American Journal of Advanced Drug Delivery

www.ajadd.co.uk

Original Article

# The Wand: A Mini Review of an Advanced Technique for Local Anesthesia Delivery in Dentistry

**Dubey A*, Singh BD, Pagaria S, Avinash A**

Department of Pedodontics & Preventive dentistry, Rungta College of Dental Sciences, Bhilai (C.G), India.

Date of Receipt- 23/01/2014
Date of Revision- 28/01/2014
Date of Acceptance- 15/02/2014

**Address for Correspondence**
Reader & PG Guide, Pedodontics Department
Rungta Dental College, Bhilai, India.
**E-mail:** dentistalok @yahoo.co.in

## ABSTRACT

Pain is a complex multidimensional phenomenon. Among other factors psychological and physiological factors can affect pain response to a painful stimulus. Dental visits are often associated with anticipated pain, particularly when an injection is expected. Pain control is an important part of dentistry. WAND has been developed as a possible solution to reduce the pain related to the local anesthesia injection. WAND can be considered to be more comfortable and pleasant means of anesthesia before the dental procedures. This paper gives a review of the WAND technique and its effectiveness in a dental set up to lower or eliminates anxiety or fear related to needle prick while delivering anesthesia.

**Keywords**: Anxiety, Fear, Pain, Wand.

## INTRODUCTION

Pain is an unpleasant sensory emotional experience caused by noxious stimulus. Pain is a highly complex and multi dimensional phenomenon that energizes the organism, regardless of real or apparent tissue damage, to take action in relieving or alleviating its presence.[1] Pain experienced by the patient during injection can be twofold. First, tissue damage occurs during the actual perforation of the mucosa by the needle, and second, pressure is built-up by the infiltration of the injection fluid.[2]

Pain control is an important part of dentistry and particularly of pediatric dentistry. Fear-related behaviour has long been recognized as the most difficult aspect of patient management and can be a barrier to good care.[3,4]

One of the most important reasons children dislike dental treatment is the fear and anxiety related to the injection of local anesthetics.[5-7] Painful dental operations cause fear, whereas fear and anxiety increases the amount of perceived pain.[8]

In children, behaviour management is critical to the success of pediatric dental procedures. A relaxed and calm child during the administration of local anesthesia is important for the success of the clinical process as well. The challenge facing clinicians is to provide an environment that allows technically complex dental treatment, starting with the injection of local anesthetic, to be delivered without inflicting adverse psychological or physical harm to the child or others.[9]

There is a constant search for ways to avoid the invasive and often painful nature of the injection, and to find a more comfortable and pleasant means of producing local anesthesia before dental procedures. Although a totally painless injection seems impossible to achieve, techniques have been suggested to ease the discomfort of intra-oral injections, such as a prolonged injection time or warmed-up anaesthetic solution. None of these techniques have been able to offer a complete solution to the pain related to injections.[10] Other techniques have used instrumental approaches such as the use of computer-controlled local anaesthetic delivery systems.

## Computerized control local anesthesia delivery (CCLAD)

A computerized local anesthetic system has been developed as a possible solution to reduce the pain related to the local anesthetic injection.[11] The first of this CCLAD device, the Wand was introduced in 1997. The core technology is an automatic delivery of local anesthetic solution at a fixed pressure: volume ratio regardless of variations in tissue resistance. This results in a controlled, highly effective and comfortable injection even in resilient tissues such as the palate and periodontal ligament.[12] The Wand System (Milestone Scientific, Livingston, NJ, USA) consists of 3 components disposable hand piece component and a computer control unit and foot pedal. The hand piece is an ultra-light pen-like handle which is linked to a conventional anesthetic cartridge with plastic micro tubing. The Local anaesthesia delivery is controlled by computer control unit and foot pedal controls the rate of injection this is a commonly used in dentistry.[13] Bi-directional rotation of the needle during penetration is recommended by the manufacturer.[12] Maintaining an ideal flow rate of anesthetic solution is probably the major factor in achieving a comfortable anesthetic injection.[4]

## Rate of injection 13

- Slow-0.005 ml/s-needle insertion, PDL injection, Palatal administration
- Fast-0.03 ml/s-buccal infiltration, nerve block
- Turbo-0.06 ml/sec.

The first study reported in the literature on the use of the Wand in children was carried out in 1999 by Asarch *et al*.[14] The aim of that study was to compare the efficacy of computerised LA with the traditional syringe. The findings of that study showed no significant difference between the computerised and the traditional method. However, that study failed to target injection sites and control the existing differences in the duration of the two injection methods as specifically recommended by the manufacturer.

In a pilot study where low and high anxious children were examined, it was found that the dental injector preference was influenced by anxiety levels.[25]

In the mandibular arch, a safe and predictable periodontal injection technique may replace the need for an inferior alveolar block in numerous clinical situations.[26,27] Similar result was noted by oztas N in their

study comparing child reactions to inferior alveolar nerve injections with traditional syringe and traditional syringe with computerized device WAND.[4]

### Factors which can affect pain and distress behavior following Local anesthesia

- Site of injection and Area to be anaesthetized
- Level of anxiety in children
- Child preference-physical appearance of injection
- Rate of injection
- Presence of parents in the operatory[28]
- Sequential visit[29]
- Age of the child
- Experience of the operator[30]

### Computerized controlled local anesthetic delivery system other than Wand

Single Tooth Anesthesia System (STA System) introduced by Milestone Scientific in 2007, the STA system incorporates dynamic pressure-sensing (DPS) technology that provides a constant monitoring of the exit pressure of the local anesthetic solution in real time during all phases of the drug's administration and also to identify the ideal needle placement for PDL injections. The DPS system alerts the user if leakage of LA occurs that can be caused by improper needle placement, insufficient hand pressure on the syringe, or internal leaking from the cartridge/ syringe. Pressure of the LA is strictly regulated by the STA system, therefore greater volume of LA can be administered with increased comfort and less tissue damage.

### Rate of Injection

(i) STA mode: Single, slow rate of injection. (ii) Normal mode: emulates the Wand. (iii) Turbo mode: faster rate of injection-0.06ml/s.

### Comfort Control Syringe (CCS)

It consists of two components; base unit and syringe. Injection and aspiration can be controlled directly from the syringe. Rate of injection: Five different basic injection rate settings for specific applications: Block, Infiltration, PDL, IO and Palatal regions. Two stage delivery rates are used for every injection. LA solution is initially expressed at an extremely low rate; the rate slowly increases to the pre-programmed value for the selected injection technique after 10 seconds.[31]

## CONCLUSION

The Wand technique not only lowers the pain of injection, but also eliminates the visual stimulus of dental anxiety occurs due to dental syringes. However it has been found useful in children with low anxiety levels. It can be the essential equipment in dental armamentarium besides developing new injection devices, anxiety control through behavioural management techniques should be supported and encouraged for pain-free dental injections in children.

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**Table 1.** Various studies concerning the use of WAND

| Author | Sample size | Age group | Site of injection | Finding concerning usefulness of WAND |
|---|---|---|---|---|
| Gibson *et al* 2000[5] | 62 | 5-13 years | | Significant less disruptive behavior |
| Allen *et al* 2002[15] | 40 | 2-5 years | | Significant reduction |
| Primosch and Brooks 2002[16] | | | Palatal injection | Significant reduction |
| Ram and Peretz 2003a[17] | 102 | 3-10 years | | No significant reduction in pain and distress |
| Palm 2004[18] | 33 | 7-18 years | Mandibular nerve | Significantly less painful |
| Klein *et al* 2005[19] | 21 | 3-5 years | Maxillary anterior segment P- ASA[@] | Compu med device caused significantly less disruptive behavior |
| Ram and Kassirer 2006[20] | 138 | 24-24 months | Compared P-ASA[@], PDLi[#] and | Better behavior than conventional block infiltration |
| Versloot *et al* 2008[21] | 147 | 4-11 years | Infiltration | No significant reduction in pain and distress |
| Yesilyurt *et al* 2008[22] | 40 | 18-30 years | Inferior alveolar nerve | Significantly lower pain scores |
| Tahmassebi *et al* 2009[23] | 38 | 39-120 months | Maxillary local analgesia | No significant difference in level of pain and anxiety. |
| Kandiah 2012[24] | 30 | 8-16 years | Maxillary infiltration | No difference in pain infiltration |

[@]Palatal Anterior Superior Alveolar
[#]Periodontal ligament injections
[*]Conventional block injection