

Journal of Advanced Medical and Dental Sciences Research

@Society of Scientific Research and Studies

NLM ID: 101716117

Journal home page: www.jamdsr.com

doi: 10.21276/jamdsr

Index Copernicus value = 85.10

(e) ISSN Online: 2321-9599;

(p) ISSN Print: 2348-6805

Review Article

Recent Advances in Local Anesthesia Delivery Systems: A Review

Yogesh Santoba Nagargoje¹, Garima Sharma², Siddharth Narula³, Girish Kumar⁴, Deepak Mahla⁵, Namrata Mahajan⁶

1. Post Graduation Student, Department of Prosthodontics Crown Bridge and Implantology, Rajasthan Dental College and Hospital, Jaipur, Rajasthan;
2. Post Graduation Student, Department of Prosthodontics Crown Bridge and Implantology, Rajasthan Dental College and Hospital, Jaipur, Rajasthan;
3. Prof. & HOD, Department of Prosthodontics Crown Bridges and Implantology, Rajasthan Dental College and Hospital, Jaipur, Rajasthan;
4. Associate Professor, Department of Prosthodontics Crown Bridges and Implantology, Rajasthan Dental College and Hospital, Jaipur, Rajasthan;
5. Associate professor, Department of Prosthodontics Crown Bridges and Implantology, Rajasthan Dental College and Hospital, Jaipur, Rajasthan;
6. Assistant professor, Department of Prosthodontics Crown Bridges and Implantology, Rajasthan dental college and Hospital, Jaipur, Rajasthan

ABSTRACT:

For managing and preventing pain, the local anesthetic drugs presently available in dentistry are the safest and also most effective drugs in all of medicine. Patients' fear of injections and the perception that these are painful is the only drawback associated with the intraoral local anesthesia. The advent of recent advances has made the use of computer-controlled local anesthetic delivery vehicles in order to regulate the delivery and also the rate of flow of local anesthetics at the injection site, thereby reducing the potential discomfort associated with the injections. In the present article, the new injection techniques and the local anesthesia delivery systems that provide appropriate anesthesia have been discussed.

Keywords: Local anesthesia, dental pain, recent advances

Received: 02/07/2020

Modified: 23/07/2020

Accepted: 24/07/2020

Corresponding Author: Dr. Yogesh Santoba Nagargoje, Post Graduation Student, Department of Prosthodontics Crown Bridge and Implantology, Rajasthan Dental College and Hospital, Jaipur, Rajasthan

This article may be cited as: Nagargoje YS, Sharma G, Narula S, Kumar G, Mahla D, Mahajan N. Recent Advances in Local Anesthesia Delivery Systems: A Review. J Adv Med Dent Scie Res 2020;8(8):88-90.

INTRODUCTION:

According to the IASP: pain can be defined as an unpleasant sensory and emotional experience associated with actual or potential tissue damage or described in terms of such damage.¹ Worldwide, the successful management of pain is one of the most important cornerstones in the medical and dental field. It is the pain which mostly brings the people to a dentist.

However, for a dentist, the pain is like a double-edged sword, because of the reason that the pain which brings the patient to dentist is the same that takes away the same due to fear and anxiety caused by pain in various dental treatments. In order to eradicate the pain during any treatment procedures, usually anesthesia have to be administered. The word Anesthesia is a compound word from the Greek words an- ("without") and aesthesis

(“sensation”).² In 1980, local anesthesia defined by Stanley F Malamed as a loss of sensation in circumscribed area of the body caused by a depression of excitation in nerve endings or inhibition of the conduction process in peripheral nerves.³ Conventionally as well as even today, anesthesia is being administered by the injections. This fear related to injections has been recognized as the most difficult aspect of the patient management.⁴ Thereby, it can be a barrier for delivering a successful treatment. The continuous challenge that has been faced by the dentist is to find a more comfortable means of administering local anesthetics without much invasion of soft tissues and thereby less painful. Although, a painless injection is practically impossible, however, with the advent of the new techniques, needles and anesthetic gels, there can be relieve in the discomfort caused by the conventional methods up to a large extent. Even after a thorough advancements in the field of local anesthesia, painless injection is still a dream.

TOPICAL ANESTHETICS:

For an a traumatic administration of local anesthesia, topical anesthesia is an important component. Topical anesthesia reduces the discomfort that is associated with the insertion of needle before injecting the local anesthetic solution. They are available in liquid, gel, pressurized spray and in ointment form. There is no vasoconstrictor in topical anesthetics and hence vascular absorption is rapid, and the blood levels may quickly reach those achieved by direct IV administration. The effectiveness of a topical anesthetic is only on the surface tissues i.e., 2 to 3 mm. A small adhesive patch, Dentipatch promises relief from dental pain up to 45 minutes contains lignocaine.⁵

RECENT ADVANCES

Transcutaneous Electrical Nerve Stimulation (Tens):

It is an electroanalgesia and have been used for simple restorations and also for periodontal procedures. Two mechanisms have been explained, one is that TENS stimulate the release of the endogenous opiates of body, while the other is based on the Melzack and Wall’s gate control theory.⁶

Computer - Controlled Local Anesthetic Delivery System⁷:

The standard dental syringe is a simple mechanical drug delivery device which had been introduced by Charles Pravaz in 1853 and it requires the simultaneous attempt by the operator to control the variables of drug infusion and also the movement of the penetrating needle. An injection technique can be compromised if the operator is unable to precisely control both of these activities during an injection.

Moreover, a palm-thumb grasp of the traditional syringe is not designed for the ideal ergonomics or needle control during the injection. The first computer-controlled local anesthetic delivery system (CCLAD) was introduced into dentistry in 1997. The WAND which was designed to improve on the ergonomics and precision of the dental syringe manufactured by Milestone Scientific, Inc, Livingston, NJ. The core technology comprised of an automatic delivery system of the local anesthetic injection at a fixed pressure and volume ratio regardless of the variations in the tissue resistance. This resulted in a controlled, highly effective as well as comfortable injection even in the resilient tissues like periodontal ligament and the palate. Due to the computer-controlled delivery of local anesthetic, flow rates remain consistent from one injection to the next. There has been a significant change in the manner of administration of local anesthetic injections by the CCLAD system. The attention of the operator focuses on the needle positioning and insertion, thereby allowing the motor in device to administer the drug at a preprogrammed flow rate. In many clinical studies which had been conducted with this device in dentistry, it has been observed that it is likely that greater ergonomic control coupled with fixed flow rates are responsible for an improved injection experience. CCLAD which are currently available are: The WAND/CompuDent system, Quick sleeper, Comfort Control Syringe. A.M. Palm states that mandibular alveolar nerve block analgesia seems to be less painful when using the wand than when using a traditional syringe.⁸

Comfort Control System (CCS): The Comfort Control Syringe (CCS) system was introduced several years after the Wand and it attempts to improve on the concept of CCLAD. CCS is an electronic and preprogrammed delivery system that provides the control to the operator which is needed to make the experience of the patient's local anesthetic injection as pleasant as possible. As with other CCLADs, this is achieved by slow deposition of the local anesthetic and consistently than it is manually possible. Both CCS and traditional anesthesia were rated similarly on the basis of level of anxiety, comfort with the injection, the profoundness of anesthesia and overall experience.⁹

Electronic Dental Anesthesia (EDA): The contraindications for the use of EDA are same as those for TENS, which include the patients with prior history of the cerebrovascular accident (CVA) or other neurological disorders (epilepsy), patients with cardiac pacemakers and pregnant women. For many years, the Temporomandibular joint pain has been successfully treated by the dentists and physical therapists with TENS. Although in children of 6 to 12 years, EDA was

less effective than LA in controlling pain during cavity preparation.¹⁰

Syrijet Mark II System: National Keystone, Cherry Hill, NJ, USA manufactured this instrument and was developed to achieve the local anesthesia for dental procedures without the use of a needle. This is accompanied by delivering the anesthetic solution under high compressive forces.

Vibraject: A vibrating dental local anesthesia attachment has been introduced in recent years. This device has been developed on the basis of gate-control theory which states that the pain transmission through A-delta and C nociceptive fibers is suppressed at the level of secondary neuronal cell bodies in the dorsal horn if the nerve impulses are evoked by the tactile sensation which are simultaneously transmitted through A-delta fibers. Although, it was reported by Yoshikawa et al that the injection pain did not decrease when the Vibraject was applied with a conventional cartridge type dental syringe with a 30-gauge needle.^{9,10}

Intraligamentary Anesthesia – Sta System: Milestone scientific corporation has a new single tooth anesthesia device. It has computerized control of flow rate of anesthetic delivery and the pressure applied when giving the injection.¹⁰

The Intraflow System (IntraVantage): It is based upon a special low-speed handpiece that permits the perforation and injection with the hand piece in place.

CONCLUSION: Dentistry is fortunate in tin acquiring plenty of excellent agents for relieving the perioperative

as well as postoperative pain associated with the dental care delivery. Thereby, the modern-day dentist has a huge responsibility of knowing the variety of the anesthetic devices and techniques available till date. Moreover, a dentist procures great satisfaction when the goal of painless anesthesia is achieved and the patient is also happy with the improved quality of care.

REFERENCES:

1. Ray E Stewart, Thomas K Barber, Kenneth C Troutman, Stephen H.Y. Wei. Pediatric Dentistry Scientific foundations and clinical practice. 1stedition.
2. Anthony S. Mennito. Local Anesthetic review Jan 2006.
3. Stanley F. Malamed. Handbook of Local Anesthesia. 5th edition.
4. Guideline on use of local anesthesia for pediatric dental patients – council on clinical affairs – clinical guidelines – pediatric dentistry. Reference manual. 10/11; 32(6):156-162.
5. Steven Schwartz. Local anesthesia in pediatric dentistry. Continuing education course. Revised January 6 2012:1-31
6. Patch delivers longer, deeper relief from dental pain. Science Daily Apr 2, 2002.
7. Wayne Herman, Joseph Konzelman, Robert Comer. Using transcutaneous electrical nerve stimulation to prevent postoperative pain. J Am dent Assoc 2002; 133:643-645.
8. LA delivery system. Dental Product Spotlight. JADA, 2002; 133:106-107. 75
9. Palm A.M., Kirkegaard U., Poulsen S. The Wand Versus Traditional Injection for Mandibular Nerve Block in Children and Adolescents: Perceived and time of onset. Pediatr Dent. 2004; 26:481-484.
10. Grace E.G., et al. Computerized local anesthetic system: patient and dentist satisfaction. Journal of Dentistry 31, 2003; 9–12.