

# The Wand®

## Digitale Anästhesie

## Scientific studies



# The Wand®

## Scientific studies

M. Prothmann, et. al.: Oralprophylaxe & Kinderzahnheilkunde; 39 (2017)

### **Intraligamentary anaesthesia in paediatric dentistry. An alternative to conventional local anaesthesia techniques.**

**INTRODUCTION:** Most of the dental treatments applied in children are possible only under pain control. The world wide applied local anaesthesia methods infiltration and IANB anaesthesia cause, in addition to the anaesthesia effect, a numbness of cheek, tongue and lips that persists still a certain time after the end of the treatment. The risk to generate postoperative hurts is considerable.

**OVERVIEW:** The technical and clinical progress of the last 15 years led to the effect that- in addition to the mentioned local anaesthesia methods- the intraligamentary anaesthesia (ILA) became easily applicable and a primary dental -minimal invasive- local anaesthesia method. The application of this anaesthesia method also in dental health care for children is indicated. Injection syringes without integrated multistage lever systems such as the dosing wheel syringes or the electronically guided STA System, enable the operator to adapt his created injection pressure very sensibly to the individual anatomic situation of the patient- even of a child – and not to generate unwanted effects.

**OBJECTIVE:** The aim of this review was to evaluate the benefits of the intraligamentary anaesthesia in paediatric dentistry.

**Material and Methods:** The evaluation was based on a critical review of the scientific literature and own experiences.

**CONCLUSIONS:** Because the full sensitivity is completely restored nearly with the end of the dental treatment, with the intraligamentary anaesthesia the risk of postoperative hurts is not given. This local anaesthesia method should be favoured when treating children under pain control.

**Fazit:** Die konventionellen Lokalanästhesietechniken der Infiltrations- und der Leitungsanästhesie des N. alveolaris inferior können in der Kinderzahnheilkunde durch die intraligamentäre Schmerzausschaltung wegen der damit generierten systemimmanenten geringen Komplikationsgefahr (u.a. geringere Menge an benötigtem Anästhetikum, geringere Gefahr von Bissverletzungen post OP) häufig substituiert werden. Die in den letzten Jahren gewonnenen eigenen Erfahrungen mit der praktischen Anwendung der ILA bei Kindern bestätigen, dass diese Anästhesietechnik keinerlei Beeinträchtigungen während und nach der Behandlung verursacht. Durch die ILA wird keine nachweisbare Taubheit von Zunge, Lippen und Wangen generiert, sodass es auch nicht zu Bissverletzungen kommen kann. Dies ist ein wichtiger Vorteil der ILA gegenüber anderen Methoden der Anästhesie.

Re D. et. al.: J Invest Clin Dent; e12275 (2017)

### **Minimally-invasive dental anesthesia: Patients' preferences and analysis of the willingness-to-pay index.**

**AIM:** The aim of the present prospective study was to evaluate the impact of a computer-controlled anaesthesia on patients' comfort and to investigate, through the willingness-to-pay (WTP) index, and patients' acceptance of this new technology.

**METHODS:** Fifty patients undergoing a class I or II restorative procedure were enrolled. A computer-controlled device for anaesthetic delivery was utilized, and a questionnaire on the level of discomfort and WTP was given to all patients.

**RESULTS:** A total of 86% of participants declared less discomfort than that perceived during their last traditional procedure for pain control; 58% of patients were willing to pay an additional fee for a modern anaesthesia technique, with a median WTP value of 20\$.

**CONCLUSIONS:** Computer-controlled systems for local anaesthesia represent a relevant tool for reducing patients' discomfort during dental treatment. The WTP index helps to quantify its relevance.

**Fazit:** Vergleich The Wand®/STA Anästhesie mit herkömmlicher Technik: 86% der Studienteilnehmer hatten weniger Schmerz; 58% der Teilnehmer waren gewillt pro STA-Anästhesie bis zu 20 \$ aufzuzahlen.

Asokan S. et. al.: J Indian Soc Pedodontics & Preventive Dent; 33, 223-228 (2015)

### **Behavioral response and pain perception to computer controlled local anesthetic delivery system and cartridge syringe.**

**AIM:** The present study evaluated and compared the pain perception, behavioral response, physiological parameters, and the role of topical anesthetic administration during local anesthetic administration with cartridge syringe and computer controlled local anesthetic delivery system (CCLAD).

**DESIGN:** A randomized controlled crossover study was carried out with 120 children aged 7-11 years. They were randomly divided into Group A: Receiving injection with CCLAD during first visit; Group B: Receiving injection with cartridge syringe during first visit. They were further subdivided into three subgroups based on the topical application used: (a) 20% benzocaine; (b) pressure with cotton applicator; (c) no topical application. Pulse rate and blood pressure were recorded before and during injection procedure. Objective evaluation of disruptive behavior and subjective evaluation of pain were done using face legs activity cry consolability scale and modified facial image scale, respectively. The washout period between the two visits was 1-week.

**RESULTS:** Injections with CCLAD produced significantly lesser pain response, disruptive behavior ( $P < 0.001$ ), and pulse rate ( $P < 0.05$ ) when compared to cartridge syringe injections. Application of benzocaine produced lesser pain response and disruptive behavior when compared to the other two subgroups, although the result was not significant.

**CONCLUSION:** Usage of techniques which enhance behavioral response in children like injections with CCLAD can be considered as a possible step toward achieving a pain-free pediatric dental practice.

**Fazit:** Injektionen mit The Wand®/STA bewirkten weniger Schmerzreaktionen, kein abwehrendes Verhalten und keine erhöhte Pulsrate. The Wand®/STA bei Kindern ist ein wichtiger Schritt für eine schmerzfreie Behandlung.

Ram D. et. al.: J Clin Pediatric Dent; 16, 348-3551 (2006)

### **Assessment of a palatal approach-anterior superior alveolar (P-ASA) nerve block with The Wand® in pediatric dental patients.**

**OBJECTIVES:** The purposes of the study were to compare the reaction of children while receiving local anaesthesia for anaesthetizing maxillary incisors with a computerized device Wand: a periodontal ligament injection (PDLi) and a palatal approach-anterior superior alveolar (P-ASA) nerve block compared with a conventional buccal infiltration (CBI), and to assess the efficacy of the anaesthesia and children's reaction after treatment.

**METHODS:** One hundred and thirty-eight children aged 24-48 months participated in this study.

**RESULTS:** More children reacted negatively during injection while receiving the CBI and positively during the injection with the Wand. After treatment, significantly more children scratched the upper lip and/or the nose or complained of numbness of the region after the CBI ( $P = 0.000$ ).

**CONCLUSIONS:** Same effectiveness was achieved with the Wand and the CBI. Children displayed better behaviour during injection when they received local anaesthesia with the Wand than they did when the CBI was used. They did not scratch the upper lip/nose and/or cried after treatment when they received the PDLi and the P-ASA, whereas they did when receiving a CBI.

**Fazit:** Gleiche Wirksamkeit von The Wand®/STA und der traditionellen Injektion. Kinder haben bessere Akzeptanz während der Injektion mit The Wand®/STA gezeigt. Keine Taubheit der Oberlippe und Nasen.

Jalevik B. et. al.: Pan European Federation Journal; 13-16 (2006)

### **Sensation of pain when using computerized injection technique, The Wand®.**

Local anesthesia, especially palatal injection, is often associated with fear and anxiety. The aim was to compare the sensation of pain when using palatal block technique with computerized injection technique (CIT), to conventional infiltration technique with traditional syringe in surgical procedures involving the palate. Patients referred for bilateral minor maxillary surgical treatments were randomized for traditional infiltration anesthesia on one side and palatal block anesthesia with CIT on the other side. AMSA and P-ASA approaches were used with CIT. The sensation of pain was scored by the VAS scale. Twenty-eight patients were included in the study, where of 17 (61%) were girls. The median age was 14.8 yrs. (12.6 - 17.8). Bilateral

exposure of palatal impacted canines was the most common treatment. The injection pain was significantly lower, ( $p = 0.009$ ), when using the CIT injection compared to conventional injection. However, with time-consuming surgery, additional CIT analgesic solution had to be injected in the buccal gingiva when suturing, in one fourth of the cases. Patients sedated with nitrous oxide seemed to benefit less from CIT. Computerized injection techniques, including P-ASA and AMSA approaches, reduces the sensation of pain when carrying out less time-consuming palatal dental surgery, especially in non-sedated teenagers.

**Fazit: Bedeutend weniger Schmerz mit der The Wand®/ STA Anästhesie.**

Ashkenazi M. et. al.: JADA; 136, 1418-1425 (2005)

**Effectiveness of computerized delivery of intrasulcular anesthetic in primary molars.**

**BACKGROUND:** Pain measures associated with computerized delivery of intrasulcular anesthetic have not been reported. The authors evaluated a computerized delivery system for intrasulcular (CDS-IS) anesthesia in primary molars. **METHODS:** The study population consisted of children aged 2 to 13 years who received CDS-IS injections, 159 in mandibular molars and 48 in maxillary molars. Children were treated by one of three modes of behavioral management: behavior modification (BM) only, inhalation of nitrous oxide (N<sub>2</sub>O) in addition to BM or intrarectal sedation. Variables evaluated included the subjective perception of the child's well-being before and after administration of the anesthetic, the child's pain behavior during anesthetic administration, effectiveness of the anesthetic during dental treatment, incidence of reported postoperative dental pain (PDP) and analgesic use after the CDS-IS injections.

**RESULTS:** The effectiveness of CDS-IS anesthesia in mandibular molars was 97 percent, 92 percent, 63 percent and 71 percent for restorations, pre-formed stainless steel crowns, extractions and pulpal therapies, respectively (mean effectiveness, 89 percent). The effectiveness of CDS-IS anesthesia in maxillary molars was 96 percent, 50 percent, 92 percent and 78 percent, respectively (mean effectiveness, 90 percent). CDS-IS was less effective in children aged 2 to 4 years who received sedation than it was in older children. The authors found no differences between children's subjective self-reports of well-being before and after anesthetic administration, between the sexes and/or between modes of behavioral management (that is, BM or N<sub>2</sub>O). Most children exhibited low pain-related behavior during anesthetic administration, with no differences between boys and girls. The overall incidence of PDP was 31.4 percent; 64.9 percent of these patients received pain-relieving medications as a result, with no correlation to age, tooth treated, effectiveness of anesthesia or type of treatment.

**CONCLUSIONS:** CDS-IS is effective for anesthetizing primary molars, mainly for amalgam, resin-based composite and stainless steel crown restorations.

**Fazit: Die Wirksamkeit der STA Anästhesie ist besser als bei der herkömmlichen Leitungs- oder Infiltrationsanästhesie. Kinder bevorzugen eine The Wand®/ STA Anästhesie. Die STA Intraligamentär-Anästhesie eignet sich hervorragend für konservierende und prothetische zahnärztliche Behandlungsmaßnahmen.**

Versloot J. et. al.: European Journal of Oral Sciences; 113, 488-493 (2005)

**Computerized anesthesia delivery system vs. traditional syringe: comparing pain and pain-related behavior in children.**

The aim of this study was to compare the behavioral reaction of children who receive local anesthesia with a traditional syringe with the behavioral reaction of children who receive local anesthesia with a computerized device (Wand) and to differentiate between the reactions of highly anxious children with those displaying low anxiety. One hundred and twenty-five children aged 4-11 yr were randomly allocated to receive local anesthesia with the Wand or a traditional injection. Parents completed the Dental Subscale of the Children's Fear Survey Schedule (CFSS-DS). Two independent observers scored videotapes of the anesthesia in 15-s intervals. The occurrence of muscle tension, crying, verbal protest, movement, and resistance was registered and a score was given on the Venham distress scale. The mean injection time with the Wand was four times as long as with the traditional syringe. During the first 15 s of the injection, low-anxious children receiving local anesthesia with the Wand displayed less muscle tension, less verbal protest and less movement than children receiving local anesthesia with the traditional syringe. Within the high-anxious group no differences were found. It was concluded that low-anxious children seem to benefit from the use of the Wand instead of the traditional syringe in receiving local anesthesia.

**Fazit: STA-Anästhesie: Weniger ängstliche Kinder; weniger Muskelspannung, weniger wörtlicher Protest und weniger Bewegung während der ersten 15 Sek..**

Öztas N. et. al.: Quintessence Int; 36, 559-564 (2005)

### **The Wand® in pulp therapy: an alternative to inferior alveolar nerve block.**

**OBJECTIVES:** The purpose of the study was to compare children's reactions to inferior alveolar nerve injection with traditional syringe and periodontal ligament injection with a computerized device (Wand); and to assess the efficacy of the anesthesia and their reaction after treatment.

**METHOD AND MATERIALS:** Twenty-five children, aged 6 to 10 years, participated in the study. The contralateral primary mandibular second molars were treated in 2 separate visits with random use of either the Wand or traditional syringe injection. The pain perception levels for each step were assessed with Eland Color Scale during the preparation. A Mann-Whitney U test was performed to compare the results. The patients were asked their preference of technique after the treatment.

**RESULTS:** When pain was measured immediately after injection, the traditional syringe was found to be more painful than injections with the Wand ( $P < .05$ ). Pain scores with the Wand injections were found to be significantly ( $P < .05$ ) higher than those with traditional inferior alveolar nerve injections at the end of the restoration. The overwhelming majority of patients favored the periodontal ligament injection with the Wand.

**CONCLUSION:** The Wand technique provided significantly lower pain scores during the periodontal ligament injection. However, the pain scores during the treatment were significantly higher compared with the inferior alveolar nerve injections. Most of the patients stated that they preferred the periodontal ligament injection with the Wand to the traditional inferior alveolar nerve injection.

**Fazit: The Wand®/STA verursacht deutlich weniger Schmerz als eine herkömmliche Anästhesie. Die meisten Patienten bevorzugten die The Wand®/STA-Injektion gegenüber traditionellen Injektionen.**

Palm A.M. et. al.: Pediatric Dent; 26, 481–484 (2004)

### **The Wand® versus traditional injection for mandibular nerve block in children and adolescents: perceived pain and time of onset.**

**PURPOSE:** The purpose of this study was to compare the perception of pain and time of onset in relation to mandibular alveolar nerve block administered by a computerized anesthesia delivery system (ie, The Wand) and a traditional anesthesia system (ie, the syringe).

**METHODS:** This study was conducted according to a split-mouth design, with both types of injections being given to all patients. Subjects consisted of 33 patients between 7 and 18 years of age requiring local anesthesia for dental restorations in both sides of the mandible. All patients were blindfolded, and the sound from the Wand machine was activated during both types of administration. Topical analgesic was placed in the area of the injection site in all cases. Pain ratings were obtained using a 10-point visual analog scale (VAS). Time of onset was measured, from withdrawal of the needle to numbness of the lower lip was reported.

**RESULTS:** The computerized anesthesia delivery system resulted in significantly lower pain ratings than the traditional syringe. No difference could be found in time of onset between the 2 methods.

**CONCLUSIONS:** Mandibular alveolar block analgesia seems to be less painful when using The Wand than when using a traditional syringe.

**Fazit: Das digitale Anästhesiesystem The Wand®/ STA rief bedeutend weniger Schmerz hervor als die traditionelle Injektion. Es bestehen keine Unterschiede hinsichtlich des Beginns der Wirkung zwischen den zwei Methoden.**

Allen K.D. et. al.: Pediatric Dent; 24, 315-20 (2002)

### **Comparison of a computerized anesthesia device with a traditional syringe in preschool children.**

**PURPOSE:** The purpose of this investigation was to evaluate the efficacy of a computerized injection device (Wand) on reducing pain behavior during injections with preschool-aged children.

**METHODS:** Subjects consisted of 40 patients between the ages of 2 and 5 requiring local anesthesia for dental restorations in the maxilla. Patients were randomly assigned to either the Wand or the traditional anesthetic delivery system. A palatal approach to the anterior and middle superior alveolar nerves and the anterior superior alveolar nerve was used with the Wand injections. Buccal infiltration and palatal injections were used for the traditional method. Pain behavior was observed and coded.

**RESULTS:** Results of Fisher Exact tests found that using the Wand to deliver anesthetic lead to significantly fewer ( $P < .01$ ) disruptive behaviors in preschool-aged children when compared with a traditional injection regimen. In addition, none of the preschool-aged children exposed to the Wand required restraint during the initial interval, while nearly half of the children receiving a traditional injection required some type of immediate restraint.

**CONCLUSIONS:** These results demonstrate that the Wand can significantly reduce disruptive behaviors in a population of young children who are traditionally more difficult to manage and may be one method of creating a more positive experience for the young child and the practitioner.

**Fazit:** Die The Wand®/STA-Injektion empfiehlt sich gerade für Kinder.

Nicholson J. et. al.: General Dent; 03-04, 167-172 (2001)

**Pain perception and utility: a comparison of the syringe and computerized local injection technique.**

**AIM:** The present study evaluated and compared the pain perception, behavioral response, physiological parameters, and the role of topical anesthetic administration during local anesthetic administration with cartridge syringe and computer controlled local anesthetic delivery system (CCLAD).

**DESIGN:** A randomized controlled crossover study was carried out with 120 children aged 7-11 years. They were randomly divided into Group A: Receiving injection with CCLAD during first visit; Group B: Receiving injection with cartridge syringe during first visit. They were further subdivided into three subgroups based on the topical application used: (a) 20% benzocaine; (b) pressure with cotton applicator; (c) no topical application. Pulse rate and blood pressure were recorded before and during injection procedure. Objective evaluation of disruptive behavior and subjective evaluation of pain were done using face legs activity cry consolability scale and modified facial image scale, respectively. The washout period between the two visits was 1-week.

**RESULTS:** Injections with CCLAD produced significantly lesser pain response, disruptive behavior ( $P < 0.001$ ), and pulse rate ( $P < 0.05$ ) when compared to cartridge syringe injections. Application of benzocaine produced lesser pain response and disruptive behavior when compared to the other two subgroups, although the result was not significant.

**CONCLUSION:** Usage of techniques which enhance behavioral response in children like injections with CCLAD can be considered as a possible step toward achieving a pain-free pediatric dental practice.

**Fazit:** Die Injektion mit The Wand®/ STA wurde als weniger unangenehm empfunden als eine herkömmliche Injektion. Die nachoperativen Beschwerden waren mit The Wand®/ STA bedeutend niedriger. Nach dem Einsatz von The Wand®/ STA und der Spritze bevorzugten die Patienten The Wand®/ STA für zukünftige Injektionen. Zahnärzte mit entsprechender Erfahrung bevorzugten zunehmend The Wand®/ STA.

Gibson R.S. et. al.: Pediatric Dent; 22, 458-62 (2000)

**The Wand® vs. traditional injection: a comparison of pain related behaviors.**

**PURPOSE:** The purpose of this study was to evaluate the efficacy of a computerized anesthesia delivery system (e.g., Wand) compared to a traditional anesthesia administration, with respect to reducing disruptive pain related behavior during injections.

**METHODS:** Subjects consisted of 62 patients between the ages of 5 and 13 requiring local anesthesia for dental restorations in the maxilla. Patients were randomly assigned to either the Wand or the traditional anesthetic delivery system. A palatal approach to the anterior and middle superior alveolar nerves and the anterior superior alveolar nerve was used with the Wand injections. Buccal infiltration and palatal injections were used for the traditional method. Pain behavior was observed and coded. Pain ratings were obtained. Subjects also rated their satisfaction with treatment.

**RESULTS:** Results of chi-square tests found that the Wand injections produced significantly fewer patients who exhibited disruptive behavior during the initial 15 seconds of an injection when compared with those who received a traditional palatal injection. Wand patients were significantly less likely to cry, to exhibit disruptive body movements, and to require physical restraint. In contrast, there were no significant differences in disruptive behavior when comparing the Wand with the traditional buccal injection. Pain ratings showed no statistical difference between the Wand and the traditional injections.

**CONCLUSION:** The Wand injections can deliver proper anesthesia, utilizing one palatal injection site, while significantly reducing the likelihood of disruptive behaviors during the initial moments of an injection.

**Fazit:** Patienten haben mit der The Wand®/STA-Injektion bedeutend weniger Schmerzen als im Vergleich zur traditionellen Injektion. Die Anästhesietiefe war für beide Techniken ähnlich.



Hochman M.: Quintessence Int; 31, 33-39 (2000)

### **In vitro study of needle deflection: a linear insertion technique vs. a bi-directional rotation technique.**

**OBJECTIVE:** Deflection of dental needles during tissue penetration has been associated with a failure to achieve successful anesthesia. The purpose of this study was to determine whether needle deflection in a tissuelike substance could be minimized through the use of a bidirectional rotation insertion technique.

**METHOD AND MATERIALS:** Three in vitro deflection test models were constructed, each incorporating a different tissuelike substance of a different density. Each substance was tested with 3 different needle sizes (30-gauge, 27-gauge, and 25-gauge). A customized dental surveyor allowed for standardized needle insertions to a standardized depth of 20 mm. Two different insertion techniques, a linear insertion technique and a newly described bidirectional rotation insertion technique, were tested. Radiographic analysis was performed after each insertion.

**RESULTS:** The bidirectional rotation insertion technique described was consistently more effective in minimizing needle shaft deflection for 30-, 27-, and 25-gauge needles. The differences were statistically significant. Each of the different tissuelike substances consistently demonstrated this reduction in needle deflection.

**CONCLUSION:** The factor that most greatly affects the path taken by a needle through a tissuelike substance is the force vectors that act on the needle's beveled surface. The use of a bidirectional rotation insertion technique minimized needle deflection, resulting in a straighter tracking path for 30-, 27-, and 25-gauge dental needles, in 3 different tissuelike substances tested in this study.

**Fazit:** Die The Wand®/STA Injektion vermeidet starken Injektions-Schmerz. Sehr wirksam für Pulpa-Anästhesie der seitlichen Schneidezähne, Eckzähne sowie der 1. und 2. Molaren.

# The Wand®

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