

# Comparative Evaluation of Incidences of Post Operative Pain in Patient Treated in Single Visit Root Canal Treatment by Using Different Sealers: - An in-Vivo Study

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## Abstract:-

### ➤ Aim-

This study aims to evaluate the effect of calcium hydroxide-based and MTA-based sealers on the post-obturation pain in single-visit root canal treatment -a VAS study.

### ➤ Methodology-

24 patients with carious single rooted premolar teeth with vital pulp indicated for root canal therapy, were randomly divided into two groups according to the sealer used: calcium hydroxide-based and resin-based sealer. Neoendo flex rotary files were used for root canal preparations. Root canals were then obturated with gutta percha cones corresponding in size and taper to the last instrument used. Calcium hydroxide-based sealer was used in the first group and MTA-based sealer in the second group as the root canal sealer. Postoperative pain at 4hrs, 24 hrs and 1 week after root canal treatment was recorded with the use of Visual analogue (VAS) scale. Statistical analysis was then carried out.

### ➤ Result and Conclusion:

There was no significant difference found in between the two groups. Thus, concluding that the effect of calcium hydroxide-based and MTA-based sealers on post-obturation pain in single-visit root canal treatment was similar when compared.

**Keywords:-** Calcium Hydroxide-based Sealer, MTA-based Sealer, Post-Obturation Pain, Single-Visit Root Canal Treatment, VAS.

## I. INTRODUCTION

The success of an endodontic treatment depends upon the following factors like proper debridement, shaping, disinfecting, and three dimensional obturation of root canal system.

The conservative non-surgical treatment of an endodontically involved tooth consisting of complete biomechanical cleansing, shaping and obturation of the root canal system during one visit is referred to as Single-visit endodontic therapy.

The aim of root canal therapy is to debride microorganisms, eliminate biofilms and prevent microorganisms from infecting or reinfecting root canals and periradicular tissue [3,8]

However due to complex root canal anatomical variations, the complete elimination of microorganisms and biofilm is uncertain. To address issues that arise after instrumentation and root canal irrigation, root canal obturating materials must be effective.

Root canal sealers, used alongside solid or semisolid obturating materials, are essential for achieving a proper seal within the root canal system. Effective sealers should have antibacterial properties and excellent sealing capabilities to control endodontic infections, inhibit residual bacterial growth, prevent reinfection, and support the healing of apical and periapical tissues.

Calcium hydroxide-based sealers are known for their antibacterial effects, which result from the release of hydroxyl ions that increase pH levels. These sealers also promote osteogenic and cementogenic activity and have lower cytotoxicity compared to other types of sealers.

Bioceramic materials offer bioactive properties that can stimulate tissue repair and induce mineralization. These sealers are biocompatible, nontoxic, and bioactive, presenting an alkaline pH and dimensional stability with minimal expansion. Their hydraulic nature makes them ideal for treating moist root canals and tubules, as they release calcium hydroxide into a solution, providing pH levels above 12. Once set, these materials become hard and insoluble, ensuring excellent long-term sealing ability.

## II. MATERIAL AND METHODODOLOGY

Twenty-four patients having symptomatic carious single rooted mandibular teeth have been included in this study.

### ➤ Inclusion Criteria-

- Single rooted mandibular teeth
- No periapical lesion
- Symptomatic teeth
- Type I root canal configuration
- No aberrant root canal morphology
- Vital teeth
- No presence of swelling or sinus tract
- No Re-RCT teeth

### ➤ Exclusion Criteria-

- Maxillary teeth
- Anatomical variations
- Asymptomatic, Necrotic, non-vital teeth
- Teeth with periapical lesion
- Teeth associated with swelling or sinus tract
- Instrument separation in canal during the procedure

- Patients which fail to follow-up

### ➤ Methodology-

Patients which met the inclusion criteria were randomly divided into two groups according to the sealer used- Group A- Calcium hydroxide-based sealer and Group B- MTA based sealer.

Electronic pulp testing was carried out to check for the vitality and IOPA was evaluated for root canal configuration.

Written consent was obtained from the patient prior to commencement of the procedure. Patients were taught how to record their pain response on the VAS (visual analogue scale) and were asked to record the pain intensity prior to the treatment.

Local anaesthesia was administered and access opening was done.

Working length was determined 0.5mm short of the reading displayed on the electronic apex locator and confirmed with the help of the RVG.

Biomechanical preparation was carried out using the Neoendo flex file upto 25-6% file. 5.25% NaOCl (1:1 dilution) was used for irrigation. After completion of the cleaning and shaping procedure, the canal was dried using a sterile paper point and single cone obturation technique was carried out. While obturation, patients in group A received Calcium hydroxide sealer, whereas group B received MTA based sealer. The sealer was first coated on the canal walls as well as on the gutta percha point and then the obturation was carried out followed by post obturation restoration.

The patients were asked to record their pain response at interval of 4 hrs, 24hrs and 1 week.

Data analysis- Chi-square test was used. [ $\alpha = .05$ - the level of significance].

## III. RESULTS

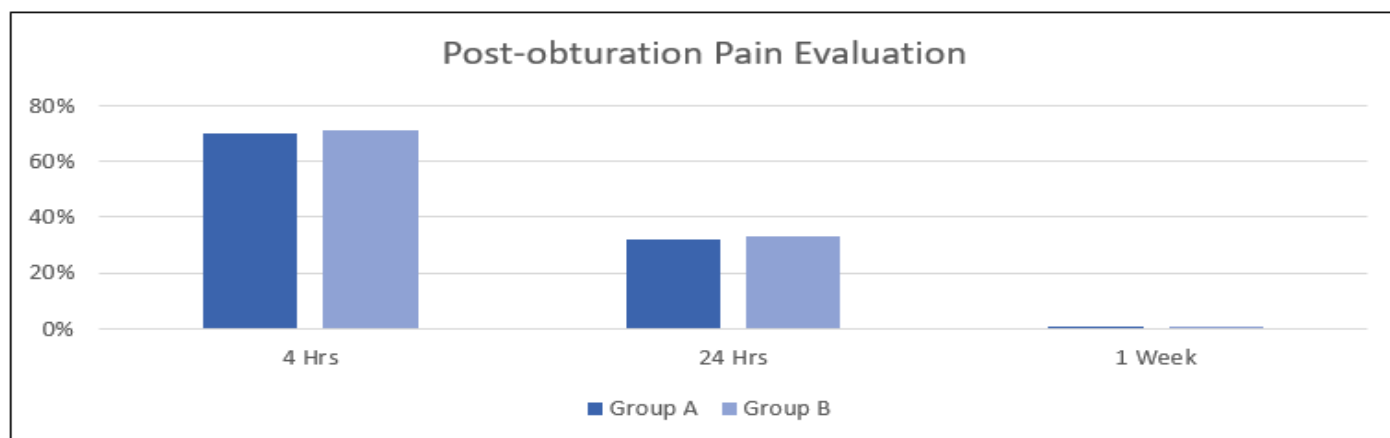


Fig1 Statistical Graph of Results in which x-axis: Percentage of People that Experienced Pain at Intervals and y-axis: Time Intervals of Recording Responses on VAS Scale.

Both groups A and B showed similar post obturation pain results when evaluated at intervals of 4 hrs, 24hrs and 1 week after treatment. There was no significant statistical difference between the values recorded.

#### IV. DISCUSSION

Postoperative pain primarily arises from acute inflammation in the periradicular tissue, which occurs as a result of microorganisms penetrating from the root canal during endodontic retreatment.<sup>[7]</sup>

The factors affecting postoperative pain are the intraoperative and extraoperative factors. Factors such as the size of the radiolucency, the quality of the coronary restoration, the type of intracanal medications used, the location of the tooth, incomplete instrumentation, extrusion of intracanal medicament, patient's age and sex, presence of periapical pathosis, apical debris extrusion, and irrigant extrusion, among others, can influence various aspects of endodontic treatment outcomes.<sup>[1,2]</sup>

Calcium hydroxide-based sealers provide antibacterial effects through the release of hydroxyl ions, which raise pH levels. Additionally, they encourage osteogenic and cementogenic activity and are less cytotoxic compared to other types of sealers.<sup>[13-17]</sup>

Bioceramic materials have properties that encourage tissue repair and mineralization. They are biocompatible, non-toxic, maintain an alkaline pH, and are dimensionally stable with minimal expansion.<sup>[18,12]</sup> Their hydraulic nature makes them ideal for moist root canals and tubules, as they release calcium hydroxide, raising the pH above 12.<sup>[19,11]</sup> After setting, they become hard and insoluble, ensuring excellent long-term sealing.<sup>[10]</sup>

Melis Coşar, Gözde Kandemir Demirci, and Mehmet Kemal Çalışkan found that Mineral Trioxide Aggregate displayed comparable incidence and intensity of post-obturation pain as well as a similar success rate to AH Plus sealer.<sup>[4]</sup>

Heng Seh Gabriel Tan, Kian Chong Lim, Jeen Nee Lui, Wei Ming Clement Lai, Victoria Soo Hoon Yu concluded that no notable distinction in post-obturation pain was observed among teeth filled with Tricalcium Silicate and those sealed with Resin-based Sealer.<sup>[5]</sup>

In 2023 Mine Buker, Meltem Sumbullu, Afzal Ali, Oguzhan Unal, Hakan Arslan examined the impact of root canal sealers based on Calcium Silicate and Calcium Hydroxide on postoperative pain, and it was determined that patients treated with both types of sealers reported comparable levels of postoperative discomfort.<sup>[6]</sup>

Cynthia Maria Chaves Monteiro, Ana Cristina Rodrigues Martins, Alessandra Reis, Juliana Larocca de Geus conducted a random-effects meta-analysis to compare the effect different of endodontic sealers on postoperative pain in patients who received endodontic treatment. They concluded there was no difference in the risk and intensity of postoperative pain after filling with different endodontic sealers.<sup>[20]</sup>

#### V. LIMITATIONS OF THE STUDY

The limitation in the present study are inadequate sample size and limited duration of evaluation to prove the long-term success of these sealers used in single visit endodontic treatment. Further in vivo studies with these sealers in all types of root canal configurations with a larger sample size and long-term evaluation deems necessary.

#### VI. CONCLUSION

Within the limits of this study, there was no significant difference between the two sealer groups. Thus concluding that the effect of calcium hydroxide-based sealer and MTA-based sealer on post-obturation pain in single-visit root canal therapy was similar when compared.

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