

**Comparative evaluation of degree of post endodontic pain following obturation with cold lateral condensation and thermoplasticized gutta-percha technique: A randomized clinical trial**

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**Conflicts of Interest:** Nil

**Abstract**

**Aim:** Comparative evaluation of degree of pain post endodontic pain following obturation with cold lateral condensation and thermoplasticized gutta-percha technique.

**Materials and Methods:** In the present study, thirty molars were included. Case history was recorded. Maxillary and mandibular arch anesthesia was given with 2% lignocaine with 1:80,000 epinephrine local anesthesia . Access cavities were made, Canal orifices were located and canal patency checked with #10 K-file. Coronal and middle third were enlarged with S-X Protaper files. Canal orifices were enlarged with the help of Gates-Glidden drills G1-G3. Determination of working length were made with apex locator and with radiographs. Canals were prepared and shaped using crown down techniques

with both manual and rotary instrumentation. During whole instrumentation RC Prep was used as canal lubricant and 2.5% NaOCl as irrigant followed by 17% EDTA and final flush with saline. The canals orifices were protected with sterile dry cotton pellet and the access cavities were sealed temporarily with cavit. After one week patients was recalled and the canals were re-opened, and obturation was performed. The root canal fillings were divided into two groups. Group A (n=15) obturation with cold lateral condensation Group B (n=15) obturation with thermoplasticized gutta percha with help of VDW beefill 2 in 1 system. 10-cm visual analogue scale (VAS) was used to record postoperative pain.

**Result:** The result of visual analogue scale showed that there was more post endodontic pain (PEP) in Cold lateral obturation technique than Thermoplastized GP obturation

technique. At 6 hrs Group A had mean value 2.86 whereas Group B had 2.13 which was not significant, but there was significant change ( $p < 0.05$ ) at 12 hrs.

**Conclusion:** Within the limitation of the study, more post endodontic pain was seen with cold lateral obturation than thermo plasticized obturation. It was seen that females had more PEP than males, symptomatic teeth, teeth diagnosed with apical periodontitis and vital teeth had more PEP.

**Keywords:** Post endodontic pain(PEP), Cold lateral obturation technique, Thermoplastized GP obturation technique.

### Introduction

Endodontic therapy or root canal treatment (RCT) is executed to manage pain and eliminate infection from teeth. Pain is a distinctive and subjective experience<sup>1</sup>. Generally appropriate pertinent diagnosis and relevant treatment procedures are victorious in effecting a cure<sup>2</sup>. It is contemplated to be associated with periapical inflammatory response. The factors responsible for postoperative pain are unclear. Mechanical, chemical and microbial factors may be responsible for peri-radicular inflammation<sup>3</sup>. Over instrumentation, inadequate debridement, periapical extrusion of debris, overfilling, retreatment, host factors are few factors which are considered responsible for postoperative pain. It may persist from few hours to many days after endodontic therapy. Endodontic therapy objective is to put an end to pulpal and peri-radicular microorganisms<sup>4</sup>. Understanding the etiology of postoperative pain after obturation is been done, may greatly help clinicians to adopt strategies to prevent such highly distressing phenomenon<sup>5</sup>.

Pain is regulated by many factors such as personality, behaviour, physical and emotional factors. Pain is a subjective affair and difficult to quantify and standardize. To simplify this difficulty numerical, verbal and visual analogue scales are properly coming into existence<sup>6</sup>. The

Visual Analogue Scale (VAS) consists of a straight line with the endpoints mark out end most limits such as 'no pain at all' and 'pain as bad as it could be'<sup>7</sup>. The patient is asked to spot his pain level of pain on the line between the two extreme limits. (Fig.1). The distance between 'no pain at all' and the spot made by the subject then defines the subject's pain. This tool was first used in psychology by Freyd in 1923<sup>8</sup>. If descriptive terms like 'mild', 'moderate', 'severe' or a numerical scale is added to the VAS, then we are describing about the Graphic Rating Scale(GRS)<sup>7</sup>.

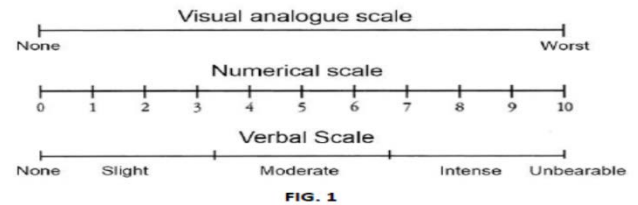


Figure 1

Cold lateral condensation (CLC) as an obturation technique is extensively put forward by dental practitioners throughout the world because of its advantages of be in control of placement of gutta-percha (GP) in the root canal and also cost is very low<sup>9-11</sup>. The final filling is composed of a large number of GP cones firmly pressed together and united by frictional grip and cementing material, rather than a homogeneous mass of GP<sup>12</sup>. Voids are present because of spaces between individual GP cones and the root canal walls can be seen with improper root canal preparation, curved canals, deficient lateral pressure during condensation, or discrepancy between GP cones and the prepared root canal. In such cases it would lack homogeneity and have to count on sealer to fill the voids, and thus would have a poorer outcome<sup>13,14</sup>.

Compared CLC with, warm vertical condensation of GP, it can provide a highly dense filling and better sealing ability of all portals of entry between the root canal and

the periodontium<sup>15,16</sup>. This method of obturation allows the placement of a homogeneous mass of GP into the root canal system with the carrier as a mode of compaction<sup>17</sup>. This technique can be more effectual in filling lateral canals than CLC<sup>18</sup>. In clinical framework practice, the drawback of this technique is that the filling length is difficult to control. Prompt insertion is related to overextension, whereas slow insertion leads to result in underfilling<sup>19</sup>. On the basis of outcome of microscopic analysis and clinical tests, it has been concluded that optimum filling is achieved when canals are instrumented and filled 0.5 to 2.0 mm short of the root apex<sup>20-23</sup>.

The aim of this study was to compare the degree of post endodontic pain following obturation with cold lateral condensation and thermoplasticized Gutta-percha technique and to evaluate the association of general and clinical factors such as gender, age, tooth type, preoperative pulpal status, and preoperative pain with the postoperative pain in the endodontic therapy. Also to evaluate the association of length of obturation and sealer extrusion with postoperative pain in endodontic therapy. The null hypothesis is that there is no difference in post endodontic pain following obturation with cold lateral condensation and thermoplasticized Gutta-percha technique.

**METHOD AND MATERIAL**

In the present study thirty molars were included from the referred patient pool of the Department of Conservative Dentistry and Endodontics, ITS Dental College, Greater Noida (U.P,India).The clinical study protocol was reviewed and approved by the Institutional Research Ethical Committee .The inclusive criteria were selected on the bases of age group 18 years to 40 years , Asymptomatic and symptomatic with non-vital teeth and teeth giving signs and symptoms of irreversible pulpitis. Exclusion criteria were Patients who consumed ketarolac analgesic at least 6 hours prior to the treatment were excluded Patients with

conditions like diabetes mellitus, hypertension, cardiovascular disorders and immuno compromised conditions known to affect healing status, retreatment cases were excluded. Patients with known allergy to any of the drugs used in this study, teeth having internal or external resorption, teeth with open apices ,teeth with severely curved canals were also excluded and Periodontally compromised teeth. Case history was recorded. In maxillary arch, Infiltration anesthetic technique was used with 2% lignocaine with 1: 80,000 epinephrine local anaesthesia. In mandibular arch: Inferior alveolar nerve block technique was used with 2% lignocaine with 1:80,000 epinephrine local anaesthesia. Access cavities were prepared with the help of round diamond bur #2, EndoZ and tapered bur. Canal orifices were located and canal patency checked with #10 K-file. Coronal and middle third were enlarged with S-X Protaper files. Canal orifices were enlarged with the help of Gates-Glidden drills G1-G3. Determination of working length were made with apex locator and with radiographs. Canals were prepared and shaped using crown down techniques with both manual and rotary instrumentation. During whole instrumentation RC Prep was used as canal lubricant and 2.5% NaOCl as irrigant followed by 17% EDTA and final flush with saline. The canals orifices were protected with sterile dry cotton pellet and the access cavities were sealed temporarily with cavit. After one week patients was recalled and the canals were re-opened, and obturation was performed. The root canal fillings were divided into two groups. Group A (n=15) obturation with cold lateral condensation Group B (n=15) obturation with thermoplasticized gutta percha with help of VDW befill 2 in 1 system. Postoperative radiographs were taken (Fig2a, b). Radiographic length of root canal filling and sealer extrusion were recorded. Patients were recalled 24 hours after obturation and each patient received instructions on



hrs as group A had mean value of 2.80 and whereas Group B had 1.0. At 24 hrs the Group A had a mean value of 1.66 and on the other hand mean value recorded for the Group B was 0.73.

**Table 1: Comparison of Visual Analogue scale between Group A (Cold Lateral Condensation) and Group B (Thermoplasticized Gutta percha) respectively**

	Group A (Cold Lateral Condensation) MEAN (SD)	Group B (Thermoplasticized Gutta percha) MEAN (SD)	Unpaired t test	p value, Significance
6 hours	2.86 (1.3)	2.13 (1.45)	t = 1.453	p = 0.157
12 hours	2.80 (1.42)	1.0 (1.46)	t = 3.413	p = 0.002*
24 hours	1.66 (1.17)	0.73 (1.57)	t = 1.836	p = 0.077

p >0.05 – not significant      \*p<0.05 – significant      \*\*p<0.001 – highly significant

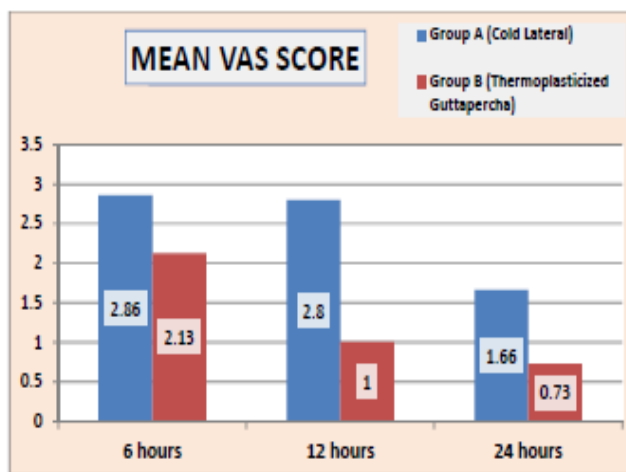


Fig. 4: Graphical Presentation of Comparison of Visualanalogue Scale between Group A And Group B

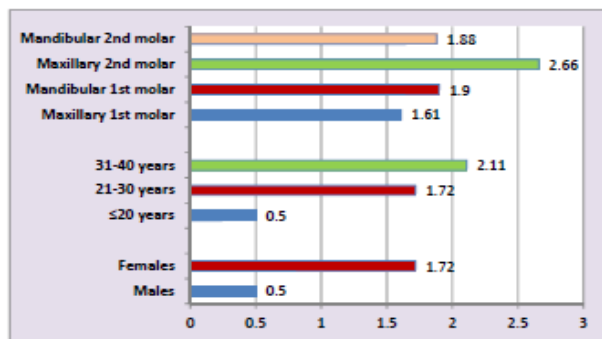


Fig. 5: Graphical Presentation of Comparison of Post

Endodontic Pain Within Tooth Type, Age Group And Gender

As shown in Fig.5, tooth type maxillary 2<sup>nd</sup> molar had greater post endodontic pain (2.66) followed by mandibular 1<sup>st</sup> molar (1.9). Post endodontic pain was more with age group 31-40 years(2.11) than age group 21-30 years(1.72)and mild PEP seen was recorded in age group less than 20 years(0.5). Greater pain was reported in females (1.72) than male(0.5)

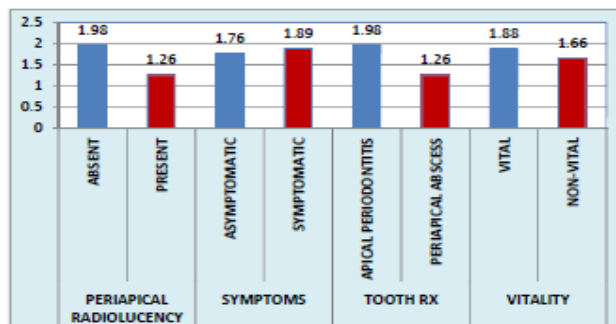


Fig. 6: Graphical Presentation Of Comparison Of Post Endodontic Pain In Cases With Type Of Radiographic And Clinical Findings

Greater PEP were seen in cases with no periapical radiolucency(1.98) as compared to periapical radiolucency present (1.26). Symptomatic tooth had more pain (1.89) than asymptomatic (1.76). More pain were seen in tooth with diagnosis apical periodontitis (1.98) than periapical abscess (1.26) Vital teeth had more pain (1.88) as compared to non-vital teeth (1.66).(Fig.6).

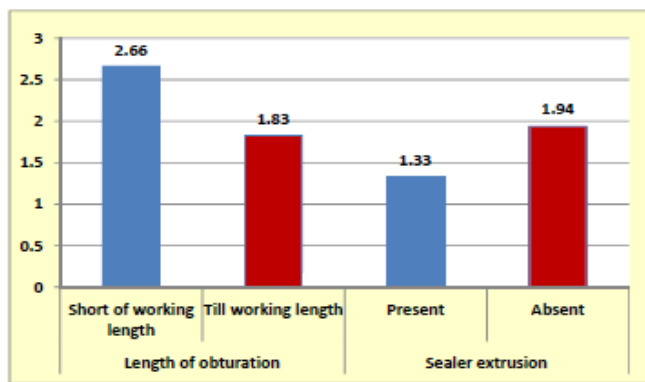


Fig.7: Graphical Presentation of Comparison Of Post Endodontic Pain In Cases With Length Of Obturation And Sealer Extrusion.



Fig.8a Group A



Fig.8b Group B

Fig.8: Short Working Length

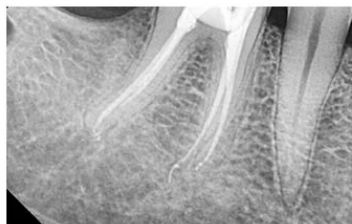


Fig.9a GROUP A



Fig.9b GROUP B

Fig.9: Sealer extrusion

Obturation present with short working length had greater post-operative pain (2.68) than obturation present till working length (1.83)(fig 7). There was more association of pain with absence of extrusion of sealer(1.94) than presence of sealer extrusion(1.33)(Fig.8a,b and Fig.9a,b).

### Discussion

Most studies have concentrated on postoperative pain, which occurs in 25%–40% of all endodontic patients<sup>24,25</sup>. Postoperative pain experienced by the patient and control of pain are clinical interest in endodontics. Our study assessed postoperative pain followed two different type of obturations i.e, Cold lateral condensation

obturation(CLC) technique(Group A) and Thermoplastized GP obturation technique(Group B,using VDW befill 2 in 1 system) .In the present study there was significant change ( $p < 0.05$ ) at 12 hrs as Group A had More postoperative pain then group B , therefore our null hypothesis was rejected. It was also seen that there was no statistically significant difference between the two groups at 6 hrs and 24 hrs.

There was no study so far which compares the post-operative pain between obturation done with CLC and Beeffil 2 in 1 system. Although the studies were done using TF(Thermafil).The study done by Demirci GK et al in 2016 found that the higher pain levels correlated with the TF obturation technique can be described by the extrusion of root canal filling material, something that occurs regularly with this technique<sup>26</sup>. One of the drawback of the TF technique as compared with CLC is the higher risk of extruding sealer and/or gutta-percha from the apical foramen as seen with many in vitro studies<sup>27,28</sup>. Although Da Silva et al<sup>29</sup> reported 25%–100% of root canal filling been extruded with the TF technique, Abarca et al<sup>28</sup> found no difference in the volume of sealer extruded with the TF and LC(lateral compaction) techniques.

Tooth type maxillary 2<sup>nd</sup> molar have greater PEP then mandibular 1<sup>st</sup> molar. PEP is more with as age advanced (age group 31-40 years). Our study goes in contrast with M. Gotler et al, B. Bar-Gil et al and M. Ashkenaz et al where, there was no statistically significant correlation between tooth location and the intensity of PEP<sup>30</sup>.

According to our findings, reduced pain threshold was seen with females then in males. Our results were similar to the study According to S. Durre et al. females more frequently experienced pain (65%) than males (35%)<sup>31</sup>. Higher levels of PEP among women in the current study agree with investigations by Albashaireh and Alnegrish<sup>32</sup>,

Torabinejad et al<sup>33</sup>, Ng et al. , Al Bashaireh and Al Negrish<sup>32</sup> , and Al-Negrish and Hababbeh<sup>34</sup> . Differences between the genders may be described by differences in emotional reaction to pain or by less reporting by men, due to societal expectations that they tolerate pain more than women<sup>35</sup>. Greater pain was seen in cases where periapical radiolucency (1.98) is absent as compared to periapical radiolucency present (1.26).

Symptomatic tooth had more pain than asymptomatic. The study is in the agreement with the study done by Abdel Hameed *et al.* which also showed greater incidence of postoperative pain (15.9%) in preoperatively symptomatic teeth than in asymptomatic teeth (7.1%)<sup>36</sup>.

The present study suggested that more pain was seen with tooth diagnosed with apical periodontitis (1.98) than periapical abscess (1.26) and it was also seen in the present study that, Vital tooth had more pain (1.88) as compared to non-vital (1.66) The rationale for the higher incidence and severity of Postoperative pain after treatment of teeth with vital pulp is not completely understood. One possibility is that the injury of periapical vital tissue during endodontic treatment in teeth with vital pulp elevates more intensive secretion of inflammatory mediators, such as prostaglandins, leukotrienes, serotonin, histamine, and bradykinin (they are also pain mediators)<sup>30</sup>. Evidence in the previous studies of the effect of pulp status (vital or necrotic) on the incidence and severity of postoperative pain is inconclusive. Our findings concur with those of Clem<sup>37</sup> and Calhoun and Landers<sup>38</sup>, Marshal and Liesinger<sup>39</sup>, Fox et al<sup>40</sup>, and Undoye and Jafarzadeh, who found that postoperative pain is more common following treatment of teeth with vital pulp.

In contrast, Albashaireh and Alnegrish<sup>41</sup> , Mor et al<sup>42</sup>. and Mattscheck et al. reported greater incidence of PEP following treatment of teeth with necrotic pulps. The discrepancy may be due to different criteria used to

evaluate postoperative pain or to different endodontic materials and techniques<sup>30</sup>

Most problems which occurs during obturation are actually problems with the dentist's instrumentation. The obturation is the impression of the canal internal morphology after biomechanical preparation has been done. The post-obturation radiograph put some light on the information about the instrumentation or flaring of the canals. If the master gutta-percha cone does not go up to the desired working length, it could be due to the debris blocking the canal or because the flaring was not appropriate. If the master cone goes beyond the apex, an apical stop has been breached<sup>44</sup>.

### Conclusion

Within the limitation of the study the following conclusion were drawn. More post endodontic pain was seen with cold lateral obturation than thermoplasticized obturation. Under the parameters of the present study females had more PEP than males. Also it was seen that symptomatic teeth, teeth diagnosed with apical periodontitis and vital teeth had more PEP. Therefore, proper diagnosis and patient follow up after endodontic treatment should be done. As far as management of post endodontic pain, Dentist should be familiar with the post endodontic pain and make efforts to prevent or treat it. Patient should be informed beforehand about the possibility of pain after endodontic treatment and use of analgesics.

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