

To Study the Incidence of Post Operative Pain Following the Use of Different Sealers in Single Visit Root Canal - An *In Vivo* Study

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Abstract

Introduction: The objective of present study was to evaluate the incidence of post operative pain after single visit endodontic treatment using five different sealers.

Methods: Hundred (100) patients were selected who needed endodontic treatment. Samples were assigned into five group according to use of different sealers. After single visit endodontic treatment, patients were asked to note incidence of pain on VAS scale at different time intervals. i.e. at 24,48 and 72 hours. Results were calculated and subjected to statistical analysis.

Results: Among five sealers used, BioRoot RCS (Septodont, St. Maur-des-Fossés, France: Group 5) showed best results when compared to other groups like MTAFillapex (Angelus Solucões Odontológicas, Londrina, PR, Brazil: Group 4), Sealapex (Sybron Endo, Glendora, CA, USA: Group 3) and Tubliseal (SybronEndo, Orange, CA: Group 2) whereas Zinc oxide eugenol (Control Group) (Deepak Enterprises Mumbai, India: Group 1) demonstrated poorest outcome during all the time intervals of the study.

Conclusion: In single visit endodontics, BioRootRCS (Group 5) sealer showed lowest intensities of pain and Zinc Oxide Eugenol (Group 1) showed highest intensities of pain when compared to all other sealers used for the time duration of the study.

Keywords: Single Visit Endodontics; Protaper Gold Rotary Files; Sealapex; MTAFillapex; Bio Root RCS

Introduction

Endodontic treatment of a tooth consists of elimination of bacteria and infectious tissue following the biomechanical preparation and chemo mechanical debridement of the root canal system [1]. According to various studies, pain after endodontic treatment ranges from 3% to 58% [2]. Reason for post endodontic pain can be attributed to mechanical, chemical and bacterial invasion to periapical tissues while performing root canal treatment [3].

Evolution of newer techniques, materials, better understanding of canal anatomy has significantly affected the outcome of endodontic treatment to a large extent. One main concept is single visit endodontic treatment which has many advantages like reduced flare-up rates,

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decreased number of operative procedures and no risk of inter appointment leakage through temporary restoration [4]. Previous study has shown that better performance of single visit root canal therapy over multiple root canal therapy. So, when compared to multiple visit endodontics single sitting is preferred [5,6].

Irrespective of techniques used, main objective of endodontic treatment is hermetic 3-dimensional seal to avoid any leakage from oral cavity and/or periapical tissue thus reducing periapical inflammation [7]. This obturation can be achieved by combination of endodontic sealer and gutta percha. Though, gutta percha is widely used due to its good physical and biological properties, but due to lack of adhesiveness, a sealer is used along with it. An ideal sealer should flow along the entire dentinal wall surface, fill all voids and gaps between gutta percha and canal wall, adhere to both core material and dentinal wall and produce minimal or no periapical inflammation [8].

The present study was conducted to evaluate the incidence of post operative pain using different sealers viz. Zinc Oxide Eugenol (Group 1), Tubliseal (Group 2), Sealapex (Group 3), MTAFillapex (Group 4) and Bio Root RCS (Group 5) at three different time intervals following single visit endodontics.

Methodology

100 patients reporting to the Department of Conservative Dentistry and Endodontics needing endodontic treatment in teeth with asymptomatic apical periodontitis were selected for the study. Teeth with fully formed apex, vital pulp, absence of periapical inflammation and patients with preoperative pain were included in the study. Teeth with incompletely formed apex, requiring re-treatment, multiple canals or multiple roots, teeth affected by periodontal disease, tender on percussion, patients with systemic disease and immune compromised status were excluded from the study. Before commencement of the study, ethical approval was taken from ethical committee of the institution and informed consent was obtained from patients. Thereafter, samples were divided randomly into five groups according to the usage of five different types of sealers.

For single visit endodontics of selected tooth local anesthetic (1:2,00,000 Cadila Pharmaceuticals Ltd.) was administered, and endodontic access was done under rubber dam isolation. Cleaning and shaping of the canal was achieved by early negotiation followed by working length with k-Files (Dentsply, Maillefer, Switzerland) #8, #10, #15, #20. An initial working length was established with the apex locator root ZX mini (J. Morita Corporation, Tokyo, Japan) which was further confirmed by radiograph. The working length was set 0.5-mm short of the radiographic apex. Canals were prepared using engine-driven rotary nickel-titanium ProTaper Gold files (Dentsply Maillefer, Switzerland) according to manufacturer's instructions. Prep canal (Dental Avenue Pvt. Ltd) was used as a root canal lubricant. Irrigation was performed with 5.25% sodium hypochlorite (Prime Dental, India) after each file change followed by copious use of saline. Apical preparation was accomplished using finishing files which ranged from F1 to F5 depending on the initial diameter of the canal. Then, the patients were divided into five treatment groups for obturation.

Patients were randomly divided into five treatment groups depending on the sealer used:

- Group 1: Obturation done using ZOE along with gutta percha (Deepak Enterprises Mumbai, India).
- Group 2: Obturation done using Tubliseal (Sybron Endo Corporation, Orange, CA) along with gutta percha.
- Group 3: Obturation done using Sealapex (Sybron Endo, Glendora, CA, USA) along with gutta percha.
- Group 4: Obturation done using MTA fillapex (Angelus Soluc, ões Odontológicas, Londrina, PR, Brazil) along with gutta percha.
- Group 5: Obturation done using Bioroot RCS (Septodont, Saint-Maur-des Fosses, France) along with gutta percha.

All the teeth were then obturated using the lateral compaction technique. Patients were then given the VAS pain rating scale and were instructed to mark the individual pain level at 24, 48 and 72 hours after root canal therapy. After obturation coronal preparations were restored using direct composite resin restoration.

No medications were prescribed to patients. Patients were recalled at an interval of 24, 48 and 72 hours after treatment and asked for degree of discomfort they experienced. The status of pain was assessed by using VAS scale at each point of time. Results were calculated and statistically analyzed.

Results

The statistical analysis was done by using Post-hoc bonferroni test. A total of hundred patients were analyzed for post endodontic pain at an interval of 24, 48 and 72 hours respectively. The highest mean post-operative pain score was seen in first 24 hours i.e. 7.50 ± 2.06 in zinc oxide eugenol (Control Group) and the least mean value was noted in Bio Root RCS (Group 5) 4.55 ± 2.54 . Significant decline in pain was observed in next 48 and 72 hours. After 72 hours there was decrease in pain score values in all the groups. Bio Root RCS (Group 5) showed least value of $0.60 \pm .08$ followed by MTAFillapex (Group 4) 0.85 ± 0.09 , Sealapex (Group 3) 1.10 ± 1.07 , group Tubliseal (Group 2) 1.10 ± 1.37 and zinc oxide eugenol (Group 1) 1.50 ± 1.99 . Statistically significant difference was seen among all the groups.

	Pain score at 24 hours	Pain score at 48 hours	Pain score at 72 hours
Group 1 (Control)	7.50 ± 2.06	4.60 ± 1.64	1.50 ± 1.99
Group 2 (Tubliseal)	7.10 ± 1.25	4.15 ± 1.31	1.10 ± 1.37
Group 3 (Sealapex)	6.40 ± 1.98	3.50 ± 1.76	1.10 ± 1.07
Group 4 (MTA fillapex)	5.85 ± 3.63	3.35 ± 2.39	0.85 ± 0.99
Group 5 (Bioroot)	4.55 ± 2.54	2.10 ± 2.34	0.60 ± 0.82

Table 1: Pain values experienced by patients with different root canal sealers.

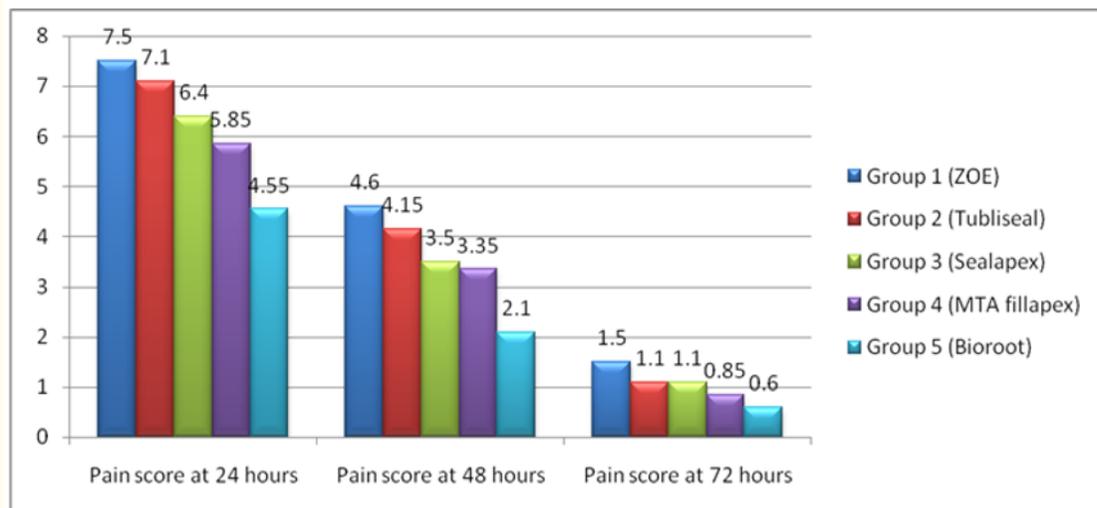


Figure: Bar chart representing different pain values at different intervals of time using five different sealers.

Discussion

Endodontic treatment is performed to manage pain and eliminate infection from teeth. Pain is a personal and subjective experience [9]. Post-operative pain after RCT has been seen in 3 - 58% cases [2]. The post endodontic pain generally shows decrease in severity over time [10]. It is generally associated with periapical inflammatory response to various mechanical, chemical and microbiological factors [11]. Present study evaluated effect of different sealer on post endodontic pain at different time intervals following Single Visit Root canal treatment. Since pain is a subjective experience and is difficult to quantify and standardize, verbal and visual analogue scales are used in many clinical studies.

In this study, VAS composed of categories of no pain, mild, moderate and sever pain was used. Single visit endodontic treatment of teeth was done using different sealers. After completion of treatment, follow up was done at an interval of 24 hrs, 48 hrs and 72 hrs. The assessment of pain was recorded by using Visual Analogue Scale (VAS).

Samples of group 1 and group 2 were obturated using zinc oxide sealer and Tubuliseal sealer respectively. When eugenol is mixed with zinc oxide, a chelation reaction occurs and zinc eugenolate is formed. When exposed to aqueous media such as saliva or dentinal fluid, hydrolysis of zinc eugenolate occurs, yielding eugenol and zinc oxide. Eugenol liberated from zinc oxide eugenol can diffuse through dentin and into the saliva. Besides antimicrobial activity of ZOE, it shows localized inflammation in related soft and hard tissue due to presence of para formaldehyde [12]. In the present study, pain in this group ranged between moderate to severe in nature. This type of pain depicts the interaction between zinc oxide eugenol and periapical tissues at histological level and also governs the atrocious cytotoxic effects. The same result has been shown by previous studies [13,14] suggesting ZOE as irritating to periapical tissues, causing necrosis of bone, cementum and leaving the area devoid of cells leading to cell destruction.

In group 3 and 4, the teeth were obturated using Sealapex and MTA Fillapex sealers respectively. These are primarily calcium hydroxide and MTA based. Sealapex has been shown to be cytotoxic [15] and contains additives such as a proprietary resin, isobutylsalicylate, aerocil R792 [16] and high pH due to calcium hydroxide itself. Likewise, on initial setting MTA Fillapex also attains the pH of 10.2 which increases to pH 12.5 on final set. This high alkalinity level has a destructive effect on protein structures of some microorganisms, promoting some cell membrane enzyme inactivation and loss of biological activity, followed by damage to membrane integrity [17]. The pain associated with these can be attributed to initial high pH value and osteoblastic activity. Previous studies [18] showed that Sealapex has moderate inflammatory reaction after 48 hrs and became mild in later periods. As studies compared the cytotoxicity, inflammatory response, osteogenic effect, and signaling mechanism of 4 calcium compound based root canal sealers (i.e. Sealapex, Apatite root sealer, MTA Fillapex and iRoot SP) in human periodontal ligament, they concluded that Apatite root sealer, MTA Fillapex and iRoot SP showed a lower expression of inflammatory mediators and enhance the osteoblastic differentiation of periodontal ligament cells via the integrin-mediated signaling pathway on comparing with Sealapex.

In group 5, the teeth were obturated using Bio root RCS along with gutta percha in cold lateral compaction method. This sealer showed satisfactory tissue tolerance. The result is supported by the fact that Bio Root RCS sealer exhibits the formation of calcium hydroxide on hydration and this would potentially promote bioactivity and adhesion to canal wall through mineral tags [19]. BioRoot RCS is marketed as powder/liquid hydraulic tricalcium silicate-based cement [20]. In this, powder contains tricalcium silicate, povidone and zirconium oxide and liquid consists of an aqueous solution of calcium chloride and polycarboxylate. BioRoot RCS has been reported to induce production of angiogenic and osteogenic growth factors by human periodontal ligament cells [21]. Therefore, it has a less cytotoxicity than other traditional sealers, it may induce hard tissue deposition [22,23] and has antibacterial activity [24]. In micromolecular level periradicular tissue reaction to all the cements will first be inflammatory, but as the cements reach their final set, cellular repair takes place unless the cement continues to break down, releasing one or more of its toxic components [25].

Conclusion

Current study concluded that Zinc oxide eugenol based sealers (ZOE and Tubli Seal) have highest incidence of pain than Calcium based sealers (Sealapex and MTA Fillapex) followed by least incidence of pain by Bio Root RCS at the time interval of 24, 48 and 72 hours post endodontically. Based on these observations and clinical results further studies are required to explore the different advantages and disadvantages of sealer which would definitely provide better understanding and selection of sealers in endodontic treatment.

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