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ORIGINAL ARTICLE

Effect of long acting local anesthetic on postoperative pain in teeth with irreversible pulpitis: Randomized clinical trial

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KEYWORDS

Local Anesthetic;
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Abstract *Objective:* The objective of this study was to compare the effect of long acting anesthetics on postoperative pain in teeth with irreversible pulpitis.

Methodology: Forty patients were randomly assigned into two groups of twenty patients each. Each patient who fit the inclusion criteria was administered local anesthesia before undergoing root canal treatment. The anesthetic solution was either 2% lidocaine with 1:80,000 epinephrine or 0.5% bupivacaine with 1:200,000 epinephrine. Patients were instructed to complete a VAS pain score at 6, 12, 24 h after single visit root canal treatment. Data were analyzed by Mann–Whitney, Cochrane Q analysis and *t* test to compare qualitative and quantitative data between the groups.

Results: The results showed the levels of pain of the patients who received lidocaine as the anesthetic agent and had significantly more postoperative pain after root canal treatment ($P < 0.05$) but had significantly decreased pain by 24 h compared to the bupivacaine group patients who had significantly lower postoperative pain levels at 6 and 12 h.

Conclusion: The use of long acting local anesthetic can significantly reduce the postoperative pain in teeth with irreversible pulpitis.

1. Introduction

Postoperative pain reduction after root canal treatment is significantly important for both practitioners and patients (Rosenberg, 2002). Several articles have been published regarding the prevalence of pain after endodontic treatment as well as the effect of different irrigants, medications, techniques of root canal reparation, and the number of treatment visits (Dunsky and Moore, 1984; Rosenberg et al., 1998; Attar et al., 2008; Ince et al., 2009; Jalalzadeh et al., 2010; Pak and White, 2011; Su et al., 2011).

Numerous strategies have been described for pain control after root canal treatment (Rosenberg, 2002). The prescription of analgesics on the basis of a flexible plan and use of long-acting anesthetics (Keiser and Hargreaves, 2002), prescription of analgesics before starting root canal treatment

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(Attar et al., 2008) and occlusal reduction (Rosenberg, 2002; Rosenberg et al., 1998) have all been advocated. Most of these studies were done on the teeth extraction model which is totally different from the root canal treatment model (Bouloux and Punnia-Moorthy, 1999; Volpato et al., 2005; Gregorio et al., 2008; Trullenque-Eriksson and Guisado-Moya, 2011).

Only few articles investigated the effect of long-acting anesthetics on pain control after root canal treatment. These articles have several shortcomings such as insufficient sample size and included upper and lower teeth with variable diagnosis (Dunsky and Moore, 1984). Therefore, the objective of this study was to compare the effect of long acting anesthetics on postoperative pain in teeth with irreversible pulpitis.

2. Methodology

This study was approved by the Ethics Committee of College of Dentistry Research Center, Deanship of Research, King Saud University.

Inclusion criteria included healthy patients having a first or second mandibular molar tooth with normal periapical radiographic appearance and irreversible pulpitis without sensitivity to percussion. The clinical diagnosis of acute irreversible pulpitis was confirmed by a prolonged exaggerated response (> 5 s) with moderate-to-severe pain to a cold test (Roeko Endo-Frost; Roeko, Langenau, Germany) after the stimulus had been removed.

The exclusion criteria were the presence of a periapical radiolucency, unrestorable tooth, pregnancy, the use of any type of analgesic medication during the last 12 h before treatment, teeth with a necrotic, infected pulp or swelling, the presence of any systemic disorders that prevented administration of lidocaine and bupivacaine as anesthetic agents, sensitivity to either lidocaine with 1:80,000 epinephrine or bupivacaine with 1:200,000 epinephrine.

Patients were selected randomly from the emergency clinics of College of Dentistry at King Saud University, Riyadh, Saudi Arabia. All patients included in the study signed informed consent before the treatment and were fully explained the nature of the procedure and the possible risk and discomforts.

All patients were randomly divided into two groups of 20 patients each and each patient was assigned a number randomly to either group. All inferior alveolar nerve block (IANB) injections were administered blindly by covering the carpules with a covering tape. A visual analog pain scale (VAS) was given to each patient to rate their pain level before the anesthesia was administered. Only patients who reported adequate anesthesia (lip numbness) were included in the study. The anesthetic solution was either 2% lidocaine with 1:80,000 epinephrine (Xylocaine; Dentsply, Oklahoma, USA) or 0.5% bupivacaine with 1:200,000 epinephrine (Vivacaine; Septodent, Louisville, Colorado, USA).

After local anesthetic was administered, the tooth was isolated with a rubber dam and endodontic treatment was started with the access. Root canal preparation was performed after electronic root canal measurement with a Root ZX (Morita Corporation, Kyoto, Japan) and this was confirmed with a periapical radiograph. A 2.5% solution of sodium hypochlorite was used as an irrigant during root canal preparation. The root canals were instrumented initially to file size no. 15, followed by the use of the ProTaper rotary system (Maillefer, Switzerland) and instrumentation was carried out to the file F3. The root canals were then dried and filled with guttapercha and AH26 (Dentsply De Tery, Konstanz, Germany) root canal cement.

Patients were instructed to complete a VAS pain score at 6, 12 and 24 h after root canal treatment. The following criteria were outlined for the patients to rate their pain: 0, no pain; 1–3, mild pain; 4–6, moderate pain; 7–9, severe pain (Jalalzadeh et al., 2010; Asgary and Eghbal, 2010). Data were analyzed by Mann–Whitney, Cochrane Q analysis and t test to compare qualitative and quantitative data between the groups.

3. Results

A total of 40 patients participated in the study after exclusion of other patients who did not fit the inclusion criteria initially. The average age of the patients in the lidocaine group was 41.5 years and 39.5 years in the bupivacaine group. In the lidocaine group, 19 patients were male and 21 were female whereas in the bupivacaine group, 16 patients were male and 24 were female. No significant differences between age and gender ($P > 0.05$) were found in both groups. The summary of the demographic data of all patients in both groups is shown in Table 1.

Almost half of the patients in the lidocaine group had no pain at all time intervals while in the bupivacaine group, more than two thirds of the patients had no postoperative pain at all time intervals.

In the lidocaine group, 12.5% of patients had no pain, 50% had mild pain, 12.5% had moderate pain and 25% had severe pain at 6 h. While at 12 h, 25% had no pain, 40% had mild pain, 20% had moderate pain and 15% had severe pain. At 24 h, 50% had no pain, 25% had mild pain, 15% had moderate pain and 10% had severe pain (Table 2 and Fig. 1).

In the bupivacaine group, 75% of patients had no pain, 20% had mild pain and 5% had moderate pain at 6 h. While at 12 h, 50% had no pain, 42.5% had mild pain and 6.5% had moderate pain. At 24 h, 87.5% had no pain, 7.5% had mild pain and 5% had moderate pain (Table 3 and Fig. 2).

There was no significant difference between age, gender and the level of postoperative pain in both the lidocaine and bupivacaine groups ($P > 0.05$).

Cochrane Q test of the patients' levels of pain showed that the patients who received lidocaine as the anesthetic agent had significantly more postoperative pain after root canal treatment ($P < 0.05$), although this had significantly decreased by 24 h. The bupivacaine group patients reported significantly lower postoperative pain levels at 6 and 12 h compared with the patients who had received lidocaine ($P < 0.05$).

4. Discussion

This research was designed to test the effect of using long acting anesthetic compared to short acting one on postoperative pain in patients with irreversible pulpitis. Most of the evidence based on Pubmed search is on the effect of using long acting anesthetic on postoperative pain after tooth extraction and this is why such a study is important where the model used is on postoperative pain after root canal treatment (Bouloux and Punnia-Moorthy, 1999; Volpato et al., 2005).