

## **Incidence of Postoperative Pain after Multi-visit Endodontic Treatment in Anterior and Posterior Teeth**

**Sayed Abrar Bashir Ahmed<sup>1\*</sup>, Rasika Nayak<sup>2</sup>, Erra Puri<sup>3</sup>, Gulam Anwar Naviwala<sup>4</sup>, Kishor Sapkale<sup>1</sup>, Manoj Ramugade<sup>1</sup>**

<sup>1</sup>Associate Professor, Department of Conservative Dentistry and Endodontics, Government Dental College and Hospital, Mumbai, India

<sup>2</sup>Ex. Assistant Professor, Department of Conservative Dentistry and Endodontics, Government Dental College and Hospital, Mumbai, India

<sup>3</sup>Post Graduate Student, Department of Conservative Dentistry and Endodontics, Government Dental College and Hospital, Mumbai, India

<sup>4</sup>Medical Officer (Dental), Directorate of Health Services, Mumbai, India

**\*Corresponding Author:** Sayed Abrar Bashir Ahmed, Associate Professor, Department of Conservative Dentistry and Endodontics, Government Dental College and Hospital, Mumbai, India.

**Received:** October 31, 2018; **Published:** December 12, 2018

### **Abstract**

**Aim:** To evaluate the incidence of post-operative pain in anterior and posterior teeth in patients undergoing two visit endodontic treatment.

**Methodology:** 925 patients from routine appointment schedule of the department for endodontic treatment were selected. Cases with acute endodontic emergencies and retreatment cases were excluded. A structured questionnaire assessed age, gender, tooth location, pulp and periapical diagnosis. Endodontic treatment was completed following standard protocol in two visits. Patients were asked to grade their pain using a visual analogue scale at the end of 4 hours, 1 day, 3 days and 7 days after each visit.

**Results:** The mean incidence of post endodontic pain was 30.57%. Around 69.42% patients reported no pain, 11.25% experienced mild pain while 18.87% reported moderate pain. Mandibular teeth were significantly more painful than the maxillary teeth. Females experienced significantly more pain than males.

**Conclusions:** Post-operative pain occurs in almost one-third patients undergoing root canal treatment. Mandibular molars are the most painful teeth while maxillary anterior's the least. Females are affected more than males. Suitable precautions and forewarning the patient can help clinicians instill a positive attitude in patients towards endodontic treatment.

**Keywords:** Postoperative Pain; Anterior Teeth; Posterior Teeth

### **Introduction**

Pain is the primary reason that patients seek dental treatment. It is caused by pulp and periapical injury as sequelae of dental caries and, thus, the need of endodontic treatment. In this manner, patients associate endodontic treatment to pain. A preliminary study on pain in endodontic therapy by O'Keefe [1] highlighted an interesting finding. 62.5% patients in their study had moderate to severe pain before the initiation of any treatment for their dental problems indicating that patients indeed require endodontic therapy primarily for relief of pain. Pain related to endodontic treatment can be annoying and perplexing problem to the patient and the dental surgeon. It affects patients' quality of life and the success of the dentist-patient relationship. Ingle [2] has also stated that, "to allow the patient to remain in violent uncontrolled pain borders on criminal neglect." Patients might consider post-operative pain as a benchmark against which the clinician's skills are measured. The occurrence of pain might undermine patient's confidence in their dentist or patient satisfaction with their treatment even when the treatment has followed the highest standards. Though the pain may not indicate treatment failure, relief of pain is, at times, more important to the patient than success or failure of the treatment. Prevention and management of pain is, thus, a crucial factor for the dental surgeon's success in his/her practice. Forewarning the patient before commencing the treatment can definitely create positive approach towards the endodontic treatment. Post endodontic pain is considered to be poly etiologic in origin, caused by microbial, chemical and mechanical factors. The intensity of the inflammatory reaction might be influenced by tooth type, pulp diagnosis, occurrence of pre-operative pain and certain demographic factors such as age, gender and general health of the patient [3].

On this background, the present study was carried out in the Department of Conservative Dentistry and Endodontics, Government Dental College and Hospital, Mumbai to study the incidence of post-operative pain related to endodontic therapy taking into account tooth type, arch and gender.

**Materials and Methods**

Patients appointed for root canal treatment from pre-existing appointment schedule of the Department of Conservative Dentistry and Endodontics, Government Dental College and Hospital, Mumbai were thoroughly evaluated by case history taking and clinical examination. 925 patients who were asymptomatic at least 15 days prior to the appointment were selected. Exclusion criteria consisted of acute endodontic emergencies with pain and/or swelling, retreatment cases, compromised systemic and psychological health as well as patients under premedication of analgesics 24 hours prior to the appointment. Selected patients were divided into the following groups:

- **Group I:** Anterior Teeth (n = 302)
  - IA: Maxillary Anteriors (n = 151)
  - IB: Mandibular Anteriors (n = 151)
- **Group II:** Premolar Teeth (n = 303)
  - IA: Maxillary Premolars (n = 151)
  - IB: Mandibular Premolars (n = 152)
- **Group III:** Molar Teeth (n = 301)
  - IA: Maxillary Molars (n = 150)
  - IB: Mandibular Molars (n = 151).

The study design was approved by the Institutional Review Board and ethical clearance for conducting the same was obtained. Informed consent was taken from all patients. All the cases were scheduled for two visit root canal treatment following standard protocol.

First visit comprised of administration of local anaesthesia of 2% lignocaine hydrochloride with 1:200000 (EL-LIGNO ADR, Elder Pharmaceuticals Ltd., Mumbai) if indicated. Access cavity preparation was prepared using round diamond (BR-40) and non-end cutting tapered diamond (EX-24) (Mani Inc., Tochigi, Japan). Working length was estimated by radiographic method. Pulp extirpation/debridement and biomechanical preparation was done with stainless steel hand files (Mani Inc., Tochigi, Japan) using step back technique. Root canal system was irrigated with freshly prepared 2.5% NaOCl. Intracanal medicament of Ca(OH)<sub>2</sub> (Cal Excel, Ammdent, Mohali, India) was given and access cavity was temporarily sealed with zinc oxide eugenol cement. Patients were instructed to take acetaminophen to relieve moderate to severe pain. At the second visit, seven days later, the temporary dressing was removed followed by copious irrigation using 2.5% NaOCl. Master cone was selected and fit of master cone was assessed radiographically. Root canal obturation with cold lateral compaction of gutta-percha using zinc oxide eugenol sealer was done. Access cavity was sealed temporarily. Quality of root canal obturation was assessed radiographically. Assessment and record of pain was done according to Visual Analogue Scale (VAS) at the end of 4 hours, 1 day, 3 days and 7 days.

**Results**

Of the 925 patients treated, 14 patients failed to turn up for the subsequent visit, 5 had the involved tooth extracted elsewhere. The distribution of the remaining 906 patients according to tooth type, age and gender is presented in table 1.

Group	Tooth Type	No. of Patients	Age	Gender (M/F)
I	Anterior Teeth	302	34	161/141
II	Premolar Teeth	303	33.9	158/145
III	Molar Teeth	301	34.2	160/141

**Table 1:** Distribution of patients according to tooth type, age and gender.

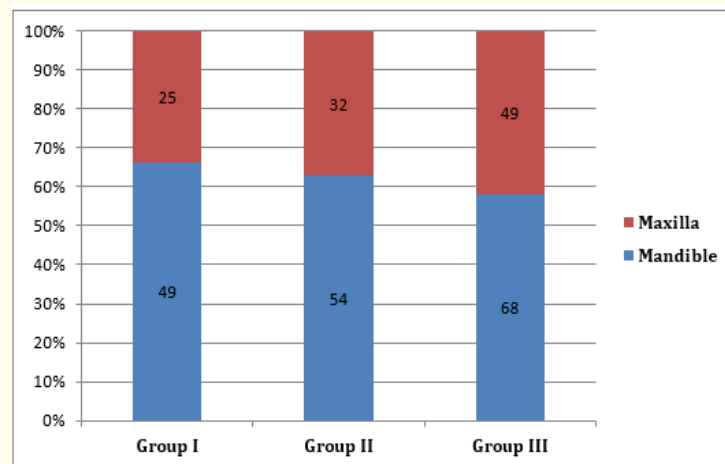
All the three groups- anterior, premolar and molar teeth were equally divided between the maxillary and mandibular arch. The inter group comparison of age and gender distribution across the three groups was found to be non-significant.

**Incidence of post endodontic treatment pain**

The incidence of post endodontic pain was 30.57% (277/906). The incidence increased from the anterior to posterior region with anterior's having 24.5% (74/302), premolars having 28.38% (86/303) and molars with the highest incidence of 38.87% (117/301) as shown in table 2. Pain occurred more frequently in the mandibular (37.66%) than the maxillary (23.45%) arch (Graph 1). Males experienced significantly less pain (21.5%) than females (40.7%) (Table 2).

Group	Tooth Type	Pain	
		Number	Gender (M/F)
I	Anterior	74/302	
	Maxillary	25/151	12/13
	Mandibular	49/151	18/31
II	Premolars	86/303	
	Maxillary	32/151	14/18
	Mandibular	54/152	18/36
III	Molars	117/301	
	Maxillary	49/150	16/33
	Mandibular	68/151	25/43
<b>Total</b>		Maxilla: 106/452	Males: 103/479
		Mandibular: 171/454	Females: 174/427

**Table 2:** Incidence of post-endodontic pain and distribution according to tooth type, arch and gender.

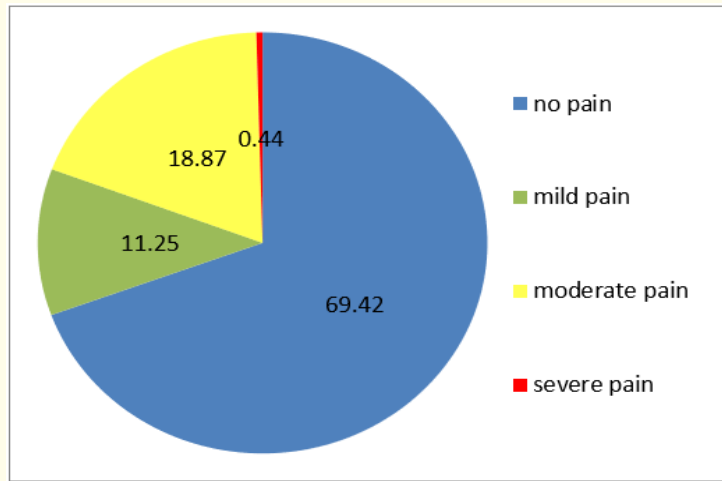


**Graph 1:** Incidence of pain according to arch across the three groups.

According to severity, 69.42% patients reported no pain (629/906), 11.25% (102/906) patients experienced mild pain, while 18.87% (171/906) patients reported moderate pain. Severe pain was observed in only 4 out of 906 patients (0.44%) (Graph 2).

**Intensity of post endodontic treatment pain**

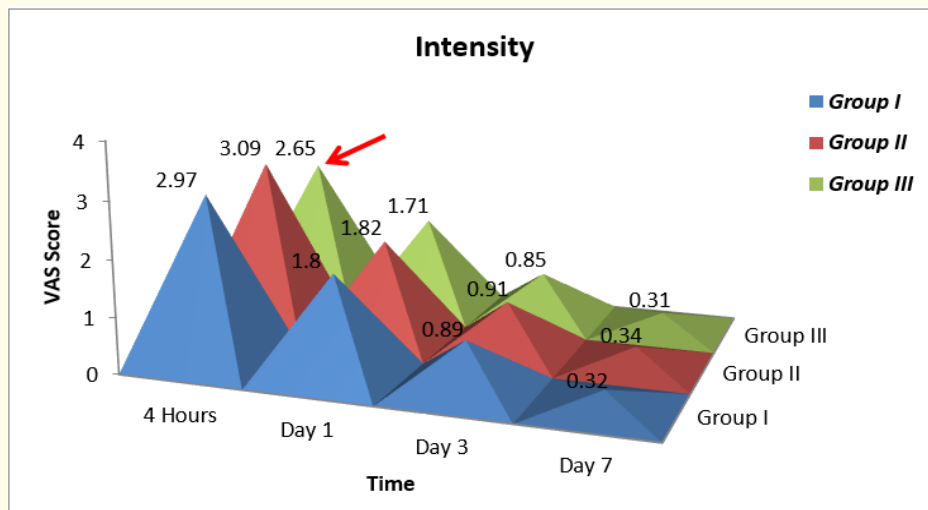
The intensity of pain declined steadily with time in all the three groups reaching almost to the no-pain level 7 days after treatment (Table 3 and Graph 3).



Graph 2: Incidence of pain according to severity.

Time	Group I	Group II	Group III
4 hours	2.97 ± 0.12	3.09 ± 0.13	2.65 ± 0.12
Day 1	1.8 ± 0.09	1.82 ± 0.09	1.71 ± 0.09
Day 3	0.89 ± 0.07	0.91 ± 0.07	0.85 ± 0.07
Day 7	0.32 ± 0.03	0.34 ± 0.03	0.31 ± 0.03

Table 3: Intensity of pain in the three groups at different time intervals.



Graph 3: Intensity of pain across the three groups  
(The difference between group II and III at 4-hours is significant).

Intra-group comparisons show significant reduction in pain after day 1, 3 and 7 as compared to 4 hour pain score across all the three study groups (p-value < 0.001 for all pair wise comparisons) as highlighted in graph 3.

### Discussion

Post appointment endodontic pain is one of the major challenges to all the clinicians. The major difficulty to assess pain related to therapeutic procedures is the reliability of values placed on the entity pain. Because of the subjective nature of the pain experience, patients' interpretation and evaluation shows wide variations. Unallied stressful situations, coupled with anxiety and ignorance of the procedure and its sequelae alter the individual's reaction to pain. In an attempt to minimise the influence of subjectivity, the VAS method was used as it is considered to be a valid and reliable ratio scale for measurement of pain [4]. Additional measures taken to simplify pain rating and overcome modulation by various factors were:

1. A written description of the treatment procedure with postoperative instructions, in which leading words were carefully avoided, was given to every patient.
2. Only one tooth from each patient was used in the study.

This study measured the presence or absence of pain after endodontic therapy taking into account the variables- tooth type, arch and sex. The incidence of post-endodontic pain is as varied as the number of dentists rendering therapy. It ranges from 1.9% to 48% [3]. This broad range can be attributed to the fact that comparison between studies of pain is difficult because of differences of study designs, pre-operative conditions of the treated tooth, treatment protocol, definition of pain, pain measurement, methods of collecting and analysing the post-operative pain data.

Within the treatment parameters and populations of this study, the incidence of post-operative pain was 30.58%. This corroborates with the findings of Clem, Genet and associates, Roane., *et al.* and Ng., *et al* [5-8]. It was greatest during the first 24 hours of the observation period and decreased thereafter [9].

Researchers reporting a greater incidence include Soltanoff, Albashaireh and Alnegrish, Mulhern [10-12]. However, the lack of a standardised treatment procedure, absence of intra canal medicament and differences in preoperative status of the teeth could be responsible for the variations.

Those studies selecting pain levels moderate or severe or pain that required analgesics have reported much lower prevalence of pain [1,13,14]. Using modified double-flare and alternated rotation motion technique, investigators have shown an even lower incidence (11 - 15%) of post-appointment pain [15,16]. However, bias cannot be ruled out due to the authors being patrons of these specific techniques.

In group I, the incidence was found to be 24.66% with one-third (8.33%) contribution from the maxillary and two-third (16.33%) contribution from the mandibular region. This was consistent with some (Fox., *et al.* [18], Roane., *et al.* [8], Albashaireh and Alnegrish [11]) but lower than that reported by other studies (Mulhern [17], Harrison [5], Ng., *et al* [9]). This discrepancy could be attributed to differences in preoperative status of the teeth, small sample size for some tooth types and treatment protocol. Mandibular anterior teeth were twice as painful as the maxillary, which could be because of their more complex anatomy and a high incidence of multiple canals [7,19,20]. Also, mandible has a dense trabecular pattern, reduced blood flow and more localization of infection and inflammation, which might lead to delayed healing. Mulhern., *et al.* conversely stated that maxillary or mandibular arch tooth position was not a factor [17]. His study, being limited to single rooted teeth, cannot be generalised for the dentition as a whole.

Females experienced more pain than males in both maxillary and mandibular subgroups. However, the difference was statistically significant only in the mandibular teeth. The intensity of pain showed significant reduction reaching to almost no pain level 7 days after treatment.

In group II, painful incidence of 28.66% is in accordance with Fox., *et al.* [18], Roane., *et al.* [9], Ng., *et al.* [9]. It is, however, much lower than Albashaireh and Alnegrish [11] (42.8%). Their small sample size does not lend itself to reliable interpretation as an entity. Similar to group I, mandibular teeth were more painful than the maxillary. Also, females more often complained of pain than males. Pain was most intense in these teeth, but declined steadily from 4 hours to 7 days after treatment.

In group III, an incidence of 38.23% was recorded. In line with this are the works of Roane., *et al.* [8], Harrison., *et al.* [5]. Lower incidence has been reported by Risso., *et al.* [16] which could be due to their sample comprising adolescents only. So, the results on these young permanent molars cannot be authentically extrapolated on the general population as a whole. Fox and associates [18] had a 18.75% incidence of pain on their 16 molar teeth. On the contrary, Albashaireh and Alnegrish [11] had 50% of 10 patients reporting pain. The statistical significance of such small sample sizes is open to question. Ng., *et al.* [9] found 46.6% incidence of post-appointment pain. Inclusion of cases treated in a single visit might be responsible for this variation. Although the frequency was high as compared to premolars, but the intensity was significantly lower at 4-hour interval. It however, reduced with time waning away the statistically significant difference. Hence, it was concluded that across all groups, pain differed significantly in frequency but not intensity.

### Conclusion

This study was carried out to assess the average incidence of post-operative pain in routine endodontic treatment without taking into consideration pulp and periapical diagnosis, pre-operative pain, intra-operative pain, systemic health of the patient, intra-operator variability and extent of obturation.

Since post-endodontic pain is an entity proven beyond doubt, the dental physicians are often left distressed. This study aimed at generating data for general dental practitioners regarding how frequent they can anticipate pain during regular practice of endodontics. The general dental practitioners who are apprehensive about the occurrence of post-operative pain after root canal therapy can thus gain assurance from the results of this study by comparing and correlating their experience of incidence of post-operative endodontic pain.

### Bibliography

1. O'Keefe EM. "Pain in endodontic therapy: preliminary study". *Journal of Endodontics* 2.10 (1976): 315-319.
2. Ingle JL., *et al.* "Endodontic cavity preparation". In: Ingle JL, Taintor JP. eds. *Endodontics*. 3<sup>rd</sup> edition. Philadelphia, DSA: Lea and Febiger (1985).
3. ElMubarak AH., *et al.* "Postoperative pain in multiple-visit and single-visit root canal treatment". *Journal of Endodontics* 36.1 (2010): 36-39.
4. Price DD., *et al.* "The validation of visual analogue scales as ratio scale measures for chronic and experimental pain". *Pain* 17.1 (1983): 45-56.
5. Harrison JW., *et al.* "Incidence of pain associated with clinical factors during and after root canal therapy. Part 2. Postobturation pain". *Journal of Endodontics* 9.10 (1983): 434-438.
6. Genet JM., *et al.* "The incidence of preoperative and postoperative pain in endodontic therapy". *International Endodontic Journal* 19.5 (1986): 221-229.
7. Clem WH. "Posttreatment endodontic pain". *The Journal of the American Dental Association* 81.5 (1970): 1166-1170.
8. Roane JB., *et al.* "Incidence of postoperative pain after single-and multiple-visit endodontic procedures". *Oral Surgery, Oral Medicine, Oral Pathology* 55.1 (1983): 68-72.
9. Ng YL., *et al.* "Prevalence of and factors affecting post-obturation pain in patients undergoing root canal treatment". *International Endodontic Journal* 37.6 (2004): 381-391.

10. Soltanoff W. "A comparative study of the single-visit and the multiple-visit endodontic procedure". *Journal of Endodontics* 4.9 (1978): 278-281.
11. Albashaireh ZS and Alnegrish AS. "Postobturation pain after single-and multiple-visit endodontic therapy. A prospective study". *Journal of Dentistry* 26.3 (1998): 227-232.
12. Byström A, *et al.* "The antibacterial effect of camphorated paramonochlorophenol, camphorated phenol and calcium hydroxide in the treatment of infected root canals". *Dental Traumatology* 1.5 (1985): 170-175.
13. Frank AL, *et al.* "The intracanal use of sulfathiazole in endodontics to reduce pain". *The Journal of the American Dental Association* 77.1 (1968): 102-106.
14. Seltzer S, *et al.* "Incidence and duration of pain following endodontic therapy: relationship to treatment with sulfonamides and to other factors". *Oral Surgery, Oral Medicine, Oral Pathology and Oral Radiology* 14.1 (1961): 74-82.
15. Siqueira JF, *et al.* "Incidence of postoperative pain after intracanal procedures based on an antimicrobial strategy". *Journal of Endodontics* 28.6 (2002): 457-460.
16. Risso PD, *et al.* "Postobturation pain and associated factors in adolescent patients undergoing one-and two-visit root canal treatment". *Journal of Dentistry* 36.11 (2008): 928-934.
17. Mulhern JM, *et al.* "Incidence of postoperative pain after one-appointment endodontic treatment of asymptomatic pulpal necrosis in single-rooted teeth". *Journal of Endodontics* 8.8 (1982): 370-375.
18. Fox J, *et al.* "Incidence of pain following one-visit endodontic treatment". *Oral Surgery, Oral Medicine, Oral Pathology* 30.1 (1970): 123-130.
19. Maddox DL, *et al.* "Incidence of posttreatment endodontic pain related to medicaments and other factors". *Journal of Endodontics* 3.12 (1977): 447-452.
20. Colameco S, *et al.* "Sex bias in the assessment of patient complaints". *The Journal of Family Practice* 16.6 (1983): 1117-1121.

**Volume 18 Issue 1 January 2019**

**© All rights reserved by Jorge Sayed Abrar Bashir Ahmed, *et al.***