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Effect of antibacterial intracanal medicaments mixed with different vehicle used in inter-appointment flare-up patients: An in vivo study

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Abstract---Background: Post-operative pain is a common finding after endodontic treatment, its incidence ranges from 3% to 58%. It may be due to microbial, mechanical or chemical injury to the periapical tissues. Calcium hydroxide has been recommended for use as an intracanal medicament based on its antibacterial, antiresorptive and tissue dissolving properties. The use of chlorhexidine gluconate as an intracanal medicament has been suggested either in the form of 2% gel or solution placed in a sustained release device or active points. Aim of the study: To evaluate and compare the effect of antibacterial intracanal medicaments mixed with different vehicle and used in inter-appointment flare-up patients. Materials and methods: The present study was conducted in the Department of Conservative Dentistry and Endodontic of the dental institute. This study was

conducted on 45 permanent single-rooted mandibular premolars with acute apical periodontitis. Results: It is evident that the preoperative pain in Group 1, 2 and 3 patients was 3.56, 3.88 and 3.41 respectively. The post-operative pain for Group 1, 2 and 3 patients decreased significantly from 6 to 48 hours. However, on comparing the pain intensity for Group 1, 2 and 3, results were non-significant. Conclusion: Within the limitations of the present study, it can be concluded that the use of antibacterial intracanal medicaments in teeth with apical periodontitis was efficient in reducing the post-operative pain; however, the use of different vehicles for delivering medicament was statistically non-significant.

Keywords---calcium hydroxide, chlorhexidine gluconate, antibacterial medicament, apical periodontitis.

Introduction

The severity and incidence of post-operative pain are usually associated with specific dental treatments; the highest of which is root canal therapy. ¹ Post-operative pain is a common finding after endodontic treatment, its incidence ranges from 3% to 58%. It may be due to microbial, mechanical or chemical injury to the periapical tissues. ^{2,3} It is the main reason why patients seek endodontic treatment, therefore it must be accompanied by efficient relief of pain to be considered successful by both patients and clinicians.⁴ Calcium hydroxide has been recommended for use as an intracanal medicament based on its antibacterial, antiresorptive and tissue dissolving properties. ⁵ It has been used clinically to obtain microbial control, dissolve organic remnants, heal periapical inflammation, arrest inflammatory root resorption, stimulate hard tissue formation and serve as a temporary obturating material in between appointments.⁶ The most common and effective type of calcium hydroxide is an aqueous suspension. ⁷ Despite its good antimicrobial effect, it exhibits poor handling properties, and its distribution throughout the canal is problematic.⁵ Another challenge is its complete removal. Recently, developed endodontic points containing calcium hydroxide have been developed to address the handling and application of conventional calcium hydroxide preparations. ⁸ The use of chlorhexidine gluconate as an intracanal medicament has been suggested either in the form of 2% gel or solution placed in a sustained release device or active points. Chlorhexidine gluconate has strong antibacterial activity against a wide range of Gram-positive and Gram-negative as well as yeast, facultative anaerobes and aerobes. It is particularly effective against *Enterococcus faecalis* Scientific Name Search andida strains, which have been implicated in endodontic treatment failures and were resistant to treatment with calcium hydroxide. ⁹ Important characteristics of chlorhexidine gluconate are protein binding and substantivity, thereby, prolonging the period of antibacterial activity and also its low toxicity. Hence, the present study was conducted to evaluate and compare the effect of antibacterial intracanal medicaments mixed with different vehicle in inter-appointment flare-up patients.

Materials and Methods

The present study was conducted in the Department of Conservative Dentistry and Endodontic of the dental institute. The ethical clearance for the study was approved from the ethical committee of the hospital. This study was conducted on 45 permanent single-rooted mandibular premolars with acute apical periodontitis. Single-rooted premolars with acute apical periodontitis in the patients of age group 14 to 60 years were selected. The selected teeth were without periapical radiolucency. Teeth with incomplete root formation, severe periodontal problem, and those requiring retreatment were excluded from this study. Patients with systemic problems, for example, diabetes and autoimmune disease, and so on, were not selected for this study. Before commencing treatment, the complete procedure was explained to the patients and consent was obtained. Local anesthesia was administered. Access cavity preparation was done, and canals were explored using endodontic explorer. Working length was determined with No. 15 K-files and was confirmed with radiovisiography. Cleaning and shaping were done with K3 files up to No. 35, 4% using crown down method along with copious irrigation using 3% NaOCl and 0.9% saline. Patients were divided into three groups (n = 15) using randomized sampling technique. Temporary dressings with 60 mg CH mixed with 100 ml of three different vehicles were used, as follows:

- G1 = CH with DW,
- G2 = CH with 5.25% NaOCl,
- G3 = CH with 0.2% CHX.

Patients were instructed to complete a visual analog scale (VAS) pain score to rate their pain at 6 hours, 12 hours, 18 hours, 24 hours, 48 hours, after the treatment. The statistical analysis of the data was done using SPSS version 11.0 for windows. Chi-square and Student's t-test were used for checking the significance of the data. A p-value of 0.05 and lesser was defined to be statistically significant.

Results

Table 1 shows the average values of pain intensity at predetermined time intervals. It is evident that the preoperative pain in Group 1, 2 and 3 patients was 3.56, 3.88 and 3.41 respectively. The post-operative pain for Group 1, 2 and 3 patients decreased significantly from 6 to 48 hours. However, on comparing the pain intensity for Group 1, 2 and 3, results were non-significant (p value <0.05).

Table 1: Average values of pain intensity at predetermined time intervals

Groups	Pre-operative pain	Post-operative pain (hours)			
		6	12	24	48
Group 1	3.56	4.22	3.20	2.21	1.98
Group 2	3.88	4.36	3.46	2.14	1.82
Group 3	3.41	4.19	3.36	2.08	1.85

Discussion

In the present study, it was observed that the pain intensity decreased from pre-operative level to post-operative level; however, on comparing the results of different groups, the results were statistically non-significant. The results were compared with previous studies from the literature. Gyanani, H et al evaluated the efficacy of two different pretreatment single oral doses of betamethasone on the incidence of inter-appointment flare up and postoperative discomfort. Fifty-four patients aged 18–59 years requiring endodontic treatment were selected and randomly assigned to three groups; single pretreatment oral dose of placebo or betamethasone in two different oral doses of 0.5 mg and 1 mg, respectively. Endodontic therapy was completed in two visits using triple antibiotic paste as intracanal medicament. Patients were given a questionnaire to record their pain at 1, 2, 3, and 7 days after treatment. In the second visit, obturation was done, and the patients were again instructed to record their pain scores after treatment and discharged. 0.5 mg betamethasone group showed least mean pain scores among all experimental groups; however, there was no statistically significant difference between any of the groups. They concluded that pretreatment single oral dose of betamethasone is an effective in managing endodontic flare-ups; however, the results were statistically insignificant.¹⁰ Pai S et al evaluated and compare the effect of antibacterial intracanal medicaments on inter-appointment flare-up in diabetic patients. Fifty diabetic patients requiring root canal treatment were assigned into groups I, II, and III. In group I, no intracanal medicament was placed. In groups II and III, calcium hydroxide and triple antibiotic pastes were placed as intracanal medicaments, respectively. Patients were instructed to record their pain on days 1, 2, 3, 7, and 14. Inter-appointment flare-up was evaluated using verbal rating scale (VRS). Overall incidence of inter-appointment flare-up among diabetic patients was found to be 16%. In group I, 50% of the patients and in group II, 15% of the patients developed inter-appointment flare-up. However, no patients in group III developed inter-appointment flare-up. The comparison of these results was found to be statistically significant. However, with respect to intergroup comparison, only the difference between groups I and III was found to be statistically significant. They concluded that calcium hydroxide and triple antibiotic paste are effective for managing inter-appointment flare-ups in diabetic patients. Triple antibiotic paste is more effective than calcium hydroxide in preventing the occurrence of flare-up in diabetic patients.¹¹

Samir A S et al assessed the ability of double antibiotic paste versus calcium hydroxide used as intra-canal medication in reducing postoperative pain. 36 patients with single rooted necrotic premolars with apical periodontitis were randomly assigned into two groups according to the intra-canal medication used: calcium hydroxide group [Ca(OH)₂] and double antibiotic paste group (DAP). Preoperative pain was recorded using numerical rating scale. After isolation, access cavity was performed followed by chemico-mechanical preparation using rotary Race files with 2.5% sodium hypochlorite irrigation. Subsequently, intra-canal medication was placed and postoperative pain was recorded at 6, 12, 24 and 48 hours postoperatively. There was no statistically significant difference between both groups. Both groups resulted in an increase in median pain value from preoperative to 6 hours postoperative, followed by gradual decrease from 6 hours to 12, 24, 48 hours postoperatively with statistically significant difference.

When comparing both groups, DAP group showed lower postoperative pain values than $[\text{Ca}(\text{OH})_2]$ group at 12 and 24 hours, but this was not statistically significant. They concluded that the use of intra-canal medication in necrotic teeth with apical periodontitis was efficient in reducing postoperative pain regardless of type of intra-canal medication used.¹² Farhad AR et al compared the antibacterial activity of $[\text{Ca}(\text{OH})_2]$ combined with three different vehicles in root canal system. In this in vitro experimental study, 61 freshly extracted human single rooted teeth were used. After chemo-mechanical preparation, the teeth were dressed with $[\text{Ca}(\text{OH})_2]$ in combination with: G1: Distilled water (DW); G2: 5.25% sodium hypochlorite; G3: 0.2% chlorhexidine gluconate solution. All teeth were mounted in a 2-chamber apparatus. After sterilization, the coronal chamber was exposed to bacteria and the apical chamber was filled with broth for 90 days. Leakage was recorded when turbidity was observed in broth. Mean times of leakage and turbidity percentage were recorded for each group. The highest mean time of contamination was for chlorhexidine gluconate / $[\text{Ca}(\text{OH})_2]$ combination, and the lowest was for DW/ $[\text{Ca}(\text{OH})_2]$ combination. Statistically significant difference was observed between G3 and G1, but the difference between G2 and G3 or G1 and G2 were not significant. 88.23% of the samples of G1, 70.58% of G2, and 64.70% of G3 were contaminated after 3 months. They concluded that as an intracanal medication, the chlorhexidine gluconate / $[\text{Ca}(\text{OH})_2]$ combination had significantly more antibacterial activity than DW/ $[\text{Ca}(\text{OH})_2]$ combination.¹³

Conclusion

Within the limitations of the present study, it can be concluded that the use of antibacterial intracanal medicaments in teeth with apical periodontitis was efficient in reducing the post-operative pain; however, the use of different vehicles for delivering medicament was statistically non-significant.

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