

Original Research

Efficacy of Reduction In Post operative Pain With Different calcium hydroxide Formulation When Used as intracanal medicament In RCT: A Comparative Study

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ABSTRACT:

Introduction: Main objective of endodontist is to remove microorganism from root canal system. This results in reduction of pain and swelling. In process of this different formulation of calcium hydroxide are used. **Material & Method:** 160 patients were included in this study. Patients were evaluated both clinically and radiographically and ten were divided into five groups. 52 patients were in every group depending upon intracanal medicament used Calcium hydroxide paste (Ivoclar) Group 2: Calcium hydroxide paste with iodoform (Metapex) Group 3: Calcium hydroxide points (Hygienic) Group 4: Calcium hydroxide paste using chitosan (0.2%) as vehicle and Group 5: Control group containing dry sterile cotton. Assessment of post operative pain was analysed 6 hourly after first visit of treatment using visual analogue scale. **Results:** Patients with least pain was of Group 1 (calcium hydroxide paste) after 12, 24 and 48 hours postoperative. Patients with least pain was observed in Group 3 (calcium hydroxide point) 6 hours postoperative. **Conclusion:** When pain was analysed 6, 12, 24, 48 it was observed that pain was least in calcium hydroxide point at 6th hourly and at 12, 24, 48 least pain was associated with calcium hydroxide paste (apexal)

Key Words: Calcium hydroxide, Post-operative pain, Intra-canal medicament

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INTRODUCTION

Removal of microorganism from root canal system is the main objective of endodontist. Once the microorganism are removed there will be reduction in pain and swelling. Periradicular tissue inflammation is associated with post operative pain and pain can be due to over instrumentation or presence of microorganism due to failure to disinfect root canal properly. Endotoxins are released by microorganism in periapical region are main cause of post operative pain.^{2,5,6}

Most commonly used intra canal medicament is calcium hydroxide. Different formulations of calcium hydroxide are used to remove microorganisms by endodontist. Medicaments that are used by endodontists range from phenolic compound and its derivatives, triple antibiotic paste, chlorhexidine gluconate, calcium hydroxide, formocresol etc.^{7,8} Due

to high pH of calcium hydroxide disrupts the cytoplasmic membrane causes chemical injury to organic component and transport of nutrient. Few bacteria like *E. faecalis* and *Candida albicans* are resistant to calcium hydroxide.

Metapex is iodoform based calcium hydroxide paste, it is a silicone and oil based calcium hydroxide paste. Iodoform is being used frequently as antiseptic. Iodine acts by precipitating proteins and oxidizing essential enzymes.^{11,12}

Biocompatibility, bioadhesion and biodegradability are properties of Chitosan which is a natural polysaccharide. It has properties like broad spectrum antibiotic and it has chelating properties.

As there are many advantages of calcium hydroxide but due to its prolonged time removal from root canal and its interactions with root canal sealer lead to introduction of calcium hydroxide points. These are of

28mm of length and brown in colour. These are available in size of 15 to 140. It is made up of 52% calcium hydroxide, 42% gutta percha, sodium chloride, surfactant and colouring agent.¹⁶

Different studies on postoperative pain comparing calcium hydroxide with different medicaments have been done but there are limited study comparing post operative pain with different vehicles of calcium hydroxide. This study aim to evaluate reduction in postoperative pain with different calcium hydroxide formulation when used as intracanal medicament.

MATERIALS & METHODS

200 patients were selected for present study out of this 40 do not participated in study. Patients undergoing root canal treatment on maxillary anterior, mandibular anteriors and premolars were included in present study. Medical, dental history, any medication as well as any drug allergy were taken before beginning of study. An informed written consent was taken from patients. Age, gender, tooth number was properly recorded. Patient selection criteria for present study was

1. Acceptance and interest of patient to present study
2. Adequate time available for present study
3. The teeth should be vital
4. Tooth with single root
5. No previous root canal treatment
6. Irreversible periodontitis with or without irreversible periodontitis
7. Mobility of teeth not more than 0 to 1 degree
8. Pregnant patients not included
9. Teeth with calcified canal not included
10. History of allergy

Visual analogue scale (VAS) with the help of Verbal Descriptor Scale (VDS) Was used to measure and record intensity of pain. All the patients were instructed to mark a note on the horizontal scale to show their pain intensity after treatment that they experienced. The markings on the VAS were measured and the degree of pain was categorized as:

0	No pain
0.1-3	Mild pain
3.1-6.9	Moderte pain
7-10	Severe pain

Clinical examination and radiographical examination was done. Patient were divided in five group randomly. Each group contains 52 patients. Group division ws based on type of intracanal medicament used: Group 1: Calcium hydroxide paste (Ivoclar) Group 2: Calcium hydroxide paste with iodoform (Metapex) Group 3: Calcium hydroxide points (Hygienic) Group 4: Calcium hydroxide paste using chitosan (0.2%) as vehicle and Group 5: Control group containing dry sterile cotton. Anaesthesia (1.8ml, 2% lignocaine with 1:100,000 epinephrine) was given. Proper rubber dam application was done and working length was taken with 15 no. k-file using apex locator

and it was re confirmed with intra oral sensor (Vatec). All canal were prepared with crown down technique using protaper next file system (Densply). Copious irrigation was done with 3% sod. Hypochlorite and 15% EDTA and with normal saline.

RESULTS

Our study showed that Group 1 (calcium hydroxide with propylene glycol paste) has best results in reducing pain after 12, 24, 48 hour post-operatively among other groups. 6 hour post operatively reduction in pain was best result seen in Group 3 (Calcium hydroxide points) maximum pain was seen in group 5 patients. 12 hourly post operative pain was seen minimum in group 1 patients followed by group 3 and maximum in group 5 patients.

24 hour post operatively pain sequence was least in Group 1 then Group 3 and maximum in Group 5.

When we ranked post operative pain we found that. We had found according to superiority (in descending order) as Calcium hydroxide paste > Calcium hydroxide points > Calcium hydroxide with chitosan > calcium hydroxide with iodoform. After 6 hours post-operatively, statistically significant difference was noted in the incidence of post operative pain between all four calcium hydroxide groups (Group 1, Group 2, Group 3 and Group 4) with control group (Group 5). Also, statistically significant difference was revealed between Group 2 with Group 1 (calcium hydroxide with iodoform with calcium hydroxide paste) & Group 2 (calcium hydroxide with iodoform) with Group 3 (calcium hydroxide points). At 12th postoperative hour, no statistically significant difference was identified among all groups. At 24 hour post-operatively, relative difference in post-operative pain was observed between Group-1 and Group-5, Group-2 and Group-5, Group-3 with Group 5, Group-4 and Group-5 control group.

DISCUSSION

The thumb rule for a successful endodontic therapy is prompt elimination of an infection and attaining three dimensional obturation of the canal to put an end to subsequent reinfection. But, the currently available techniques of debridement might leave some parts of root canal space totally untouched by the endodontic instruments. Various media like normal saline, distilled water, chlorhexidine are being used for the manipulation of calcium hydroxide which thereby affecting its dissociation into ion forms such as Ca⁺ and OH⁻.¹⁹ But still, there is a void in the knowledge with respect to the best medium which can be used to mix with calcium hydroxide. Therefore, this study is carried out to determine the medium which is more efficient when mixed with calcium hydroxide in terms of reduction of the interappointment pain.²⁰ Apexcal is a viscous polyethylene glycol-based paste which comprises of 29% of calcium hydroxide, 22% of bismuth carbonate and 49% of other

materials like polyethylene glycol, glycerine and water. When mixed it revealed homogenous and constant consistency mix for an extended period of time. *Estrela* et al briefed that the liberation of calcium and hydroxide ions was relatively faster and much more significant when used as calcium hydroxide distilled water paste.²¹ Metapex contains calcium hydroxide with iodoform in silicon oil in its composition. In the year 1928, *Walkoff* introduced iodoform as an effective root canal filling material in primary teeth. The superior antimicrobial property exhibited by Metapex may be due to the combination with iodoform and to the viscous and oily vehicle which could easily prolong the action of the medicament. Based on a study by *Ho* et al showed that oily vehicles might reported to increase the antimicrobial effects of calcium hydroxide against *E. faecalis* and other bacteria.²²

The temporary calcium hydroxide points are the new device delivery for calcium hydroxide as an intra canal dressing containing calcium hydroxide at a concentration of about 50- 54% that can be easily inserted and removed from the pulp space when their role is achieved.²⁴ The product chitin is a straight homopolymer which consists of (1,4)- linked N-acetylglucosamine units, which is available in the exoskeleton of crustaceans species like crabs and shrimps. Chitosan is comprised of copolymers of glucosamine and N-acetyl-glucosamine.

Chitosan is basically considered as biocompatible, non-toxic and biodegradable and is inherently antibacterial capability. As per the information available in the literature, various calcium hydroxide preparations have been used so as to utilize its inherent antibacterial potential.²³ The reason that Apexcal showed minimum post operative pain might be due to the fact that propylene glycol in its composition keeps it to remain as a paste form for a relatively extended period of time which proposes its good manoeuvrable qualities. Other paste preparations that are being used in the study dries up within a shorter period of time which is considered to be undesirable as it would be less convenient to be used as an intra canal medicament.²⁴ The results of this present study are generally in concurrence with the results obtained by *Paul* K et al 1997, *Shetty* S et al 2014 who inferred that the paste of calcium hydroxide with propylene glycol exhibits significant antibacterial action. According to *Shetty* S et al 2014, the relatively high pH of calcium hydroxide paste with propylene glycol as vehicle may be attributed to its high molecular weight (76.09), hygroscopic nature and viscosity which possess extended release of ions.²⁶ This demonstrates that the increased mobility of the hydroxyl ions released by the calcium hydroxide points when compared with aqueous calcium hydroxide paste. The alkalisation of outer root dentin is important to attain in certain clinical conditions where the aim is to revert the acidic

environment which is necessary for the root resorption by osteoclasts.²²

CONCLUSION

Calcium hydroxide paste containing propylene glycol/water based is the most effective in reducing the pain from 6 hours to 48 hours postoperatively. Calcium hydroxide points which is a new drug delivery device significantly showed lesser post-operative pain while the condition got worse at 12 hour, 24 hour and 48 hour. Control group which is left without any medicament showed maximum post operative pain as compared to other groups at 6 hour, 12 hour, 24 hour and 48 hour. To arrive at a conclusion, calcium hydroxide with iodoform, calcium hydroxide points and calcium hydroxide with chitosan, can be correlated after comparing the findings of the present study with other clinical studies that had conducted earlier. There fore, more researches have to be proposed to achieve a definitive conclusion.

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