Advances In Dental Local Anaesthesia Delivery Devices

1Dr. Anushree Rawal, 2Dr. Puja Bansal, 3Dr. Deepak Bhargava

1Intern, 2Professor, 3Professor & HOD
1, 2, 3School of Dental Sciences, Sharda University, Greater Noida, Uttar Pradesh, India

Abstract: The safest and most efficient medications available today for the treatment and control of pain are local anesthetics. Since the first amide local anesthetic (LA), lidocaine HCl, was introduced in 1948, providing profound anesthesia for an extended period of time has been all but guaranteed. Researchers are searching for novel and improved ways to treat pain. The majority of research efforts are concentrated on developing anesthetic drugs, delivery systems, and associated techniques. Newer technologies have been created to help dentists provide improved pain management with less painful injections and fewer side effects.

Keywords: Dental anesthesia; local anesthesia delivery device; computer controlled local anesthetic delivery system

INTRODUCTION

The ability to administer local anesthesia (LA) safely and effectively is the most crucial competency required of all dental professionals. The most common cause of patient anxiety is likely the administration of local anesthesia. [1][2] Pain is a negative sensory and emotional feeling that is connected to existing or potential tissue damage or is expressed as such harm. Algiatry, another name for pain management, uses an interdisciplinary strategy to lessen suffering and raise people's quality of life. [3] Although Cook developed the contemporary dental syringe more than a century ago, several advances have only lately been introduced to the conventional drug delivery devices. These include the wand, vibrato-tactile tools such as the VibraJect, Accupal, Dental Vibe, Syringe Micro Vibrator, Jet Injections, and intra-osseous anesthetic systems such as the Stab Dent, X Tip, Interflows, Safety Dental Devices, Dent Patches, etc. [4]

RECENT ADVANCES IN LOCAL ANESTHESIA DELIVERY DEVICES [5]

- Vibrotactile devices
  - Vibraject
  - DentalVibe
  - Accupal
- Computer- Controlled local anesthetic delivery systems
  - Wand/ Compudent system
  - Comfort control syringe
- Jet Injectors
  - Syrient
  - MED- JET H III
- Safety Dental Syringes
  - Ultra Safety Plus XL Syringe
  - Ultra Safe Syringe
  - HypoSafety Syringe
  - SafetyWand
  - RevVac ™ safety syringe
- Devices for Intra- Osseous Anesthesia
  - Stabident
  - X- Tip
  - IntraFlow

Vibrotactile Devices:
- VibraJECT: It is a tiny, battery-powered add-on that attaches to the common dental syringe. It sends a strong enough high-frequency vibration to the needle for the patient to feel. [6]
- DentalVibe: DentalVibe, a freshly created device, vibrates when dental injections are given to stimulate the mechanoreceptors and minimize pain. The handheld, cordless device has a U-shaped vibrating tip that transmits percussive micro-oscillations to the injection site. [7]
- Accupal: It is a cordless device that uses pressure and vibration to treat the mouth mucosa. Michael Zweifler is the one who developed this device. Accupal applies pressure in addition to vibrating the injection site 360 degrees in the area where the needle punctured and shut the “pain gate.” After being placed at the injection site, the unit vibrates and light pressure is applied. The needle, which is inserted into a hole and has a disposable tip head, is attached to the battery-operated motor.[8]

Computer- Controlled Local Anesthetic Delivery System
The development of local anaesthetic delivery devices that used computer technology to regulate the anaesthetic solution's rate of flow through the needle started in the middle of the 1990s. Computer-controlled local anaesthetic delivery (CCLAD) is the name given to this idea nowadays. [9]

- **Wand/ Compudent system:** This technique allowed the operator to deliver the LA with a foot-activated control and precisely manipulate needle placement with fingertip accuracy. In comparison to a conventional syringe, the lightweight handpiece is held in a pen-like grip, giving the user more tactile sensation and control. Computer-controlled available flow rates for LA administration ensure consistency from one injection to the next. [10] [11]

- **Comfort-Control Syringe:** It consists mostly of a base unit and a syringe. Many of the unit's operations, most notably injection and aspiration, may be managed directly from the syringe, which might make it simpler for medical professionals used to the conventional manual syringe to get the hang of using it. The Comfort Control Syringe may be used for all injection procedures and has five pre-programmed speeds for various injection techniques. Specific applications, blocks, infiltration, PDL, IO, and Palatal areas govern this accordingly. [12]

**Jet Injectors**

By using mechanical energy to create pressure, jet-injection technology forces the solution through the aperture. It is quick and simple to administer, causes little to no discomfort, causes less tissue damage, has a faster rate of drug absorption, and reduces the risk of infection at the location. Due of their lower bone density, children are its primary users. [13]

- **Syrijet:** It allows the administration of a variable volume of solution ranging from 0 to 0.2 mL and is fully autoclavable. It accepts the standard 1.8 mL cartridges of LA solution to ensure the sterility of the solution. [14]

- **MED-JET H III:** Its capacity to use low pressure delivery techniques without sacrificing precision, convenience, and usability—while assuring patient comfort, environmental safety, and user affordability—is what makes the system special. [15]

**Safety Dental Syringes**

The safety needles protect the healthcare professional from needlestick injuries. As soon as the unique needle is taken out of the tissues, it is protected by a sheath. Safety needles like the Hyposafety syringe, Ultrasafety plus XL syringe, Ultrasafe syringe, SafetyWand syringe, and others are frequently used. [16]

The danger of an unintentional needle-stick injury to a dental healthcare professional after the administration of LA is reduced by using a safety syringe. These syringes have a sheath that ‘locks’ over the needle as it is taken out of the patient's tissues, eliminating unintentional needle sticks. [17]

**Devices for Intraosseous Anesthesia**

It entails injecting local anaesthesia right into the cancellous bone cavities next to the tooth or teeth that need anaesthetic. It offers pulpal anaesthesia with a quick onset. Stabident, X-Tip, and Intraflow are examples of devices frequently used in IO systems. Two methods can be used with these IO systems, which are two-step and one-step techniques. In two-step technique, a bur is first used to penetrate the bone using a slow speed handpiece, then local anaesthetic is placed. The one-step approach (IntraFlow™ Anaesthesia Delivery System) employs a slow-moving handpiece with a transfuser and perforator needle to penetrate the bone while simultaneously delivering anaesthesia. A foot pedal is used in the one-step approach to control the flow. [18]

**CONCLUSION**

One of the paediatric dentist's top priorities is pain management. The majority of patients typically fear needles and the agony they cause. The aforementioned strategies can be much more helpful for improving patient apprehension to overcome that. Additionally, it will raise the standard of care that the dentist can deliver. These methods can aid in fostering in children a pleasant attitude towards receiving dental care. Even if some of the methods require a lot of time and money, they are tried-and-true. It must be used in accordance with the treatment kind, viability, and user-friendliness.

**REFERENCES**