ORIGINAL ARTICLE

A Prospective Study of Postoperative Pain after Root Canal Treatment

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Abstract

Background and Objectives: A component of endodontic therapy is the prevention and management of post-operative pain The postoperative discomfort and suffering associated with root canal therapy (RCT) are more severe and frequent than those associated with other dental procedures. The objective of this study is to determine the frequency and intensity of PEP (post-operative pain)after root canal therapy (RCT) in teeth having healthy and unhealthy pulps.

Methodology: This prospective study, which was conducted from July 2022 to December 2022. Participants included all individuals (n=193) who underwent RCT in teeth with pulp (vital or pulp)after receiving initial therapy for symptomatic irreversible pulpitis at Rehman College of Dentistry in Peshawar. Using a standardized questionnaire, data on things like gender, age, pulpal diagnosis and tooth location were acquired. Patients were questioned regarding the rate their level of pain using a 1-5 point scale within 24 hours after therapy at 6, and 18 hours post-treatment.

Results: RCT of teeth with live pulp resulted in higher post-operative discomfort (63.8%; 2.46 1.4, vs. 38.5%; 1.78 1.2, resp.) than with necrotic pulp. Both spontaneous and prompted pain had no statistically significant correlation with the pulp state.

Conclusion: In comparison to teeth with necrotic pulp, RCT of teeth with viable pulp caused a considerably greater degree and incidence of post-operative pain.

Key Words: *Treatment Root canal, post-endodontic pain, vital pulps, necrotic teeth*

Introduction:

A component of endodontic therapy is the prevention and management of post-operative pain. By informing patients about anticipated post-operative discomfort and offering them with medications to alleviate it, dentists can enhance their patients' perception of pain, attitude towards future dental care, and faith in their judgment. [1] The postoperative discomfort and suffering associated with root canal therapy (RCT) are more severe and frequent than those associated with other dental surgical and operative procedures.[2,3] Between 1.5 to 53% of post-operative pain cases are described in the literature. [4]The broad variety seems to be mostly brought about by variations in post-endodontic discomfort (PEP). Severe discomfort/pain and/or swelling following endodontic therapy and necessitating an urgent appointment, was used in the majority of research that examined the prevalence of post-endodontic pain.

There has been research on the association between the frequency and degree of instant-pain and the health of teeth after treatment, but the findings are mixed. [6] Flare-ups occurred more frequently after non-vital endodontic therapy and retreatment compared to vital teeth, according to Mor et al.'s[7] observations. Nevertheless, Harrison et al. [8] discovered that there was no connection between tooth vitality and the frequency or intensity of flare-ups. Pulp condition and any PEP have no relation to one another. [9]
After endodontic treatment, post-operative pain (which is not just a flare-up) is fairly common, and greater than half of those who suffered PEP reported high pain. Nevertheless, no study has assessed the PEP prevalence and intensity in teeth with necrotic or viable pulp after initial RCT and after re-treatment
The goal of this research was to determine the occurrence and intensity of post-operative pain that developed in teeth with necrotic or vital pulp after receiving root canal therapy.

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Methodology:

This prospective study, which was conducted from July 2022 to December 2022 with the agreement of the ethics committee, was undertaken at the Operative dentistry department at Rehman College of Dentistry in Peshawar. All of the patients (n=193) who received endodontic treatment in teeth with necrotic pulp, or vital pulp that had been previously treated for symptomatic irreversible pulpitis and were managed by a single practitioner during a 6-month period were included. Information such as age, gender, position of tooth, and pulpal diagnosis were gathered by a standardized questionnaire.

The treatment of just one tooth, finishing it in a single session, and the lack of prior discomfort or pain were the inclusion criteria. Treatment indications included; teeth treated for prosthetic having vital, healthy pulp, having teeth previously treated with symptomatic irreversible pulpitis and were treated with intra-canal medication, teeth having necrotic pulps (diagnosed by a negative reaction to stimulation of cold and the lack of blood upon entrance into the root canal), with or without apical periodontitis as demonstrated by a periapical radiograph, but no prior pain.

The criteria of exclusion included the teeth presence having preoperative discomfort, symptomatic irreversible pulpitis, or pulp (necrotic) combined with symptoms like edema or purulence. The participants in the current study were also not using antibiotics.
Prior to treatment, the maxillary teeth were anaesthetized using a single cartridge of two percent Lidocaine with epinephrine (1: 100,000) and (27) gauge needles, and the anaesthetized mandibular teeth using a mandibular alveolar nerve block. In every surgical procedure, a rubber dam was put in place right after the local anaesthetic was administered. Entering the root canals and utilising hand instruments for extirpation, cleaning, and canal shaping if necessary comprised endodontic therapy. In every surgical procedure, a rubber dam was right away applied after local anaesthetic was administered. Entering the root canal(s) and utilising hand instruments for extirpation, cleaning, and canal shaping if necessary comprised endodontic therapy. Apex locator was used to determine the working length. A laterally compressed gutta-percha and calcium hydroxide-based sealant was used to obturate the canals after they had been treated with 5 mL of (3.5%) NaOCl and sterile saline (determined obturation length was (0.5-1 mm) short of the radiographic apex). The length of the treatment was approximately 45 to 60 minutes.

The treating dentist warned the patients about the possibility of experiencing post-operative pain and advised them to take Acetaminophen to lessen their discomfort. Within 24 hours after the procedure, a different dentist called patients without being informed of the procedures that had been done. She asked them to score their pain using a continuous 1-5 point scale (1- no pain, 2- mild pain,3-moderate pain, 4-severe pain, and 5-extremely unbearable/severe agony), they signed the consent form, at 6, and 18 hours following the therapy. Additionally, participants were asked regarding the sort of pain they experienced– spontaneous or provoked by palpation/mastication. After therapy, patients were questioned about their usage of painkillers.

The continuous variables of groups were compared using the one-way variance test. To compare the frequencies of categorical variables, chi-square was utilized. When probabilities were lower than 0.05, differences were deemed significant.

Results:

193 patients met the inclusion and exclusion requirements during the study period. The questionnaire received 100% of the patients' responses.

Table 1 :
Distribution (Patient) according to treatment groups, gender (Male/Female), age, and Anterior/max molar/mandibular molar* (tooth type)

Treatment groups	Patients %	Gender (male /female)	Age (years)	Anterior /max molar/m and molar* (tooth type)
Vital Pulp	141 (51.5)	52/89	50.9	36/51/54
Necrotic pulp	52 (19)	24/28	56.4	31/11/10

Table 2:
Incidence number % and intensity number % of post-endodontic pain (PEP) (Scale 1-5), after treatment (6 to 18hrs)

Treatment Groups	6 hours Incidence Number%	Incidence mean±SD	18 hours Incidence number %	Intensity mean±SD
Vital Pulp	90(63.5)	2.46+1.4	73(51.8)	2.00+1.2
Necrotic Pulp	20(38.5)	1.89+1.1	18(34.5)	1.56+0.9
P-value	0.003	0.001	NS	NS

Table 3.1 And 3.2:
Type of PEP (after 6 and 18 hours) in association to the different treatment groups

After 6 hours Treatment			
Treatment Groups	Patient No.	PEP type Spontaneous Number(%)	Stimulated Number(%)
Vital Pulp	90	73(81.1)	17(18.9)
Necrotic Pulp	20	17(85)	3(15)

After 18 hours Treatment			
Treatment Groups	Patient No.	PEP type Spontaneous Number(%)	Stimulated Number(%)
Vital Pulp	74	33(44.6)	41(55.4)
Necrotic Pulp	18	6(33.3)	12(66.7)

Discussion:

In this study, the occurrence of post endodontic pain varied depending on the pulp state, from 34.6% to 63.8%. RCT (teeth) with viable pulp had higher intensity and occurrence of post endodontic pain(six hours after treatment) compared to teeth with teeth or necrotic pulp that had previously undergone therapy. This is in line with the findings of Levin et al [3], who found that only 21% of patients after treatment of root canal, reported experiencing low levels of pain whereas 53% of them had PEP. Yet, some research discovered decreased incidence even in those with only one appointment. [10,11]In this current study, we incorporated those patients having PEP to any degree, nevertheless, those investigations only included people having a flare-up. The shorter duration of the root canal procedure may have contributed to the PEP (higher frequency)seen in the current study. It has been shown that PEP occurs more frequently with single-visit therapy, and as a result, patients take more painkillers. [12,13] Despite this, the main positive points of treatment of one visit are the decreased recuperation period and satisfactory for the patient and the dentist, with no risk of either long- or short-term issues.

The literature contains contradictory findings about the effect of pulp state (necrotic or vital) on the occurrence and PEP severity. Our findings support those of Clem [14], Calhoun and Landers [15], Fox et al. [16], Undoye and Jafarzadeh [17], and other researchers who found PEP inteeth containing essential pulp.

Contrarily, Albashaireh and Alnegrish [18], Mor et al [7], showed a higher prevalence of PEP after treating teeth with necrotic pulps. The inconsistency could result from the use of different endodontic materials and techniques or from varying PEP evaluation criteria. Also, the findings of the current study are not significantly consistent with those investigations that discovered statistically significant associations between the flare-up rates following root canal treatments performed by trainees or students and frequency of periapical lesions. [19] The treatment provided by students or residents, as well as the fact that those studies only included patients who had a flare-up, may also contribute to the discrepancy.

It is unknown why PEP occurs more frequently and with greater severity after treatment of teeth that contain essential pulp. According to one theory, endodontic therapy that causes the periapical vital tissue in teeth containing vital pulp to be damaged causes an increase in the release of inflammatory mediators like prostaglandins, histamines, bradykinin, leukotrienes and serotonin.

The results of this investigation, which showed that female participants had higher PEP levels, concur with those of studies reported. [20,21,18]and also Al-Negrish and Al-Negrish. Gender discrepancies may be due to social presumptions that men can handle pain better than women. [21]
Dentists may be able to better prepare patients for discomfort by discussing changes in the frequency and intensity of pain after endodontic treatments based on pulp status and prescribing analgesics to be used right away. Pain management should be a fundamental

component of dental care from the beginning to prevent aggravation. The concluding decision to prescribe an analgesic should take into account the patient's gender, the number of therapy sessions, and their prior experience with pain and analgesics.

Conclusion:

When compared to teeth with necrotic teeth or pulp that had already had root canal therapy, teeth with viable pulp experienced much more instances of and more severe post-operative discomfort. Dentists must be conscious of this discomfort and take steps to prevent or treat it. Endodontic therapy may cause discomfort, thus patients should be informed of this possibility and instructed on how to take painkillers.

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Author Contributions

1. Sonia Zakir - Study Design And Article Writing
2. Mashal Zeb Jan - Data Collection And Article Writing