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Inter-appointment endodontic pain comparison between calcium hydroxide and triple antibiotic paste

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Abstract--One of the biggest sources of dread for patients and a top concern for dentists is the anticipation and reality of root canal-related pain.¹ Pain is defined as "an unpleasant sensory and emotional experience associated with actual or potential damage or described in terms of such damage" by the International Associates for the Study of Pain.² The imbalance in the host-bacteria connection brought on by intra canal operations is the main cause of inter appointment pain. Objectives: The goal of current study was to associate the outcomes of these intracanal medications on pain experienced between endodontic appointments. This would make it

easier for us to find better medications to treat discomfort between appointments. Methodology: For a period of six months, from January 6, 2022, to January 1, 2023, this randomized controlled study was carried out in the Dept. of Operative Dentistry at the MIHS in Islamabad, Pakistan. With a 5% level of significance, an 85% power of the trial, and a fraction of effectiveness of 72% with triple antibiotic paste and 38% with calcium hydroxide, a sample size of 80 people, 40 in each group, was estimated. Results: The mean age of patients who received triple antibiotic paste was 25.80 + 8.38 years. The mean age of patients who got calcium hydroxide was 23.72 + 9.21 years. Twenty patients (50%) were male and twenty patients (50%) were female who received the triple antibiotic paste. 19 patients (47.5%) were female and 21 (52.5%) male among those who got calcium hydroxide. Conclusion: Calcium hydroxide was shown to be less efficient than triple antibiotic paste as a pain reliever. Thus, it can be concluded that triple antibiotic paste can be utilized in endodontic operations in place of calcium hydroxide in order to reduce patient suffering.

Keywords---triple antibiotic paste, calcium hydroxide, inter-appointment endodontic pain.

Introduction

One of the biggest sources of dread for patients and a top concern for dentists is the anticipation and reality of root canal-related pain.¹ Pain is defined as "an unpleasant sensory and emotional experience associated with actual or potential damage or described in terms of such damage" by the International Associates for the Study of Pain.² The imbalance in the host-bacteria connection brought on by intra canal operations is the main cause of inter appointment pain. Circumstantial mark has suggested that certain bacterial species linked with peri-radicular lesions comprise; "Porphyromonas endodontalis, Porphyromonas gingivalis, Prevotella species, Treponema denticola, Tannerella forsythia, Filifactor alocis, Dialister pneumosintes, Peptostreptococcus micros, and Finegoldia." Instrumentation, irrigation, and all other treatments carried out during appointments are associated to inter-appointment pain.³ Root canals should be cleaned either chemically or mechanically in order to combat this. Since total eradication of bacteria is challenging, intracanal medications can be helpful. Intracanal medications can aid in achieving sterility after instrumentation and thorough irrigation. There are several intracanal medications that have been utilised, but some of the more popular ones include calcium hydroxide, a variety of medicines combinations such as formocresol, eugenol, and iodine potassium iodide etc.⁴

Inflammatory responses in the tissues that are connected to injury & the type of harm are what cause endodontic discomfort. Endodontic discomfort might develop prior to, during, or following the endodontic procedure. ⁵ In endodontics, inter-appointment discomfort may develop from peri-apical tissue injury caused by chemical, microbiological agents or mechanical that cause acute inflammation during endodontic treatment. Endodontic treatment includes the prevention and

control of inter-appointment endodontic pain.⁶ A patient may show up in an emergency situation with pain and edema in between appointments. Correct diagnosis and vigorous therapy are required to successfully treat symptoms when an inter-appointment emergency occurs.⁷ Calcium hydroxide did have a significant effect on bone density curative and restoration over time; however it was eventually discovered that triple antibiotic paste was a superior pain reliever than calcium hydroxide. The goal of current study was to associate the outcomes of these intracanal medications on pain experienced between endodontic appointments. This would make it easier for us to find better medications to treat discomfort between appointments.

Methodology

For a period of six months, from January 6, 2022, to January 1, 2023, this randomized controlled study was carried out in the Dept. of Operative Dentistry at the MIHS in Islamabad, Pakistan. With a 5% level of significance, an 85% power of the trial, and a fraction of effectiveness of 72% with triple antibiotic paste and 38% with calcium hydroxide, a sample size of 80 people, 40 in each group, was estimated. Non-probability, sequential sampling was the method utilized. Ages 20-35, both sexes, freshly identified that met the criteria for endodontic pain as defined by the "International Associates for the Study of Pain," acute endodontic, periodontal disease, or periodontal abscess needing prophylactic antibiotics, and systemic diseases were omitted from the study. Subjects who were breastfeeding babies or who were pregnant were also not included in the sample. The institutional ethical committee gave its approval for this investigation to be carried out. Following the fulfilment of the inclusion criteria, 80 OPD patients were chosen. Each patient provided their demographic information and gave their informed consent. Patients were divided into 2 equal clusters at random using the lottery method. Triple antibiotic paste was positioned in Cluster 1. Calcium hydroxide was put in Cluster 2. On days 3 and 7, the patients were contacted once more for pain assessment and pain intensity measurements, as well as for clinical assessment and obturation if there were no symptoms. On a visual analogue scale, the efficiency of the intracanal medication was evaluated as either none, mild, moderate, or severe pain. This data was captured on a proforma. SPSS version 26 was used for the statistical analysis of the data. The effectiveness in both groups was compared using the Chi-square test, with a P-value of <0.05 measured significant.

Results

The mean age of patients who received triple antibiotic paste was 25.80 + 8.38 years. The mean age of patients who got calcium hydroxide was 23.72 + 9.21 years. Twenty patients (50%) were male and twenty patients (50%) were female who received the triple antibiotic paste. 19 patients (47.5%) were female and 21 (52.5%) male among those who got calcium hydroxide (Table 1).

Variables	Group	
	Calcium Hydroxide	Triple Antibiotic Paste
N	40	40
Age	23.72 + 9.21	25.80 + 8.38

Gender		
Female	19 (47.5%)	20 (50%)
Male	21 (52.5%)	20 (50%)

Table 1: Demographic picture

The mean pain score in participants who received triple antibiotic paste ranged from 0.80 + 1.77. The mean pain score in those who received calcium hydroxide ranged from 1.72 + 2.06. Eight (20%) of the patients who received the triple antibiotic paste complained of pain, compared to 32 (80%) of the patients who did not. 20 (or 50%) of the patients who got calcium hydroxide reported having pain, compared to 20 (or 50%) who did not. In both groups, a significant difference was seen ($p < 0.05$). Pain intensity was also documented, and while no severe cases were reported in the triple antibiotic paste cluster, four cases (10%) of severe pain were reported in the calcium hydroxide cluster, albeit the dissimilarity was not statistically significant ($p > 0.05$) (Table 2).

Variables	Group		P value
	Calcium Hydroxide	Triple Antibiotic Paste	
N	40	40	0.005
Pain Score	1.72 + 2.06	0.80 + 1.77	
Pain			
Absent	20 (50%)	32 (80%)	0.0014
Present	20 (50%)	8 (20%)	
Severity of pain			
None (0)	20 (50%)	32 (80%)	0.0062
Mild (1-3)	10 (25%)	5 (12.5%)	
Moderate (4-7)	6 (15%)	3 (7.5%)	
Severe (>7)	4 (10%)	0 (0%)	

Table 2: Evaluation of pain

Discussion

Pain is an unpleasant but normal side effect of a root canal operation that begins after few hours or days later & is constantly uncomfortable for parties, the patients and dentist.⁸ Most people believe that getting a root canal is the most painful dental procedure. Following root canal therapy, less than 20% of patients experienced substantial pain, with the majority only feeling mild discomfort.⁹ The key reasons include mechanical, chemical, or microbial factors that damage periapical tissue and cause acute inflammation. Determining a single factor or a mix of features contribute to pain in a clinical trial may be difficult.¹⁰ If a root canal system was not properly cleansed, imbalances in the host-bacteria connection, synergistic or additive microbial interactions, or the existence of visibly harmful bacteria before handling may worsen a residual infection. Calcium hydroxide intra-canal medicine has been theorized to have pain-preventing properties due to its anti-microbial or tissue-altering activities. Some disagree, claiming that calcium hydroxide might exacerbate discomfort by starting or intensifying inflammation.¹¹ Calcium hydroxide intra-canal dressing is recognized as the finest anti-microbial agent.

Numerous meticulously controlled in-vitro and in-vivo studies have shown an intra-canal microbial population reduction or at the very least a suppression of bacterial development.¹²⁻¹⁵ Additionally, calcium hydroxide alters the bacterial cell wall and renders it less antigenic by denatured lipopolysaccharide, a potent endotoxin. A triple antibiotic paste including ciprofloxacin, metronidazole, and minocycline can effectively manage non-vital young permanent teeth and control the root canal infection.

According to Malu et al.¹⁶, both medications significantly reduced mean pain over the follow-up period. Although the difference between the calcium hydroxide and triple antibiotic paste intracanal medications was not statistically significant ($p>0.05$), the triple antibiotic paste exhibited decreased post-operative pain. Conclusion: Both intracanal medications are effective at reducing postoperative pain in uniradicular necrotic teeth that are asymptomatic.

Nisa et al.¹⁷ looked at either calcium hydroxide intracanal dressing decreased postoperative pain in different types of pulpal & periapical pathosis with and without symptoms, but they found that it was not improved than leaving the canal space empty deprived of dressing. In a study by Jain et al,¹⁸ it was found that using calcium-enriched combination cement after pulpotomy significantly decreased pain intensity as early as 1 day after surgery, but the pain intensity was compact in single visit RCT after 2 days. In one study, the prevalence of moderate and severe pain varied from 20% to 1%, while the antibiotic group's median postoperative pain at all follow-up intervals was 0.19. Moradi et al¹⁹ used triple antibiotic paste, and during follow-up they found no flare-up.

Conclusion

Calcium hydroxide was shown to be less efficient than triple antibiotic paste as a pain reliever. Thus, it can be concluded that triple antibiotic paste can be utilized in endodontic operations in place of calcium hydroxide in order to reduce patient suffering.

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