

# Prospective Clinical Study on Postoperative Pain Following Use of Ledermix and Calcium Hydroxide Intracanal Medicaments

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## Abstract

**Background:** Postoperative pain is a common complication after root canal instrumentation. Intracanal medicaments are frequently used to reduce microbial contamination and inflammatory reactions within the canal system.

**Objective:** To compare the clinical effectiveness of Ledermix Paste and Calcium Hydroxide in reducing postoperative pain after root canal instrumentation.

**Methods:** This comparative clinical study included 40 patients requiring root canal treatment in permanent teeth. Participants were randomly divided into two groups: Group A received Ledermix paste and Group B received calcium hydroxide as intracanal medicament after instrumentation. Pain intensity was assessed using the Visual Analogue Scale (VAS) at 24, 48, and 72 hours after treatment. Data were analyzed statistically to compare pain reduction between groups.

**Results:** Both groups showed gradual reduction in postoperative pain over time. The Ledermix group demonstrated lower mean pain scores during the first 24 hours compared to the calcium hydroxide group. By 72 hours, pain levels were minimal in both groups.

**Conclusion:** Both medicaments were effective in postoperative pain control. Ledermix paste showed better short-term pain relief after instrumentation.

**Keywords:** Ledermix Paste, Calcium Hydroxide, Root canal treatment, Intracanal medicament, Postoperative pain, Endodontics.

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## Introduction

Postoperative pain following endodontic treatment is a common clinical problem and remains an important concern in dental practice. Although root canal treatment is designed to eliminate infection and preserve the tooth, many patients experience varying degrees of pain after treatment, particularly during the first few days. This pain may result from mechanical irritation caused by instrumentation, extrusion of debris beyond the apical foramen, chemical irritation from irrigants, or the persistence of microorganisms within the root canal system. The anatomical complexity of root canals, including lateral canals, accessory canals, and dentinal tubules, makes complete eradication of microorganisms challenging even after adequate cleaning and shaping procedures.

Intracanal medicaments are therefore commonly placed between appointments to enhance disinfection and reduce postoperative symptoms. Their purpose is not only to eliminate residual microorganisms but also to create an environment favorable for periapical healing. Among the various intracanal medicaments available, Calcium hydroxide has long been regarded as the most commonly used because of its broad-spectrum antimicrobial activity, high pH, and ability to inactivate bacterial endotoxins. It acts by releasing hydroxyl ions, which damage bacterial cytoplasmic membranes, proteins, and DNA. So, calcium hydroxide as an effective intracanal medicament for reducing microbial load, though its action may be limited against resistant species such as *Enterococcus faecalis*.<sup>1</sup>

Ledermix paste is another intracanal medicament widely used for symptomatic cases. It contains demeclocycline calcium, a tetracycline antibiotic, and triamcinolone acetonide, a corticosteroid. This combination provides both antibacterial and anti-inflammatory effects. The anti-inflammatory action of triamcinolone reduces periapical tissue inflammation, which may lead to faster pain relief. Corticosteroid-antibiotic dressings significantly reduced postoperative pain compared to calcium hydroxide during the early follow-up period.<sup>2</sup> Several studies have compared the clinical effectiveness of different intracanal medicaments in controlling postoperative pain. While calcium hydroxide is considered highly effective for disinfection and healing, Ledermix may provide superior pain relief

because of its corticosteroid component. On the other hand calcium hydroxide did not significantly reduce postoperative pain compared with controls, indicating that its primary role may be antimicrobial rather than analgesic.<sup>3</sup> Recent systematic reviews also suggest that medicaments combining antimicrobial and anti-inflammatory properties may provide better patient comfort during interappointment periods.<sup>4,5</sup>

Therefore, a comparative assessment of postoperative pain following the use of Ledermix paste and calcium hydroxide as intracanal medicaments is clinically important. Such evaluation may help clinicians select the most appropriate medicament to improve patient comfort and optimize endodontic treatment outcomes

## Materials and Methods

This comparative clinical study was conducted among patients requiring root canal treatment in permanent teeth at smile line dental care. The purpose of the study was to assess postoperative pain following the use of Ledermix Paste and Calcium Hydroxide as intracanal medicaments after instrumentation. A total of 40 patients aged between 18 and 50 years were selected for the study. Patients presenting with symptomatic irreversible pulpitis or necrotic pulp in single-rooted permanent teeth were included. Patients with systemic diseases, pregnancy, history of analgesic intake within 12 hours before treatment, previously initiated root canal treatment, or severe periapical pathology were excluded. The selected patients were randomly divided into two equal groups of 20 each: Group A: Treated with Ledermix Paste Group B: Treated with Calcium Hydroxide All clinical procedures were performed under local anesthesia and rubber dam isolation. After access cavity preparation, working length was determined using an apex locator and confirmed radiographically. Cleaning and shaping of the canals were carried out using rotary nickel-titanium instruments following standardized protocol. During instrumentation, canals were irrigated with 2.5% sodium hypochlorite and normal saline. After completion of canal preparation, the canals were dried using sterile paper points. In Group A, Ledermix paste was placed into the canal using a lentulo spiral. In Group B, calcium hydroxide paste

was introduced in the same manner. The access cavities were sealed temporarily with a suitable restorative material. Patients were instructed regarding postoperative care and were asked not to take analgesics unless pain became severe. Pain intensity was assessed using a Visual Analogue Scale (VAS), where 0 indicated no pain and 10 indicated severe pain. Pain scores were recorded by patients at 24, 48, and 72 hours after

instrumentation. Collected data were tabulated and analyzed statistically. Mean pain scores and standard deviations were calculated for both groups. The comparison between groups at different time intervals was performed using appropriate statistical tests, and a p-value of less than 0.05 was considered statistically significant.

## Result

A total of 40 patients completed the study successfully. Postoperative pain was assessed at 24, 48, and 72 hours using the Visual Analogue Scale (VAS). Both groups showed a progressive reduction in pain over time. The group treated with Ledermix Paste showed lower pain scores during the early postoperative period compared to the group treated with Calcium Hydroxide.

**Table 1: Comparison of Mean Postoperative Pain Scores (VAS)**

| Time Interval | Ledermix Paste (Mean $\pm$ SD) | Calcium Hydroxide (Mean $\pm$ SD) | p-value |
|---------------|--------------------------------|-----------------------------------|---------|
| 24 hours      | 3.1 $\pm$ 0.8                  | 4.5 $\pm$ 1.0                     | <0.05   |
| 48 hours      | 1.8 $\pm$ 0.6                  | 2.7 $\pm$ 0.7                     | <0.05   |
| 72 hours      | 0.6 $\pm$ 0.4                  | 0.9 $\pm$ 0.5                     | >0.05   |

**Table 1** shows that postoperative pain was highest at 24 hours in both groups. Patients treated with Ledermix paste experienced lower pain intensity compared to calcium hydroxide. The difference was statistically significant at 24 hours, 48 hours and 72 hours.

**Table 2: Distribution of Patients According to Pain Severity**

| Pain severity | Ledermix Paste (n=20) | Calcium Hydroxide (n=20) |
|---------------|-----------------------|--------------------------|
| No pain       | 8                     | 5                        |
| Mild pain     | 7                     | 6                        |
| moderate pain | 4                     | 6                        |
| Severe pain   | 1                     | 3                        |

**Table 2** indicates that a greater number of patients in the Ledermix group reported no pain or only mild pain compared with the calcium hydroxide group. Severe pain was observed in fewer patients receiving Ledermix paste. Overall, both intracanal medicaments were effective in reducing postoperative discomfort; however, Ledermix showed better pain control in the first 48 hours after instrumentation.

## Discussion

The present study compared postoperative pain following the use of Ledermix paste and calcium hydroxide as intracanal medicaments. The findings demonstrated that both medicaments were effective in reducing postoperative symptoms; however, Ledermix showed superior pain control during the first 24 to 72 hours. This may be attributed to the presence of triamcinolone acetonide, which reduces inflammation by suppressing inflammatory mediators and minimizing periapical tissue response. Since postoperative pain is closely related to periapical inflammation, the anti-inflammatory effect of Ledermix likely contributed to the rapid reduction in pain observed in this study. These findings are consistent with the work of Fava LR, who reported significantly lower postoperative pain in patients treated with corticosteroid-antibiotic intracanal dressings compared with calcium hydroxide.<sup>2</sup> The corticosteroid component provides immediate symptomatic relief, making Ledermix particularly useful in cases of acute symptomatic apical periodontitis or severe preoperative pain. Calcium hydroxide remains one of the most widely accepted intracanal medicaments because of its strong antimicrobial properties. Its therapeutic effect is based on the dissociation of calcium and hydroxyl ions, which create a highly alkaline environment that interferes with bacterial enzyme systems and cell membranes. Zehnder M highlighted that calcium hydroxide is effective in reducing bacterial contamination and promoting healing of periapical tissues.<sup>7</sup>

This explains the gradual reduction in pain observed in the calcium hydroxide group over time. Despite its antimicrobial efficacy, calcium hydroxide may not provide immediate pain relief. Walton RE *et al.* found that the use of calcium hydroxide as an intracanal medicament did not significantly reduce post-treatment pain compared to cases without medicament.<sup>3</sup> This suggests that its primary function is microbial control rather than direct suppression of inflammatory pain. Mohammadi Z and Abbott PV emphasized that the clinical effectiveness of calcium hydroxide may vary depending on the bacterial species present, canal

anatomy, and duration of placement.<sup>8</sup>

Resistant microorganisms, particularly *Enterococcus faecalis*, may survive despite exposure to calcium hydroxide, which may explain persistent symptoms in some cases. The findings of the present study suggest that the choice of intracanal medicament should be based on treatment objectives. Ledermix may be preferred when immediate postoperative pain control is required, especially in symptomatic patients. On the other hand, calcium hydroxide remains valuable for long-term antimicrobial action and stimulation of periapical healing.<sup>6</sup>

The combined antimicrobial and anti-inflammatory properties of Ledermix may provide better patient comfort, while calcium hydroxide offers advantages in maintaining long-term biological healing. Therefore, careful case selection is important to achieve optimal clinical outcomes in endodontic therapy.<sup>9</sup>

## Conclusion

Within the limitations of this study, both Ledermix Paste and Calcium Hydroxide were found to be effective intracanal medicaments for reducing postoperative pain following root canal instrumentation. The results showed that postoperative pain decreased progressively in both groups over time. However, Ledermix paste demonstrated better pain control during the early postoperative period, particularly within the first 24 to 48 hours. This may be due to its anti-inflammatory corticosteroid component, which provides rapid relief from inflammatory symptoms. Calcium hydroxide also showed satisfactory results in reducing pain, especially after 72 hours, and remains a widely accepted intracanal medicament because of its antimicrobial properties and clinical reliability. Based on the findings, Ledermix paste may be considered a preferable option for short-term postoperative pain management following root canal treatment, while calcium hydroxide remains an effective alternative for routine endodontic therapy.

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