



Evaluation of Post-operative Pain by using Calcium Hydroxide Based Root Canal Sealer: A Clinical Study

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Authors' contributions:

This work was carried out in collaboration among all authors. Author SU and Author NS designed the study, collect the data and wrote the first draft of the manuscript. Author SPS Author FM Author PM managed the analyses of the study and wrote the protocol. Author ZI managed the literature searches and review the manuscript. All authors read and approved the final manuscript.

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ABSTRACT

Objective: To assess the post-operative pain by using calcium hydroxide Ca(OH)₂ based root canal sealer, a clinical study at tertiary care Hospital

Materials and Methods: This cross-sectional study was performed at operative dentistry department of Liaquat University of Medical and health Sciences Jamshoro Pakistan. Study duration was 6 months from March 2020 August 2020. Total 60 patients, those having permanent anterior teeth with irreversible pulpitis, teeth restoration after root canal treatment and either of gender were included. Multiple visits of endodontic treatment were performed by obturating the canals using calcium hydroxide Ca(OH)₂ (sealapex, Sybron endo). Patients were recalled next day, after 3rd day and after one week of obturation to assess the severity of post-operative pain (POP)

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via visual analogue scale (VAS). All the information was recorded via study proforma. Data analysis was done by using SPSS version 20.

Results: Mean age of the study participants was 26.77±8.72 years. males were in majority 36(60.0%). On the next day as per severity of pain, mostly patients were presented with severe pain as mean visual analogue scale was 8.7±0.3. On third day pain was markedly decrease among almost all of the cases as average of visual analogue scale was found 2.6±0.2. However after one all the patients were seen without pain as average of visual analogue scale was 0.65±0.7. Pain was statistically insignificant according to gender.

Conclusion: Calcium hydroxide based root canal sealer found to be feasible and effective for endodontic treatment in terms of lower postoperative pain.

Keywords: Pain; obturation; sealer; endodontic treatment.

1. INTRODUCTION

The term "post-operative pain" (POP) for root-treated teeth refers to any discomfort experienced following the start of endodontic therapy [1]. Endodontic flare-ups that are described as severe pain either with swelling that develops after the start or continuing the root canal treatment (RCT), are also included in POP [1,2]. Based on the individuals and characteristics analyzed, postoperative pain (POP) following endodontic procedures appears in 3-58 % of cases [3,4]. During obturation processes, sealer extrusion occurs frequently, and it has been proven to have cytotoxic impacts upon periapical tissues, provoking an inflammatory reaction, stimulating sensory neurons, and therefore increasing POP and chronic pain [5] Understanding the factors that influence POP allows the expert to select strategies and materials which might reduce the likelihood of pain. [4] Prior research has looked at the effects of several root canal sealers upon POP and reported varying findings. For endodontic therapy, calcium hydroxide (Ca(OH)₂) is a widely accepted intra-canal medicament and antibacterial action of calcium hydroxide is via releasing hydroxyl (-OH) ions that kills or inactivates bacteria [6] Due to its antimicrobial or tissue-altering effects, Ca(OH)₂ has been advocated to possess pain protective properties [6] The vehicle application in mixing Ca(OH)₂ has been evidenced to have an effect on its functioning.[7,8] Calcium hydroxide Ca(OH)₂ has been shown to be unsuccessful against all species of bacteria, particularly *Enterococcus faecalis*, which is prevalent in root canal [7]. Ca(OH)₂ was proposed to be administered in conjunction with other medications to improve its efficacy [7] However there is still controversial observation in the literature as some studies on calcium hydroxide's effect on pain after being applied as intracanal medication during root

canal treatment shows the anti-bacterial properties of calcium hydroxide lead to decrease the pain between the sessions [6,7] On the other hand in a study and in systemic review observed that there's no real data to prove that to relief the post endodontic pain and still matter of debate and need further study to prove [9,10] However, this study aims at assessing the post-operative pain by using calcium hydroxide based root canal sealer at tertiary care Hospital.

2. MATERIALS AND METHODS

This cross sectional study was performed at operative dentistry department of Liaquat University of Medical and health Sciences. Study duration was 6 months from March 2020 August 2020. All the patients having permanent anterior teeth with irreversible pulpitis, teeth restoration after root canal treatment and either of gender were included in the study. All the patients presented with periodontal disease and mobility of teeth, teeth with resorbed roots or incomplete root formation, necrosed teeth and those who were not agree to take part in the study were excluded. After taking informed consent multiple visits of endodontic treatment were performed by obturating the canals using calcium hydroxide Ca(OH)₂ (sealapex, Sybron endo). No medication was given to the patients. A post obturation radiograph was taken, only the obturation that 1mm short of the apex was included in the study and that with under and over extension was excluded. Patients were recalled next day, after 3rd day and after one week of obturation. To assess the post-operative pain visual analogue scale was used and its severity was categorized as no pain = 0, mild pain = 1-3, moderate pain = 4-7 and severe pain =8-10. All the information was recorded via study proforma. Data was analyzed using SPSS version 20.

3. RESULTS

Total 60 patients were studied; their mean age was 26.77 ± 8.72 years. There were 36(60.0%) were males and 24(40.0%), were females. Out of all 53.3% patients were from urban areas and remaining cases were from rural areas Table 1.

On the next day as per severity of pain, mostly patients were presented with severe pain as mean visual analogue scale was 8.7 ± 0.3 . On third day assessment pain was markedly decrease among almost all of the cases as average of visual analogue scale was found 2.6 ± 0.2 . However after one all the patients were seen without pain as average of visual analogue scale was 0.65 ± 0.7 . Table 2

Table 1. Descriptive statistics of age and gender

Variables	Statistics	
Age (mean+SD)	26.77 ± 8.72 years	
Gender	Males	36(60.0%)
	Females	24(40.0%)
Residence	Urban	32(53.3%)
	Rural	28(46.7%)

Table 2. Post-operative pain as per follow-up n=60

Post-operative days	Statistics
2 nd postoperative day (VAS)	8.7 ± 0.3
3 rd post-operative day (VAS)	2.6 ± 0.2
After one week	0.65 ± 0.7

4. DISCUSSION

Postoperative pain (POP) of varying degree can compromise endodontic treatment or asymptomatic tooth retreatment. Severe POP, commonly accompanied by swelling, is a medical emergency that frequently results in treatment discontinuation and retreatment [11]. In this study calcium hydroxide $\text{Ca}(\text{OH})_2$ found to be effective in postoperative pain and during three days pain almost pain was decreased very few patients had mild pain and during one week the patient were seen without pain and any other complication. Similarly Petrović V et al. [11] reported that When $\text{Ca}(\text{OH})_2$ was utilized as an inter-appointment medicament, 9 (81.8 %) of the teeth remained asymptomatic (without pain), 1 (9%) of the cases had swelling and severe pain with chronic apical

periodontitis (CAP) and necrotic pulp, and one patient had mild pain following retreatment of chronic apical periodontitis. On the other hand, Menakaya IN et al. [1] used calcium hydroxide $\text{Ca}(\text{OH})_2$ mixed in normal saline or chlorhexidine digluconate 0.2% and found that the overall prevalence of post-operative pain (POP) at both the day-1 and the week-1 was 5.7% in normal saline group. Although, Balto KA et al. [8] observed that when tested using culture techniques, $\text{Ca}(\text{OH})_2$ showed limited efficiency in removing bacterial species from the root canals of human teeth. Antibacterial procedures and sampling methodologies must be improved in order to ensure reliable eradication of bacteria before obturation. Inconsistently Anjaneyulu K et al. [10] observed that Although calcium hydroxide $\text{Ca}(\text{OH})_2$ is among the most commonly utilized intra-canal medicaments because of its antimicrobial characteristics, no strong evidence has been found regarding effect of $\text{Ca}(\text{OH})_2$ on POP following chemo-mechanical root canal preparation. Periradicular tissues inflammation resulting from irritants released from root canal in the course of treatment is linked to POP. Because of its antibacterial or tissue-altering activities, $\text{Ca}(\text{OH})_2$ intra-canal medicaments have been suggested to have pain-preventive characteristic [10].

In this study the mean age was 26.77 ± 8.72 years. Similarly, Gudlavalleti B et al. [5] reported that group A study subjects had a mean age of 31.24 ± 11.08 years, group B study subjected had a mean age of 29.18 ± 9.49 years, whereas group C study subjects had a mean age of 31.67 ± 6.36 years. Khattak YK et al. [12] documented that in their study subjects mean age was 28.19 ± 7.667 years. In this study there were 36(60.0%) males and 24(40.0%) females. In the comparison of this study Khattak YK et al. [12] studied 80 subjects and divided them into two categories as 40 cases in both groups; As intracanal medicaments, participants of group 1 received a mixture of $\text{Ca}(\text{OH})_2$ and Chlorhexidine, whereas patients of group 2 received a mixture of $\text{Ca}(\text{OH})_2$ and normal saline. In group-1 there were 22 males with a male-female ratio of 1.22:1, whereas in group 2 male-female ratio was 1.5:1 [12]. Inconsistently Ferreira ND et al. [4] reported that there were 40 women and 17 men.

In this study pain was statistically insignificant according to gender, while Menakaya IN et al. [1] reported that the POP at both the day-1 and the week1 was more among females as compared to males. This difference may be because of some

limitations of this study like small sample size of the study. The feeling of pain has also been evidenced to be regulated via cortisol hormone that contributes in pain processing mechanisms. [13] In the study of Vieyra JP et al. [14] it was observed that the postoperative worsening was minimal when calcium hydroxide was used as a pain reliever; and healing delay does not minimize postoperative complications in necrotic pulps without fistulae. This was a small sample size and single center study and there are many some other limitations. However further large scale multicenter studies should be done to explore the effectiveness of calcium hydroxide.

5. CONCLUSION

Calcium hydroxide-based root canal sealer was found to be feasible and effective for endodontic treatment in terms of less postoperative pain. However due to some study limitations further large scale studies are recommended on this subject.

CONSENT

After taking informed consent multiple visits of endodontic treatment were performed by obturating the canals using calcium hydroxide (sealapex, Sybron endo).

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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