine potassium iodide (IPI), glutaraldehyde, formocresol, and Antibiotic Medicaments such as pastes containing a mixture of antibiotics with or without corticosteroids.[12] Calcium Hydroxide comes in the category of Antiseptic Medicaments.

Among the available intracanal dressings, calcium hydroxide is the most indicated and frequently used intracanal medicament in the clinical practice.[13] Hermann was the first to use Calcium Hydroxide as the pulp capping agent in 1930.[14] Today it is one of the most versatile medications in dentistry, especially for its utilization as an intracanal dressing.[14] Its antibacterial properties are related to its high alkalinity, which results in the inactivation of bacterial membrane enzymes.[15] There are an increasing number of indications for use of Calcium Hydroxide; such as in direct and indirect pulp capping, apexogenesis, apexification, treatment of root resorption, iatrogenic root perforations, root fractures, replanted teeth and interappointment intracanal dressing.[16]

Creosote is an antiseptic phenoloc intracanal medicament, that by nature is toxic to mammalian cells and can cause periapical irritation.[17,18] The antibacterial action of the antiseptics-containing medicaments is limited[19,20] and of short duration. Therefore, their efficacy as root canal medicaments is questionable. Due to the extreme toxicity of these chemicals, they could not be placed in direct contact with living tissue. The antiseptic was either applied on a cotton pellet, which was placed in the pulp chamber, or on an absorbent paper cone placed in the root canal. The rationale was that the antimicrobial effect could be delivered through a vapor effect. Phenolic compounds do not have effective antimicrobial vapors. An endodontic deposit antiseptic that is not in direct contact with the root canal walls in the very apical end of the pulp space is unreliable at best.[21] The efficiency of these volatile materials is also doubtful within the dentinal tubules, lateral canals, fins, anastomoses and peripheral areas of the root canal system. This study aims to enhance our knowledge about the better intracanal medicament available for reducing the interappointment pain in endodontic.

MATERIALS AND METHOD

This Quasi experimental study was carried out on 100 patients, that visited Department of Operative Dentistry, Khyber College of Dentistry, Peshawar. The patients were divided in to two groups of 50 patients each, one group received calcium hydroxide as the intra canal medicament while the other group received creosote as the intra canal medicament after the initial pulpectomy and filing. Random number table was used as the sampling technique.

The inclusion criteria was all those teeth that required endodontic treatment with acute symptoms in patients aged 15-50 years old. Teeth with open apices, or periodontally compromised teeth or patient with major medical illnesses were excluded from the study.

Pulpectomy was done by a single operator in both the groups. Then intra canal medicaments were placed in the teeth and the patients were telephonically accessed to record the pain perceived 4 hours after the treatment. Then recording of pain was repeated at 12 hours, 24 hours and finally 48 hours after the initial treatment. The flare-ups caused by Calcium Hydroxide and Creosote, when used as intracanal medicaments during endodontic treatment, were compared. Only pain was used as an indicator for the flare-up. Visual Analogue Scale (VAS) was used to evaluate and compare both the groups.

VAS is a mathematical progression from 0 to 10, 0 being no pain and 10 or 100 being the most severe pain imaginable. The flare-up was defined as "the pain perception of 3 or more than 3 points on

the visual analog scale, at any time interval, was considered to be a case of flare-up." The data was collected on a specifically designed proforma for the study.

DATA ANALYSIS

Data collected was entered using SPSS version 13 software. The mean ± SD were calculated and presented for age of the patient and the visual analogue scale. The gender distribution was assessed as proportions and male: female ratio was also measured. Unpaired t-test was used to compare VAS between the two study groups. Chi square test was applied to compare the proportions of gender and flare-up status between the groups. A p value of < 0.05 was considered as significant.

RESULTS

Overall, 50 (50.0%) of the study patients were males and 50 (50.0%) were females with male to female ratio of 1:1. Both the study groups were compared according to the gender of patients. Out of total 50 patients in group 1 (Calcium hydroxide), there were 23 (46.0%) males and 27 (54.0%) females. In group 2 (Creosote), 27 patients (54.0%) were males while 23 (46.0%) were females. The difference of gender between the two group was statistically not significant (p= 0.424) (Table 1). The average age of the study patients was 29.36 + 9.35 years (Table 2).

In group 1 (Calcium Hydroxide), the average age of the patients was found to be 29.22 ± 9.42 years while in group 2 (Creosote) it was found to be 29.5 ± 9.38. The mean difference was found not significant between the groups (p= 0.882). However, mean age in group 2 was slightly greater than group 1. (Table 3).

The change in the pain perceived was assessed by using visual analogue scale for pain scoring. The comparison of flare-up pain between groups before treatment showed almost similar score. At 4 hours after pulpectomy, the average pain score in group 1 was 2.42 ± 2.10 while in group 2 it was 1.12 ± 0.66. The pain perceived by group 1 was greater than group 2. The mean difference of pain score between the study groups at 4 hours was found to be statistically significant (p= 0.00).

Similarly, the comparison of postoperative flare-up pain at 12 hours between the study groups is shown in Table 4. The average pain score in group 1 was 1.42 ± 1.5 compared to 1.66 ± 1.3 in group 2. This difference in the mean pain score between the groups was not statistically significant (p= 0.395).

While comparing the postoperative flare-up pain between the study groups at 24 hours, the average score for pain in group 1 was found to be 0.68 ± 0.82 while in group 2 it was 1.74 ± 1.75. The difference of pain score between the groups at 24 hours was also found significant (p= 0.000).

The comparison of postoperative flare-up pain score between the study groups at 48 hours is presented in Table 4. The mean difference at 48 hours was also significant (p= 0.000).

Table 2: Descriptive Statistics of Age of the Patients (n=100)

Statistics	Age (years)
Mean ± Standard Deviation	29.36 ± 9.35
Median	27.50
Minimum Age	15
Maximum Age	50

Table 3: Descriptive Statistics of Mean Age of the patients in the two groups (n=100)

Group Status	Mean Age ± SD (in years)
Calcium Hydroxide Dressing	29.22 ± 9.42
Creosote Dressing	29.50 ± 9.38

T-Test = -0.149 DF = 98 p= 0.882

Table 1: Comparison of gender between study groups (n=100)

Gender	Group 1 (Calcium Hydroxide) (n=50)	Group 2 (Creosote) (n=50)	Total (n=100)
Male	23 (46.0%)	27 (54.0%)	50 (50%)
Female	27 (54.0%)	23 (46.0%)	50 (500%)
Ratio (Male : Female)	1: 1		

Chi-Square = 0.64 DF = 1 p= 0.424

Table 4: Comparison of pain score between groups according to age groups

Gender	Group 1 (Calcium Hydroxide)(n=50)	Group 2 (Creosote) (n=50)	P=Values
Pain before treatment	6.04 ± 1.93	6.30 ± 1.05	0.405
Pain at 4 hours	2.42 ± 2.10	1.12 ± 0.66	0.00
Pain at 12 hours	1.42 ± 1.5	1.66 ± 1.3	0.395
Pain at 24 hours	0.68 ± 0.82	1.74 ± 1.75	0.00
Pain at 48 hours	0.38 ± 0.7	1.72 ± 1.51	0.000

While recording the flare-up status, it was found to be present in 44 patients (44.0%) of the whole study patients. In group 1, flare-up was found in 19 patients (38.0%) and in group 2 it was found in 25 patients (50.0%). The difference of flare-up between groups was found to be statistically insignificant (p= 0.230) (Table 5).

Table 5: Comparison of Flare-up status between study groups (n=100)

Flare-up status	Group 1 (Calcium Hydroxide) (n=50)	Group 2 (Creosote) (n=50)
Present	19 (38.0%)	25 (50.0)
Absent	31(62.0%)	25 (50.0)

Chi-Square = 1.44 DF = 1 p= 0. 230

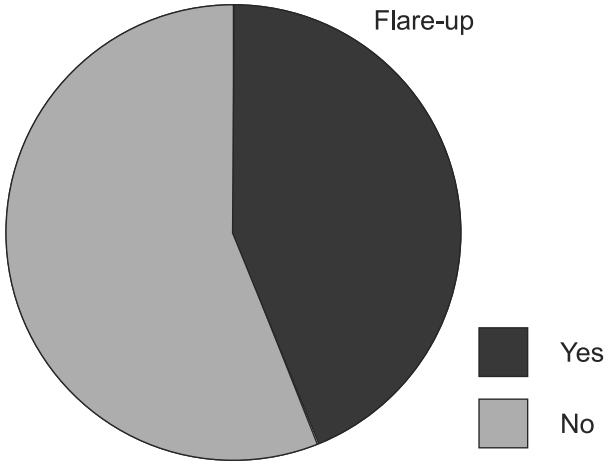

Fig. 1: Total number of Flare-ups in patients according to study groups (n=100)

DISCUSSION

Flare-up is a complication that a dentist frequently encounters during endodontic treatment, the most important determinants of which are preoperative signs and symptoms. Intracanal medication is a preventive measure that is used to reduce the incidence of inter-appointment flare-ups. Different materials can be used as intracanal medicaments such as phenolic compounds (e.g. Creosote) and Calcium Hydroxide. Calcium hydroxide has enjoyed the dominance, over the past decades. But still more comparative studies are required, to find out the best treatment option available for the prevention of interappointment flare-up.

In this study, the efficacy of Calcium Hydroxide was compared with Creosote, with reference to the reduction in inter-appointment pain using Visual Analogue Scale.

In the group of subjects, who received Calcium Hydroxide as intracanal medicament (Group 1), 38% developed inter-appointment flare-up. And in the group of subjects, who received Creosote as intracanal medicament (Group 2), 50% developed inter-appointment flare-up. Statistically, insignificant difference was recorded between the two groups (p= 0.230).

Out of the total 100 patients, 44 cases could come in the category of flare-up cases, in both the groups. Thus, the total incidence of flare-up in both the groups was recorded to be 44%. To record the incidence of flare-ups, Trope[22] found out that only 2.53% (12 in 474 cases) reported with flare-ups. This is in contrast to our study which had a flare up rate of 44%, but this difference is probably due to the fact that Trope only selected those cases which were asymptomatic while the current study had an inclusion criteria of symptomatic teeth.

In another study, Genet et al. in 1987 reported a flare-up rate of 27% in all cases treated. Genet et al. found a positive correlation between the incidence of preoperative pain and the occurrence of postoperative pain.[23] This finding might explain the higher rate of flare-up in the current study as we included all the symptomatic teeth in our study.

The most significant finding of this study was the reduced number of flare-up cases, when Calcium Hydroxide was used as an interappointment medicament, when comparing it with a more conventional interappointment medicament, i.e. Creosote. However, it has been observed that the mean pain score for patients with Creosote was less than that for patients with Calcium Hydroxide after 4 hours of the initial treatment, showing a statistically significant difference (p= 0.000). After 12 hours, there was no statistical significant difference between the two groups. However after 24 and 48 hours the mean pain score for Calcium Hydroxide was lower than that for Creosote, showing a statistically significant p value (0.000 at both times).

CONCLUSION

Based on the results, it can be said that calcium hydroxide is still the best intracanal medicament with respect to the incidence of inter-appointment flare-ups when it is compared to creosote, however the application of intracanal medicaments should be regarded as being only a treatment phase in the care of symptomatic teeth. Meticulous attention to all the details involved in normal root canal treatment should be given when performing a root canal treatment.

REFERENCES

1. Rimmer A. Intracanal medications and antibiotics in the control of interappointment flare-ups. Quintessence Int 1991; 22: 997-1005.
2. Imura N, Zuolo ML. Factors associated with endodontic flare-ups: a prospective study. Int Endod J 1995; 28: 261-5.
3. Houck V, Reader A, Beck M, Nist R, Weaver J. Effect of trephination on postoperative pain and swelling in symptomatic necrotic teeth. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2000; 90: 507-13.
4. Harrison JW, Baumgartner JC, Svec TA. Incidence of pain associated with clinical factors during and after root canal therapy. Part 1. Interappointment pain. J Endod 1983; 9: 384-7.
5. Georgopoulou M, Anastasiadis P, Sykaras S. Pain after chemomechanical preparation. Int Endod J 1986; 19: 309-14.
6. Siqueira Jr. JF, Barnett F. Interappointment pain: mechanisms, diagnosis, and treatment. Endodontic Topics 2004; 7: 93-109.
7. Siqueira Jr. JF, Microbial causes of endodontic flare-ups. Int. Endodontic Journal 2003; 36: 453-63.
8. Chavez de Paz VLE. Fusobacterium in endodontic flare-ups. Oral Surg Oral Med Oral Path Oral Radiol Endod 2002: 93: 179-83.
9. Al-Omari MA, Dummer PMH. Canal blockage and debris extrusion with eight preparation techniques. J Enododon 1995; 21: 154-8.
10. Bystrom A, Claesson R, Sundqvist G. The antibacterial effect of camphorated paramonochlorophenol, camphorated phenol and calcium hydroxide in the treatment of infected root canals. Endod Dent Traumatol 1985; 1: 170-5.
11. Sjögren U, Hagglund B, Sundqvist G, Wing K. Factors affecting the long-term results of endodontic treatment. J Endod 1990; 16: 498-504.
12. Haapasalo M, Udnýs T, Endal U. Persistent, recurrent, and acquired infection of the root canal system post-treatment page. Endodontic Topics 2003; 6: 29-56.
13. Itoh A, Higuchi N, Minami G, Yasue T, Yoshida T, Maseki T, Nakamura H. A survey of filling methods, intracanal medications, and instrument breakage. J Endod 1999; 25: 823-4.
14. Qazi SS, Ahmed M, Azam S. Calcium hydroxide as intracanal medicament. Pak Armed Forces Med J 2004; 54: 103-5.
15. Estrela C, Sydney GB, Bammann LL, Felippe O Jr. Mechanism of action of calcium and hydroxyl ions of calcium hydroxide on tissue and bacteria. Braz Dent J 1995; 6: 85-90.
16. Farhad A, Mohammadi Z. Calcium Hydroxide: a review. Int. Dent. J 2005; 55(5): 293-301.
17. Wemes JC, Jansen HW, Purdell-Lewis D, Boering G. Histologic evaluation of the effect of formocresol and gluteraldehyde on the periapical tissues after endodontic treatment. Oral Surg Oral Med Oral Patth 1982; 54: 329-32.
18. Barnett F, Trope M, Kreshtool D, Tronstad L. Suitabiltiy of controlled release delivery system for root canal disinfection. Endod Dent Traumatol 1986; 2: 71-4.
19. Ingle JI, Zeldow BJ. A clinical-laboratory evaluation of three intracanal antibacterial agents. In: Grossman LI, editor. Transactions of the Second International Conference on Endodontics. Philadelphia: University of Pennsylvania; 1958; 81-95.
20. Sommer RF, Ostrander FD, Crowley MC. Clinical Endodontics 2nd edn. Philadelphia: WB Saunders 1962; 364-5.
21. Byström A, Claesson R, Sundqvist G. The antibacterial effect of camphorated paramonochlorophenol, camphorated phenol and calcium hydroxide in the treatment of infected root canals. Endod Dent Traumatol 1985: 1: 170-5.
22. Trope M. Relationship of intracanal medicaments to endodontic flare-ups. Endod Dent Traumatol 1990; 6(5): 226-9.
23. Genet JM, Hart AAM, Wesselink PR, Thoden Van Velzen SK. Preoperative and operative factors associated with pain after the first endodontic visit. Int Endod J 1987; 20: 53-64.