What's new for the clinician?

Summaries of and excerpts from recently published papers

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1. Pulpectomies in primary mandibular molars: a comparison of outcomes using three root filling materials

Pramila R, Muthu MS, Deepa G, Farzan JM, Rodrigues SJL. Int Endod J. 2016; 49:413-21.

Pulpectomies for the management of irreversible pulpitis in primary teeth remain controversial for several reasons, including the complex root canal morphology of primary molars, the inherent risk of physiologic root resorption, the close proximity of deciduous teeth to the permanent successors, the difficulty in obtaining good radiographic views of the apices of primary teeth, complex diagnosis due to the patient's immaturity, need for behavioural guidance of paediatric patients and choice of technique and root filling materials.[1] An ideal root filling material for primary teeth should be easily placed and removed, should resorb at a rate similar to that of the primary root, should not set to a hard mass that could deflect an erupting permanent tooth, should be radiopaque and not discolour the tooth, should adhere to the walls, should not shrink and should possess antiseptic properties as well as be harmless to the periapical tissues and permanent tooth germ.[1]

The most commonly used root filling materials for primary teeth include zinc oxide–eugenol (ZOE), iodoform-based pastes and calcium hydroxide. None of these currently available materials meet all these criteria. Pramila and colleagues (2016)[1] reported on a prospective, double-blind, randomized controlled trial that sought to evaluate the success of the currently used root filling materials for pulpectomy in primary teeth. The trial aimed to investigate the clinical and radiographic success of three materials – RC Fill, Vitapex and Pulpdent root canal sealer– used for primary molar teeth with necrotic pulps and irreversible pulpitis in patients aged 6, 12 and 30 months.

MATERIALS AND METHODS

This single-centre, double-blind, randomized controlled trial conducted in India included 129 teeth in 88 children (40 girls and 48 boys aged between 4 and 9 years).
Teeth with one or more of the following criteria were included for pulpectomy: - (1) Caries-affected teeth with intra-oral and/or extra-oral swelling or draining sinus tract; (2) Teeth with deep caries lesions and associated inter-radicular and/or periapical radiolucencies; (3) Caries-affected teeth with abnormal mobility due to periapical pathosis, and not associated with normal exfoliation; (4) History of spontaneous pain in caries-affected teeth; and, (4) Caries-affected teeth with internal root resorption involving the cervical 1/3 of the root or external resorption (not physiologic resorption) involving less than 1/3 of the root length.

Children with systemic pathosis (any medically compromising conditions) or allergies to any of the materials used were excluded from this trial.

Patients were randomly assigned by a block randomization method with random table numbers of blocks 10 and 9. Allocation concealment was performed with sequentially numbered, opaque and sealed envelopes. The participants and outcome assessors were blinded about the filling materials used.

The selected participants were randomly divided into 3 groups:

- Group I (GI) – RC Fill (ZOE with iodoform),
- Group II (GII) – Vitapex (calcium hydroxide with iodoform) and
- Group III (GIII) – Pulpdent root canal sealer (ZOE).

A standardised approach to the pulpectomy procedure was used in all three groups.

Calcium hydroxide with iodoform (Vitapex) was available in pre-loaded syringes. The syringe was inserted into the canal near the apex. The paste was extruded into the canal, and the syringe was then slowly withdrawn as the paste filled the entire canal. The RC Fill and Pulpdent root canal sealer were available in powder and liquid form.

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They were mixed to the desired consistency according to the manufacturer's instructions. A lentulo spiral was used to place the RC Fill, and an Endodontic Pressure Syringe (EPS) was used to place the Pulpdent root canal sealer. The pulp chamber was also filled with the filling material, Type IX GIC was placed as a core, and an immediate postoperative radiograph was taken. The teeth were then restored with stainless steel crowns (3M) at the same appointment immediately following canal filling.

The outcome measures were evaluated both clinically and radiographically at 6, 12 and 30 months.

RESULTS

In total, ninety teeth (90) were followed up at 30 months (12% attrition of sample). All three materials were associated with 100% clinical success at 6, 12 and 30 months. Regeneration and reduction in the size of furcation and periapical radiolucencies were observed, and none of the teeth had developed new lesions at the follow-up. However, in a few cases furcation radiolucency and external root resorption increased, and there was thickening of the lamina dura and widening of periodontal ligament space, which were considered as failures. Hence, overall success was determined by the radiographic evidence which showed success rates of the three materials at 30 months of 94%, 90% and 97% for RC Fill, Vitapex and Pulpdent, respectively. The differences in the success rates amongst the materials were not significant ($P > 0.05$). An intention-to-treat strategy was used, and the results were analysed according to the assigned treatment groups. Based on this, the results were observed to be similar to the pre-protocol results of the study with respect to all clinical and radiographic parameters.

CONCLUSION

All three materials, RC Fill, Vitapex and Pulpdent, were shown to be equally effective root filling materials at 30 months post-operatively for primary molars with necrotic pulps and irreversible pulpitis.

IMPLICATIONS FOR PRACTICE

The results of the trial suggest that dentist preference for the material of their choice should not affect the outcome as all three materials showed equivalent clinical performance.

Reference

1. Pramila R, Muthu MS, Deepa G, Farzan JM, Rodrigues SJL. Pulpectomies in primary mandibular molars: a comparison of outcomes using three root filling materials. Int Endod J. 2016; 49:413-21.

2. Efficacy of mepivacaine–tramadol combination on the success of inferior alveolar nerve blocks in patients with symptomatic irreversible pulpitis: a randomized clinical trial.

Rodríguez-Wong L, Pozos-Guillen A, Silva-Herzog D, Chavarría-Bolaños D. Int Endod J. 2016; 49:325-33.

Mepivacaine is an amide-type anaesthetic that is recommended for cases in which systemic conditions restrict the use of other anaesthetics.[1] Tramadol hydrochloride is a centrally acting drug with a mechanism that is not fully understood. Tramadol hydrochloride is used for the management of acute and chronic pain, and it is effective in moderate-to-severe pain with low addiction incidence.[1]

In the last decade, it has been proposed that the use of other drugs, such as nonsteroidal anti-inflammatory drugs (NSAIDs), opioids and tramadol, could be used as adjuncts to anaesthetics to obtain a higher success rate and longer duration of the anaesthetic effect under the concept of multimodal analgesic or pharmacological synergism[1] However, oral administration of drugs can cause adverse systemic effects and that is why local application is an alternative that increases the concentration on the damaged tissue locally, reducing the possibility of interactions with other drugs and their adverse effects[1].

The inferior alveolar nerve block (IANB) is the most common anaesthetic technique used on mandibular teeth during root canal treatment. Several studies have reported a 30–80% failure rate for IANBs in patients with symptomatic irreversible pulpitis (SIP)[1]. Rodríguez-Wong and colleagues (2016)[1] undertook a randomized double-blinded trial to compare the success of an inferior alveolar nerve block after applying a combination of mepivacaine and tramadol or mepivacaine alone in patients with symptomatic irreversible pulpitis in mandibular permanent molars. The null hypothesis was that the combination of mepivacaine–tramadol will not increase the success of the IANB in patients with SIP.

MATERIALS AND METHODS

This Mexican study was a double-blind, randomized clinical trial. Seventy-four patients were pre-selected to participate according to a preoperative pain scale and preliminary clinical evaluation following the guidelines suggested by the CONSORT group for planning and reporting clinical trials; 56 patients were included and 18 were excluded. Inclusion criteria were as follows: age 18 years or older, acute moderate-to-severe preoperative pain in the posterior mandibular region, SIP in a first or second mandibular molar, no intake of analgesics for 12 h prior to the treatment and acceptance and signing of the consent form. The exclusion criteria were as follows: pregnancy, allergy to tramadol or mepivacaine, poor tooth integrity for restoration, periodontal disease, root resorption, root fracture, systemic diseases such as diabetes and uncontrolled hypertension, intake of drugs or narcotics and patients with sensory impairment or paraesthesia. The elimination criteria were teeth with necrotic pulps found

after diagnosis and during endodontic access (partial necrosis), intraoperative accidents such as perforations or crown fractures and patients who decided to withdraw from the study.

Initially, preoperative pain was scored using a modified Heft-Parker VAS of 100mm with 11 measurement points for determining the intensity of pain, where the end-points were the extremes of no pain and the worst pain (0–10, respectively). A previously calibrated independent clinician performed the initial diagnosis. Diagnostic tests were performed by applying thermal cold testing with a cold spray (Endo-Ice) on a cotton pellet in the middle third of the buccal surface of the tooth until the patient responded (maximum 7). The patient was asked to indicate the intensity and the duration of the thermal sharp sensation once identified. Equivocal or confusing responses to cold test were recorded, and these patients were excluded from the study. SIP was diagnosed if there was a prolonged response to the cold test, when compared to the control contralateral tooth. In addition, the diagnosis was complemented with the absence of radiographic evidence of periapical pathosis.

Patients were assigned sequential numbers in the order of enrolment and received their allocated treatment according to a computer-generated randomization schedule prepared before the start of the study. Patients were randomized using the block randomization method to obtain equal sample sizes in each group. This method keeps a balance in number of subjects in each group across the study. The block size was determined as four.

The control group (mepivacaine) received the IANB using 1.8mL of mepivacaine 2% 1:100 000 epinephrine, and the experimental group received 1.3mL of mepivacaine 2% 1:100 000 epinephrine mixed with 0.5mL of tramadol 50mg mL–1. The anaesthetic was injected with a metallic syringe with a 27-gauge 1.25-inch needle. All of the anaesthetic cartridges had the same appearance to blind both operator and patients.

The same operator carried out all the anaesthetic blocks by a direct (Halsted) approach, and an independent investigator carried out the evaluation of the treatment.

After 15 min, a progressive four-step examination was performed to analyse the success of the IANB in both groups as follows: lip numbness was determined and compared with the contralateral lip. Isolation of the target tooth was carried out, and a second cold test was performed to determine the presence or absence of a painful response. Then, endodontic access cavities were prepared to confirm a painful response in hard tissues (enamel, dentine or restorations). Finally, canal negotiation was performed to confirm profound anaesthesia in the pulpal tissues. If the patient reported any pain or discomfort during any evaluation, the anaesthetic blockade was categorized as a failure, and the patient received a second cartridge of mepivacaine as a repetition of the IANB or the intrapulpal technique. Only patients with no response advanced to the next examination test, and anaesthetic success was defined as no response during the whole diagnostic process. Only those patients with no response (or a zero value on VAS) in all of the sequential four-step examinations were considered as an anaesthetic success.

Patients were monitored 24 h after the procedure to assess the duration of the anaesthetic effect, the consumption of postoperative analgesics and side effects. The patient received three tablets of ibuprofen 600 mg and one tablet of sublingual ketorolac 30 mg for emergency and rescue medication, respectively, in case they experienced pain after treatment.

RESULTS

Of the 74 patients who were evaluated, 56 patients were included and 18 excluded. No significant differences between the experimental and control groups were found for gender ($P > 0.05$), age ($P > 0.05$), duration of treatment ($P > 0.05$), intensity of preoperative pain ($P > 0.05$) and pain produced by the injection ($P > 0.05$). Therefore, the groups were considered homogeneous. After administration of the inferior alveolar nerve block (IANB), all of the patients reported lip numbness, except one patient in the control group. The anaesthetic success was 57.1% for the experimental group and 46.4% for the control group with no significant difference ($P = 0.05$). There was a significant difference ($P < 0.05$) in the duration of the anaesthetic effect, with higher values in the experimental group (142 min). No patient in either group reported adverse effect.

CONCLUSION

The combination mepivacaine–tramadol solution achieved similar success rates for the inferior alveolar nerve block (IANB) when compared with mepivacaine 2% epinephrine 1 : 100 000. There was no significant difference in the anaesthetic efficacy between the control and experimental solutions, and none of the solutions tested were completely successful.

IMPLICATIONS FOR PRACTICE

The addition of a pain control medication in the local anaesthetic did not improve the performance of the local anaesthetic in patients who were undergoing root can treatment for symptomatic irreversible pulpitis (SIP).

Reference

1. Rodríguez-Wong L, Pozos-Guillen A, Silva-Herzog D, Chavarría-Bolaños D. Efficacy of mepivacaine-tramadol combination on the success of inferior alveolar nerve blocks in patients with symptomatic irreversible pulpitis: a randomized clinical trial. Int Endod J. 2016; 49:325-33.