

The ‘Painless Injection: An Oxymoron?’

Fred S. Margolis

Introduction

Ask any parent what one thing they would appreciate their child’s dentist to be able to do when restoring their child’s teeth and they would probably answer; “give injections that don’t hurt.”

Can painless anesthesia be delivered? Can local anesthesia be provided in a painless manner and in such a way that the child does not have anesthesia to the lip, tongue, and cheek? Can profound anesthesia be provided without the worry about toxicity from the local anesthesia being administered? Can painless injections lead to less stress and anxiety for the patient, parent, and dentist?

The answer is “yes” to all of these questions, and the author will review several tricks and techniques for providing less painful dentistry, using less anesthetic and without the post-op numbing effects of mandibular blocks and maxillary infiltrations.

Topical Anesthetics – do they work?

The dentist should take the time to try topical anesthetics in their own mouth to ascertain:

How does it taste?

How long does it take to numb the tongue - 30 seconds, 60 seconds, etc.?

If a topical anesthetic is to be used, it should be used effectively and left on the mucosa for the optimal time period. There are safe and extremely effective compound topical anesthetics available. The author uses a formulation of tetracaine, lidocaine, and prilocaine that has helped dentists perform pain-free injections. Several methods are available which provide less painful anesthesia without the concomitant numbing of the patient’s lip, tongue, and/or cheek. These include:

- 1) Erbium Laser
- 2) Intrasulcular anesthesia
- 3) STA system

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The Erbium Laser:

The Erbium laser can provide laser “conditioning” as the author has coined the word for laser analgesia. Over 90% of patients in his practice do not require local anesthesia for cavity preparations, pulp therapy and stainless steel crown preparations. Teenage patients report that they feel a “tingling” or “cold” sensation while their teeth are being prepared. The author has used the Erbium laser in his pediatric practice for over eight years and his patients and their parents are very pleased to have this more comfortable method for preparing their child’s teeth.

Intrasulcular Injection Technique – the periodontal syringe:

There are several dental manufacturers that offer periodontal ligament injection syringes. The periodontal ligament syringe has the benefit of offering the dentist the ability to anesthetize one or several teeth, without the use of block anesthesia. An example would be the use of a periodontal syringe to anesthetize a primary molar or bicuspid by placing the needle into the sulcus and injecting slowly when the tip of the needle is at the crestal bone. This allows the practitioner to provide anesthesia without going into the periodontal ligament space and therefore preventing post-operative pain. In using this technique for over 15 years, the author has found this technique will anesthetize an individual tooth in less than one minute and not have the concomitant “numb” lip, tongue, and cheek.

The use of a plastic-hubbed 30 gauge needle will hermetically seal the anesthetic solution without allowing the solution to drip into the mouth. The advantage of the covered anesthetic carpule as is incorporated in the Paraject™ (Septodont, New Castle, DE) is protection in case of accidental breakage of the glass carpule when excessive pressure is applied.

Intraligamentary Anesthesia – STA system

The STA™ (Milestone Scientific, Livingston, NJ) (Single



Figure 1: Post-anesthesia Lip Biting.



Figure 2: Waterlase MD™ "Conditioning" the tooth.

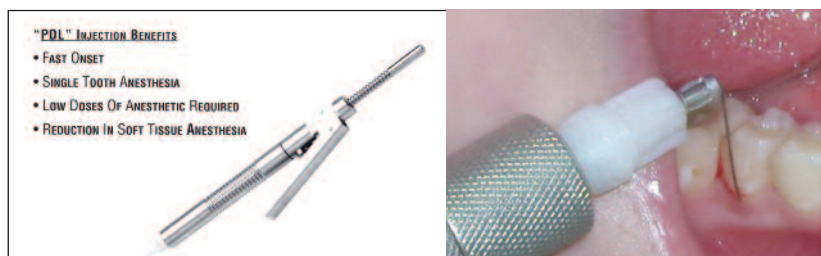


Figure 3: Periodontal ligament injection technique.

Tooth Anesthesia) device has excellent benefits for both the dentist and the patient:

- 1) Computerized control of the flow rate of anesthetic delivery and the pressure applied when giving the injection
- 2) Computerized dosage of the amount of local anesthesia injected
- 3) Specially designed needle specific for the intraligamentary injection
- 4) Rapid onset of anesthesia
- 5) Only the tooth and surrounding gingiva is anesthetized
- 6) Can be used for AMSA and P-ASA block anesthesia, if desired
- 7) Less anesthesia required and therefore no worries about toxicity
- 8) Multiple quadrant dentistry – saves time and increases production

Ashkenazi, et al, in a study of 193 children aged 2 to 13 years old found that; "Most children exhibited low pain-related behavior during anesthesia administration" when using computerized delivery of intrasulcular anesthetic in primary molars¹. A study by Oztas, et al, compared children's reactions to an inferior alveolar nerve injection with a traditional syringe and a periodontal ligament injection with a computerized device, the Wand™

(Milestone Scientific), assessed the efficacy of the anesthesia and the patient's reaction after treatment. "The overwhelming majority of patients favored the periodontal ligament injection with the Wand™².

Fear of the injection and the dental procedures:

Jalevik, et al, point out in their study, where the sensation of pain was compared utilizing the Wand™ versus conventional local anesthesia techniques, that "computerized injection technique ... was less painful compared to conventional injection techniques especially among those who reported fear for injections³."

An advantage of the STA system is that the Wand handpiece does not look like a typical local anesthetic aspirating syringe, but resembles a pen with a length of tubing attached. (Figure 5)

Which local anesthetic should be used?

Clinical studies have shown that the use of 4% Articaine can increase the probability of success for the intraligamentary injection⁴. This has been shown to provide effective pulpal anesthesia in scientific studies⁵.

One of the advantages of utilizing the 4% Articaine 1:200,000 vasoconstrictor is that only half the time will be



Figure 4 STA™ Periodontal Ligament Injection.

required to perform the injection compared to the 2% lidocaine, according to Mark Hochman⁶.

How does the STA system work?

The STA-Intraligamentary Injection uses the PDL space as the injection site. Using the ControlFlo rate, anesthetic solution travels via the periodontal ligament and associated "space" through the cribriform plate into the medullary bone surrounding the apical region of the tooth achieving predictably successful anesthesia with almost immediate onset and significantly longer duration of anesthesia.

By providing real-time visual and audible feedback using DPS (Dynamic Pressure Sensing technology, the STA allows the dentist to accurately identify the intraligamentary tissue. Throughout the injection, the DPS continuously monitors the pressure during all phases of the administration to insure proper needle position.



Figure 5: STA™ System.

What other dentists are reporting with the use of the STA system:

William Lieberman, past president of the American Society of Dentistry for Children, has noted that by utilizing the STA™ device, lip biting post-anesthesia, has been eliminated. He also noticed that his patients were more cooperative due to less stress and fear as they did not even realize that they were having an injection⁷. Marty Jablow, a general dentist and lecturer on high-tech dentistry, has been quoted as saying: "The STA™ allows me to begin every injection technique with significantly less stress for me and my patient⁸."

What are the benefits of the STA System:

- Rapid on-set which allows you to get right to work, no waiting
- Longer duration due to increased volume
- Comfortable because no numbness felt by the patient
- More comfortable than the traditional dental needle

Conclusion

The "Golden Age" of Dentistry is the here and now when it comes to being able to have many innovations that are available. This allows clinicians to practice pain-free dentistry, to increase their livelihood by practicing multi-quadrant dentistry, and leads to increased patient satisfaction.

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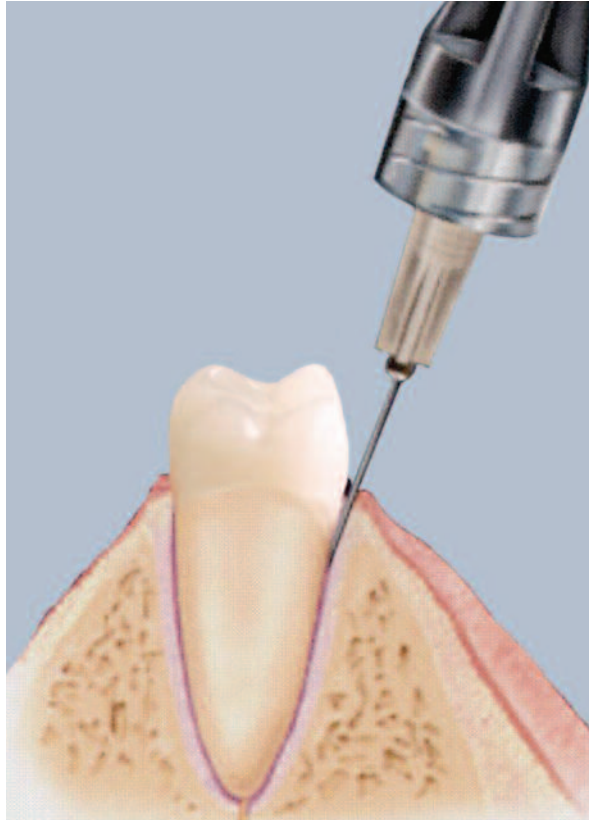


Figure 6: Injection with the STA needle into the intraligamentary space.

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