DENTAL ANESTHESIA

Supplementary anesthesia for endodontic procedures

Check for updates

BACKGROUND

Although adequate anesthesia is essential during endodontic procedures, dental anesthetic injections don't provide sufficient anesthesia in many cases. When the primary injection fails, supplemental anesthesia is often used. The most commonly used supplemental injections are intraligamentary and intraosseous injections, with intraligamentary injection considered a viable supplement after a failed inferior alveolar nerve block (IANB). A comparison of the anesthetic efficacy of 4% articaine and 2% lidocaine given as supplemental intraligamentary injections after a failed IANB was performed.

METHODS

A total of 106 adult patients participated. All had symptomatic irreversible pulpitis in a mandibular first or second molar. These patients first received an IANB with 2% lidocaine with 1:80,000 epinephrine. Pain levels were measured using a visual analog scale (VAS). Eighty-two patients with insufficient pain relief were randomly assigned to receive a supplementary intraligamentary injection of 4% articaine with 1:100,000 epinephrine or 2% lidocaine with 1:80,000 epinephrine. Endodontic treatment was then resumed. Successful pain relief was defined as no or mild pain with either the primary or supplementary injection. In addition, heart rate was monitored via finger pulse oximeter.

RESULTS

All patients reported profound lip numbness. The success rate for the initial injection was 19%. Among the patients who received the supplementary injections, those receiving the 4% articaine had a success rate of 66%, but those receiving 2% lidocaine had a success rate of 78%. The difference was not statistically significant.

The heart rate monitoring began at the end of intraligamentary injection and consisted of measurements every 15 seconds. Mean heart rate increased immediately after injection in both groups, but the increase did not reach significant levels.

DISCUSSION

The results in terms of pain relief for the 2 intraligamentary injections were not statistically significantly different. Both solutions improved success rates with no significant increase in heart rate.

Clinical Significance

The use of supplementary intraligamentary anesthesia after failed IANB is not an uncommon procedure, since the initial block is often unable to achieve complete pain relief. Either articaine or lidocaine for this supplementary injection produces much higher rates of success in terms of relief of pain.

Aggarwal V, Singla M, Miglani S, et al: Efficacy of articaine versus lidocaine administered as supplementary intraligamentary injection after a failed inferior alveolar nerve block: A randomized double-blind study. *J Endod* 45;1-5, 2019

Reprints available from V Aggarwal, Dept of Conservative Dentistry and Endodontics, Faculty of Dentistry, Jamia Millia Islamia, New Delhi, India; e-mail: drvivekaggarwal@gmail.com

Reducing dental anxiety

Check for updates

BACKGROUND

Dental fear leads patients to delay having needed dental procedures, which produces increasingly worse oral health, making the ultimate dental appointment an extremely anxiety-provoking experience. All of this does nothing to alleviate the patient's fear. The aspect of dentistry that usually produces the greatest anxiety is the dental injection. Dental practitioners have tools and skills to make injections less painful and reduce patients' anxiety.

TOPICAL ANESTHETIC

The use of a topical agent, usually 20% benzocaine or lidocaine with a flavoring agent, is often overlooked or minimized in dental practices. Dental practitioners may find it ineffective, and it does not provide complete relief of pain, but it does work well on mucous membranes. Oral injections begin in the mucous membranes, so topical anesthetic application should be reconsidered (Box 1).

Box 1. Pharmacology of Local Anesthetics. A.L. Frankhuijzen.

	Onset of Action After	Duration of Action	Effectiveness
Articaine	5 min.	1–3 hrs.	3
Bupivacaine	8 min.	3–7 hrs.	16
Lidocaine	5 min.	0.5–2 hrs.	4
Mepivacaine	3 min.	2–2.5 hrs.	2
Prilocaine	2 min.	0.5–1 hr.	1

(Courtesy of Haddad F: Pain-reducing techniques for delivery of dental anesthesia. *Dent Econ* 108:72-75, 2018.)

Techniques

Topical anesthetic that is applied to a wet site will dissolve with minimal penetration into the tissue. The patient will, however, usually complain of the taste and the numbness of his or her throat. For topical anesthetic to work well, the mucous membrane should be as dry as possible, which is accomplished using an air/water syringe. Once the site is dry, the topical anesthetic will remain in place.

A cotton-tipped applicator is used to place the topical agent where it is needed, then the dentist should apply pressure to the site for 30 seconds. This allows the topical anesthetic to penetrate more deeply into the mucous membrane and reduces the blood supply to the injection site, which can significantly reduce the pain.

Although topical anesthetic is effective in most oral areas, it's less reliable for palatal injections because of the thicker epithelium in this area. To address the problem, the dentist should apply pressure with a finger or the edge of a mirror immediately before the injection until the tissue is noticeably blanched. It's advisable to maintain pressure for 5 seconds and begin the injection while the tissue is blanched. As the injection is being given, the pressure can be slowly released, which allows more space to accommodate the anesthetic solution.

In addition to the gel form of topical anesthetic, there are sprays, creams, and patches. Dentists should try each one to see what works best for him or her. Used properly, topical anesthetic can reduce the pain of an injection. Use of the topical agent can also have a psychological effect, so that the patient anticipates he or she will experience less pain.

PSYCHOLOGICAL TOOLS

Patients who have high levels of dental anxiety anticipate pain, which increases the intensity of the pain that occurs. Positive reinforcement during the injection can reduce dental anxiety.

The dentist should begin by talking to the patient. This allows him or her to evaluate the patient's level of anxiety. Telling the patient that the procedure will be nearly painless or will take a bit longer but will have minimal pain can reduce the patient's anticipation of the pain associated with the procedure. In addition, just before the injection, the dentist should ask a distracting question or make a distracting comment. By asking the patient to open as wide as possible just before the injection, the dentist not only distracts the patient but also creates tension in the tissue at the injection site, which significantly reduces the pain associated with the insertion of the needle.

The dentist should also make positive, reinforcing statements to the patient during the injection procedure. The patient should hear that everything is going well and the procedure is nearly complete. If a topical anesthetic has been properly used, the patient may not even feel the needle insertion and may not know when the procedure began. When the patient realizes that the injection is already underway and they aren't experiencing pain, pain anticipation can be minimized.

Once the injection is completed, the patient should be told that it will take 5 or 10 minutes for the anesthesia to be complete. Knowing that the dentist will wait to begin the procedure often reassures the patient further and reduces anxiety, which allows more profound anesthesia to be achieved.

INJECTION TECHNIQUES

Once the needle tip is inserted, the dentist should inject a small amount of anesthetic to reduce the pain of further insertion. The needle should be advanced slowly while the slow injection of anesthetic continues. About a quarter of a carpule is used to reduce the pain associated with advancing the needle.

Once the needle is near the targeted area, the rest of the carpule can be slowly injected. Keeping it slow will allow the tissue to absorb the anesthetic and avoid creating a large bolus of solution. Less pressure on the innervation of the target site will reduce the patient's pain experience.

When the anesthetic has been injected to the desired degree, the needle is removed via the path of insertion. The presence of the anesthetic should allow for painless removal.

Gating Technique

The gating technique is based on the belief that the brain cannot process the signals of pain and proprioception simultaneously.

Clinical Significance

Simple techniques can be used to manage patients who are anxious and fearful of dental procedures. The injection of anesthesia is often the aspect most feared by patients, so methods to take the pain out of the process are extremely valuable. Once a patient no longer fears the injection procedure, it's more likely that he or she will take better care of his or her dental health, including keeping regular dental appointments. The dentist benefits by having a more cooperative, less fearful patient, which makes the entire care delivery process easier.

The technique consists of vibrating the needle during the injection process. Devices are available that can help in accomplishing this, but simply shaking the patient's cheek with a mirror during injection can mimic the effects. If the patient is anxious, the dentist may want to begin shaking the patient's cheek before beginning the injection, which will distract the patient as he or she tries to understand why it's being done. This can also relieve anxiety. The gating technique should be maintained throughout the injection.

Haddad F: Pain-reducing techniques for delivery of dental anesthesia. *Dent Econ* 108:72-75, 2018

Reprints not available

DENTAL TRAUMA

Reattaching tooth fragments

Check for updates

BACKGROUND

When dental trauma (DT) results in loss of a fragment of tooth, fragment reattachment can help to preserve tooth structure and maintain the color, shape, and translucency of the original tooth. Children and adolescents are most often at risk for DT, which can cause crown fractures, injuries of the enamel and dentin, or fractures limited to the enamel. The trauma can occur when there is an accident at home or school, during sports participation, or as a result of violence or motor vehicle collisions. If treatment is not performed, esthetic, functional, or emotional damage can result. Because there are many approaches and materials used for fragment reattachment, a review of in vitro studies was undertaken to analyze which bonding technique provides the best bond strength (BS) for a tooth fractured by DT.

METHODS

A search of the PubMed, LILACS, Web of Science, Cochrane, and Scopus databases was done, as well as a review of the gray literature in Google Scholar and Open Grey and the reference lists of eligible studies. The goal was to identify in vitro studies that evaluated permanent human teeth fractured by trauma. The search yielded 21 studies covering 119 in vitro experimental groups for analysis. The experimental groups were divided according to the technique and the materials used, as well as whether the fragment was rehydrated and according to which time periods and solutions were used. Ten different kinds of preparation techniques were analyzed: no preparation, chamfer, bevel, post-anchors, overcontour, internal groove, and variations of these techniques. Different materials were used to perform each technique for bonding of the fragment to the tooth remnant. After bonding, the tooth was subjected to fracture simulation and BS value was determined.

RESULTS

BS Value Results

The best results in terms of BS were obtained for reattachment without further preparation and using an adhesive system involving an intermediate composite with good mechanical properties. The results for each preparation are as follows:

1. In cases with no preparation, the highest BS values were obtained for a 2-step adhesive system and flowable resin.
2. When no preparation was done with chamfer after reattachment, the results were less favorable than for the 2-step adhesive system and flowable resin.
3. When no preparation was done with an adhesive system and microhybrid composite resin, the BS values were also less than no preparation with a 2-step-adhesive system and flowable resin.
4. Removal of the dentin portion of the fragment followed by chamfer had the best results when an adhesive system and microhybrid resin were used.
5. For the bevel technique, BS was highest when an adhesive system and a nanocomposite were used.
6. A variation of the bevel technique used an overcontour with an adhesive system and microhybrid composite resin and achieved a medium-range BS value.
7. With an anchorage system, the best BS was achieved using mini anchors of prefabricated composites reinforced by glass fibers, an acid etchant, a primer, and a luting resin cement.