http://dx.doi.org/10.17159/2519-0105/2021/v76no2a6

What's new for the clinician?
- Excerpts from and summaries of recently published papers

SADJ March 2021, Vol. 76 No. 2 p96 - p99

Compiled and edited by V Yengopal

1. The effects of Endoseal MTA vs. EndoSequence BC Sealer vs. AH Plus root canal sealer on postoperative pain following single-visit root canal treatment on molar teeth

TU Aslan, H Dönmez Özkan. The effect of two calcium silicate-based and one epoxy resin-based root canal sealer on postoperative pain: a randomized controlled trial. International Endodontic Journal. 2021; 54: 190-7.

INTRODUCTION

Choosing an endodontic sealer for clinical use is a decision that contributes to the long-term success of non-surgical root canal treatment. Sealers are used as a thin tacky paste which function as a lubricant and luting agent during obturation, allowing the core obturation material, such as gutta-percha points or other rigid materials, to slide in and become fixed in the canal.[1]

Sealers can fill voids, lateral canals, and accessory canals where core obturation materials cannot infiltrate. If the sealer does not perform its function, microleakage may cause root canal failure via clinically undetectable passage of bacteria, fluids, molecules or ions between the tooth and restorative material. It has been reported that extrusion of the sealer during root canal filling has cytotoxic effects on periapical tissues, causing periapical inflammation, necrosis and pain.[1]

Endodontic sealers are categorized by composition based on setting reaction and composition: zinc oxide eugenol, salicylate, fatty acid, glass ionomer, silicone, epoxy resin, tricalcium silicate, and methacrylate resin sealer systems.

Aslan & Özkan (2021)[1] reported on a trial that sought to evaluate the effect of two calcium silicate-based root canal sealers, Endoseal MTA and EndoSequence BC Sealer, on postoperative pain following single-visit root canal treatment on molar teeth compared to their epoxy/amine resin-based counterpart AH Plus. The null hypotheses tested in this study were as follows:

1. The type of sealer used would not change the incidence and the intensity of post-treatment endodontic pain
2. The analgesic intake of patients following single-visit root canal treatment would not differ amongst the experimental groups.

MATERIALS AND METHODS

96 patients were included in this trial. Only patients who had mandibular first and second molar teeth diagnosed with asymptomatic irreversible pulpitis due to deep caries were included. The clinical diagnosis of asymptomatic irreversible pulpitis was based on the presence of a deep carious lesion that would cause a large pulp exposure during its removal and in the absence of clinical and radiographic pathosis and symptoms.

Additional identifiers for this diagnosis were that after exposing the pulp, profuse bleeding of the pulp having a thick consistency and an inability to achieve haemostasis within 2-3 min.

Patients were considered for inclusion if they: were between 18-60 years old; had good oral hygiene; had not used any analgesic or antibiotic in the previous 7 days; had a Prolonged positive response to cold test and were patients diagnosed with asymptomatic irreversible pulpitis caused by deep carious lesion on the mandibular first or second molar teeth.

Veerasamy Yengopal: *BChD, BScHons, MChD, PhD*, Community Dentistry Department, School of Oral Health Sciences, University of Witwatersrand, Medical School, no. 7 York Road, Parktown 2193, South Africa.
ORCID Number: 0000-0003-4284-3367
Email: veerasamy.yengopal@wits.ac.za

Patients were excluded if they were medically compromised, had symptomatic or non-vital teeth, had a probing depth of >4 mm on affected teeth, or had an open apex, presence of calcification, or presence of resorption.

All procedures were standardised and performed by two specialists having at least 10 years of clinical experience. Throughout the entire procedure, the operators used dental operating loupes at ×4 magnification. All patients received a single-visit root canal treatment to limit the potential pain-inducing factors that might becaused by multiple visits. During the diagnostic examination, thermal tests and electric pulp tests were performed to determine pulp sensibility.

After the root canal procedure (obturation and irrigation and cleaning and drying out of canal), participants were randomly allocated to a group using a computer algorithm program (n=32). Allocation was done by a trained dental assistant who was blinded to the study procedures to prevent bias.

- Group 1: AH Plus
- Group 2: Endoseal MTA
- Group 3: EndoSequence BC Sealer

After the allocation of patients into the experimental groups, six patients stated that they wanted to withdraw from the study at the beginning of the canal filling process; therefore, they were excluded from the study. Since the remaining 90 patients wished to continue, 30 patients were allocated into each experimental group (n=30). A single tapered gutta-percha cone [Reciproc R25 or Reciproc R40 gutta-percha cones] was adapted to the root canal, and the position of the cone was confirmed with a periapical radiograph. Afterwards, sealer application with suitable paper point cones (1mm shorter than working length) was done as follows: the first paper point was used to apply the sealer, the second one to distribute and the third one used to remove excess sealer.

Following sealer application, the root canal was filled with a single cone placed in the canal. Subsequently, excess gutta-percha cone was removed and the pulp chamber was cleaned. Then, coronal access cavities were restored with a direct adhesive build-up using a composite resin material (Single Bond Universal). Finally, ibuprofen 400mg was prescribed and the patients were recommended to use it only when they encountered severe pain.

After treatment, two forms were given to the participants. The first form designed to record pain levels was based on the Visual Analog Scale (VAS), where VAS pain levels were indicated on the chart by the participants. The value “0” was defined as “no pain,” and ”100” was defined as “unbearable pain".

In the second form, participants were asked to report the frequency of analgesic drug intake. The patients were asked to choose one of the three options: “0: No pain, or pain which does not require the use of analgesics,” “1: Moderate pain which can be well controlled by the use of analgesics and does not affect daily activities or sleep,” “2: Impaired daily activities due to unbearable pain that cannot be controlled by the use of analgesics.”

Participants were asked to complete these two forms at 6, 12, 24 and 48h after treatment and on the 3rd, 4th, 5th, 6th and 7th days. A phone call was made every day for 7 days to obtain information on the postoperative pain and the frequency of analgesic intake. The patients were asked to call the contact number on the form if they encountered severe pain or if they needed to ask any questions regarding the treatment.

RESULTS

The treatments of two patients in the Endoseal MTA group (due to nausea), and four patients in the AH Plus group (one patient due to nausea, two patients due to anxiety, and one patient due to root canal sealer extrusion) could not be completed in a single visit. Thus, they were excluded from the final analysis, that included a total of 84 participants (50 females and 34 males).

Fifty-three of the treated teeth were mandibular first molars and 31 were second molars. The sample comprised 61 teeth with three main root canals, 21 teeth with four and two teeth with two root canals. The total number of the treated mandibular root canals was 271. Depending on the initial root canal size, 42 were prepared up to R40, the rest (229 root canals) were shaped to R25.

There were no significant correlations between age and postoperative pain at each time-point [at 6, 12, 24 and 48h after treatment and on the 3rd, 4th, 5th, 6th and 7th days] ($P>0.05$). There were no significant correlations between gender and postoperative pain at each time-point ($P>0.05$). There were no significant differences amongst the Endoseal MTA, Endosequence BC Sealer and AH Plus groups at any of the assessed time intervals based on VAS scores ($P>0.05$). The most severe postoperative pain scores were recorded 6h after the procedure, with the severity declining significantly after 12h in all the root canal sealer groups ($P<0.05$).

There were no significant differences in the intake analgesic for the Endoseal MTA, Endosequence BC Sealer and AH Plus groups ($P>0.05$). Analgesic intake significantly decreased after 12h in all groups ($P<0.05$).

CONCLUSIONS

The researchers found that Endoseal MTA, Endosequence BC Sealer and AH Plus were not significantly different in terms of the severity of postoperative pain after single-visit root canal treatment on molar teeth.

Implications of practice

The researchers found that Endoseal MTA, Endosequence BC Sealer and AH Plus were not significantly different in terms of the severity of postoperative pain after single-visit root canal treatment on molar teeth.

Reference

3. Aslan TU, Dönmez Özkan H. The effect of two calcium silicate-based and one epoxy resin-based root canal sealer on post operative pain: a randomized controlled trial. International Endodontic Journal. 2021; 54: 190-7.

2. Effect of preoperative oral administration of steroids in comparison to an anti-inflammatory drug on postoperative pain following single-visit root canal treatment - a double-blind, randomized clinical trial

N Suresh, V Nagendrababu, V Koteeswaran, JS Haritha, SD Swetha, A Varghese, V Natanasabapathy. Effect of preoperative oral administration of steroids in comparison to an anti-inflammatory drug on postoperative pain following single-visit root canal treatment - a double-blind, randomized clinical trial. International endodontic journal. 2021; 54: 198-209.

INTRODUCTION

The incidence of postoperative pain following root canal treatment ranges from 25-70% at 24 hours post-treatment Injury to the periapical tissues as a result of canal instrumentation, the extrusion of microorganisms, dentine/pulp debris, and/or medicaments and irrigants have been linked to postoperative pain after single- or multi-visit root canal treatment.

These factors trigger the sequential release of acute inflammatory chemical mediators such as prostaglandins, leukotrienes, bradykinin, serotonin and cytokines that activates and sensitizes the nociceptors that results in a neuronal response that patients perceive as pain.[1]

Use of systemic drugs to reduce the inflammatory reactions with the administration of a single dose of oral premedication has been reported to be effective in reducing postendodontic pain.[1] Prednisolone, a synthetic glucocorticoid; Dexamethasone, a potent anti-inflammatory corticoid, and Piroxicam, a nonsteroidal anti-inflammatory drug of the oxicam class, have all shown efficacy when used for premedication. However few good quality studies exist that have compared these drugs.

Suresh et al (2021)[1] reported on a trial that sought to compare the effect of a single, orally administered preoperative dose, of piroxicam, prednisolone, dexamethasone or a placebo on postoperative pain after single-visit root canal treatment in teeth with symptomatic irreversible pulpitis and symptomatic apical periodontitis. The null hypothesis was that all the premedication drugs tested would have no effect on postoperative pain after single-visit root canal treatment.

MATERIALS AND METHODS

This study was designed as single-centre, multi-arm randomized, placebo-controlled double-blinded trial. A total of 186 patients were screened against the following inclusion criteria: Systemically healthy patients aged between 18 and 60 years with maxillary or mandibular posterior teeth diagnosed with symptomatic irreversible pulpitis and apical periodontitis were included.

Diagnosis was based on clinical and radiograpic examination and pulp sensibility testing. Teeth were included if they had moderate sharp spontaneous pain (preoperative visual analogue scale (VAS) score: ≥4) or pain stimulated with hot or cold with a lingering response even after removal of the stimulus with pain on biting or chewing.

Tenderness to percussion was performed by tapping the teeth with the end of a mirror handle. The teeth with no evidence of periapical changes in radiographs were in cluded. Teeth that were tender on percussion and also exhibited a positive response to electric pulp testing as well as a lingering response of more than 10s to cold test (ethyl chloride spray) were included.

Teeth with crown/root fractures, acute or chronic apical abscess, pulp necrosis, compromised periodontium and open apices were excluded. Patients who could not interpret the VAS, medically compromised patients, pregnant and lactating women were excluded. Patients having history of allergy to local anaesthetic solutions or any of the experimental drugs, on long-term medications that influenced pain threshold, analgesics, steroids and/or antibiotics in the recent past 24 h, were also excluded from the trial. Teeth with necrotic pulps following access cavity preparation were also excluded.

One hundred and eighty-six patients were assessed for eligibility by a post-graduate student based on clinical and radiographic examination and pulp sensibility testing. One hundred and sixty patients satisfied the selection criteria and agreed to participate in the trial and by random sequence generation and allocation concealment, patients were allocated to the 4 invention groups: - Group 1-20 mg oral piroxicam; Group 2-20 mg oral prednisolone; Group 3-4 mg oral dexamethasone; Group 4 - oral placebo (dextrose).

The respective drug inside the sealed envelope was administered to the patients by a nursing assistant not related to the trial 1 h before the clinical procedure. The endodontic procedure was standardised and carried out by calibrated clinicians. The canals were dried with absorbent points and obturated with a corresponding matched taper single cone of gutta-percha and resin sealer (AH Plus). The access cavity was restored with resin composite (FiltekTM Z350 XT universal), and the teeth were relieved out of occlusion.

The primary outcome measure of postoperative pain was assessed immediately after tooth restoration, 6, 12, 24, 48 and 72h using a Visual analogue scale (VAS). The VAS system of pain assessment consisted of a line 10-cm in length with '0' signifying no pain on one end and score '10' representing the worst pain imaginable. Two methods were followed to assess VAS, one was by providing the

patients with a diary to maintain the pain score and secondly the pain score was also assessed using an electronic method through a phone text by a co-investigator at 6, 12, 24, 48 and 72h.

The patients were requested to return at 72h for review and to hand over the pain score diary. The data from both the methods were compared and the one which provided the pain scores at all-the intervals was taken for final analysis. No changes were made to the study outcome after the commencement of the trial. Ibuprofen 400 mg was prescribed as an escape medicine to be taken at a dosage of one tablet for every 6h in unbearable pain situation and these patients were excluded from further analysis.

The incidence of postoperative pain at 6, 12, 24, 48 and 72h was calculated by the presence or absence of pain postoperatively (percentage). The intensity of pain was assessed at 6, 12, 24, 48 and 72h using the mean pain score. The primary outcomes were to assess the incidence and intensity of postoperative pain following single-visit root canal treatment with regard to administration of oral premedication, whereas influence of gender, age and type of tooth, on postoperative pain, were assessed as secondary outcomes.

RESULTS

Single-visit root canal treatment was provided for 96 molars (62 mandibular and 34 maxillary) and 64 premolars (26 mandibular and 38 maxillary) in the study. There was no significant difference in baseline data in terms of age (P=0.06), gender (P=0.663), tooth type (P=0.387) and pre-operative pain (VAS scores) (P=0.728) amongst the intervention groups and placebo. Out of 160 patients enrolled, three patients from the piroxicam premedication group and one from placebo group dropped out from follow-up.

At 6, 12 and 24 h, the percentage of patients who experienced postoperative pain (incidence) after premedication with a single oral dose of piroxicam, prednisolone or dexamethasone was significantly less in comparison to the placebo (P<0.05).

The mean intensity of pain was significantly greater at 6, 12 and 24h in patients who received the placebo in comparison to the other three intervention groups (piroxicam, prednisolone, dexamethasone). However, there were no significant differences amongst the three intervention groups (P>0.05).

The incidence of postoperative pain at 48 and 72h in the piroxicam, prednisolone, dexamethasone and placebo groups was not significantly different (P>0.05). The mean intensity of postoperative pain was not significantly different between any groups at 48 and 72h.

Within the intervention groups, a significant reduction in intensity of preoperative pain occurred at all-time intervals. However, the reduction of pain intensity from 6h up to 72h was not significantly affected amongst the intervention groups. In the placebo group, the intensity of pain started to reduce significantly only after 48h.

Being a male lowered the odds to 0.54, 0.63 and 0.16 times to experience pain at 6, 12 and 24h, respectively, which was not significant. Age and tooth type were not associated with significant change in the incidence of pain at 6, 12 and 24h. The odds of reducing the incidence of postoperative pain with a single-dose premedication with 20mg piroxicam and 4mg dexamethasone were significant when compared to the placebo at 6h (P=0.03 and P=0.005), 12h (P=0.02 and P=0.006) and 24h (P=0.02 and P=0.005).

The number of patients who consumed the escape medicine was 2.7% (1/37), 5% (2/40), 2.5% (1/40) and 15.4% (6/39) amongst the patients who underwent single-visit root canal treatment following premedication with a single dose of piroxicam, prednisolone, dexamethasone and placebo, respectively.

One patient who was premedicated with piroxicam reported gastritis as an adverse effect during the follow-up at 12h. No adverse effects were observed in other groups.

The number of patients who failed to submit the pain score diary was 16.2% (6/37), 27.5% (11/40), 22.5% (9/40) and 15.38% (6/39) amongst the piroxicam, prednisolone, dexamethasone and placebo groups, respectively.

CONCLUSIONS

The researchers concluded that a single dose of oral premedication of 4 mg dexamethasone, 20 mg piroxicam or 20 mg prednisolone reduced the incidence of postoperative pain following single-visit root canal treatment compared to a placebo at 6, 12 and 24 h.

The intensity of the pain was not different between the premedications at any time interval but was significantly less than the placebo. Administering a single-dose premedication of 4mg dexamethasone or 20mg piroxicam improved the postoperative comfort for patients undergoing single-visit root canal treatment and thereby can improve their oral health-related quality of life.

Implications for practice

This trial has provided evidence of the value of oral premedication for patients undergoing a single visit root canal treatment. The three interventions performed were similarly effective.

Reference

1. Suresh N, Nagendrababu V, Koteeswaran V, Haritha JS, Swetha SD, Varghese A, Natanasabapathy V. Effect of preoperative oral administration of steroids in comparison to an anti-inflammatory drug on postoperative pain following single-visit root canal treatment - a double-blind, randomized clinical trial. International endodontic journal. 2021; 54: 198-209.