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RESEARCH ARTICLE

CONVENTIONAL DENTAL ANESTHESIA VS COMPUTER-CONTROLLED DENTAL ANESTHESIA: EXPERIMENTAL STUDY

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ABSTRACT

The aim of the study was to compare the comfort that patients experience during the application of local anesthetics with the conventional technique vs technical anesthesia controlled by computer, among children from 4 to 10 years old with different needs regarding dental treatment, the results did not show differences in the comfort and acceptance between both techniques

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INTRODUCTION

Today the dental treatmentis still a big challenge for a lot of people, most of the population avoid going to the dental office, some others leave worsen their condition by the fear to feel pain during the dental treatment, several studies mention that around 18% to 21% of the children's population that has received dental attention suffer a certain level of fear and anxiety highly related to the dental examination, which affects their behavior during the operatory treatment, reducing their capacity for cooperation (Klingberg 1995; Rãducanu *et al.,* 2009; de Carvalho *et al.,* 2013; Xiaoli *et al.,* 2013). The different causes that allow fear and anxiety to rise,go from the needle-syringe, todrilling and/or dental extractions, but all agree on a common denominator: the pain, which is the most common symptom in odontology and, therefore, patients avoid it, whichconstitutes the greatest challenge for some practitioner of dentistry (Klingberg 1995; de Carvalho *et al.,* 2013; Xiaoli *et al.,* 2013). In the Pediatric Dentistry this becomes the tip angle for anyoperatory treatment, since most of the time the patient´s behavior depends on whether the pain is present or not, their behavior can also be influenced by psychological and physiological factors such as mood, fatigue, emotional moment and the kind of experiences that they have been through (de Carvalho *et al.,* 2013). Most dental interventions involve some degree of pain, the results of some investigations have proven that the injection of the local anesthetics is the procedure that causes a less negative response in children when it is done for the first time, however if the experience is repeated more than once, the cooperation of the patient decreases (Lee and Lee 2013), therefore it is crucial to control the pain and it becomes paradoxical to have to cause a painful sensation to be able to perform anoperative procedure without pain. Failures during the application of the anesthetics also play an important role, since about 26% of the jaw anesthesia usually fails (Zwain 2006). Several techniques have been tried in order to reduce the sensation at the moment of puncture, one of these techniques is the passive/active distraction (Abdelmoniem and Mahmoud 2016), another method is the application of cold in the area to puncture (Ghaderi *et al.,* 2013) but in repeated appointments its effectiveness decreases, therefore, maintain a strict control of pain before, during and after the dental practice becomes essential. There have been several attempts to replace the dental syringe for applying anesthesia without the use of a needle, example of this is the use of iontophoresis (Gangarosa and Ga 1974), eutectic patches (Kreider *et al*., 2001; Stecker *et al*., 2001; Rai *et al*., 2014), INJEX system (Arapostathis *et al*.,

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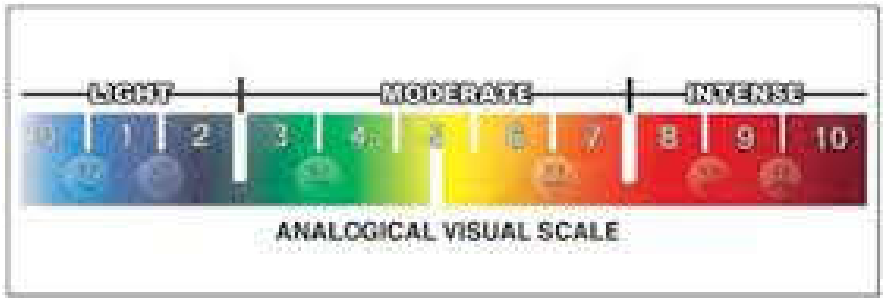
2010), Sonophoresis, Electroporation, Microporacion, Magnetophoresis, Electrokinesis (Kee and Neelakantan 2014) and Transcutaneous electrical neural stimulation (Katch 1986; Sluka and Walsh 2003; Dhindsa *et al*., 2011; Kasat *et al*., 2014). However no convincing results have been with any of these methodologies. Technological advancement today offers us help in the control of pain, the option of using an appliance for the application of local anesthesia through an electronic controller is a new way for the patient (Cho *et al*., 1998;Asarch *et al*., 1999; Munshi *et al*., 2000; Ashkenazi *et al*., 2005; Yanisey 2009; Langthasa *et al*., 2012; Shipton 2012; Dhamodharan *et al*., 2015; Kumar *et al*., 2015), and it promises to be the solution to this problem, the Want (Millistone Scientific) is a computerized device that has a two-stage system for the controlled application of anesthetic infiltration, which starts at a minimum speed, to reduce the pain associated with the puncture and expansion of tissue, after 10 seconds it automatically increases the speed according to the selected technique. In accordance with its manufacturers, there are several advantages offered by this device: First, it's a positive psychological impact due to the absence of a syringe, in addition, the device has precise control of the volume and pressure of infiltration, as it registers the resistance of tissues and manages to exceed it just enough to avoid that the patient perceives the sensation and records it in his cerebral cortex as a painful sensation.

Another advantage is that the needle is not flexed, as it is introduced into the tissue, therefore it does not tear the muscle, the result, an effective and comfortable injection according to the manufacturer; in terms of safety, the appliance is equipped with an auto vacuum system that gives the operator greater security (Munshi *et al* 2000; Ashkenazi *et al*., 2005; Yenisey 2009; Langthasa *et al* 2012; Dhamodharan *et al*., 2015; Kumar *et al*., 2015). The main disadvantage is the high cost of the product. Several previous studies mention that Computer Controlled anesthesia (CCA) was better that the conventional technique, but apparently there was no significant difference (Asarch *et al*., 1999; Shipton 2012), reason by which we decided to carry out our own research. To know the degree of comfort that child patients experience, we have proposed several scales that measure the intensity of pain as well as the behavior of the patient during the treatment, in the present study we decided to use the visual analog scale (VAS) which is based on the facial changes that express the degree of pain or comfort (Baeyer 2006) and the scale of behavior of Franklin, which is based on the behavior maintained during the dental treatment (Wright *et al.,* 1991).

Frankl Behavior Scale

Level 1	Definitelynegative	The rejection of treatment, shouting, fear or any manifest evidence of extreme negativism.
Level 2	Negative	Not cooperative but react in an acceptable manner to treatment, some evidence of negative attitude but not very evident (withdrawn).
Level 3	Positive	Accept treatment, sometimes cautious; Willing to meet the dentist, sometimes with reservation but follow the dentist's instructions.
Level 4	Definitelypositive	Good relationship with dentists interested in dental procedures laughing and enjoying.

Analog Visual Scale



MATERIALS AND METHODS

Methodology Design

A controlled clinical trial was designed; the allocation of participants to groups was conducted randomly. In order to evaluate the degree of comfort/pain, the scales VAS and Frankl were applied.

120 patients were selected within a range from 4 to 10 years old, 68 males (57%) and 52 women (43%), all of them in need of treatment under local anesthetic by infiltration. Regardless the quadrant, the study population was divided into two groups of 60 patients, the group 1 or Control group to which conventional anesthetic technique was applied, and group 2 or Experimental group to which anesthetic technique controlled by computer was applied. The procedures performed were: sealant for pits and fissures, Pulpotomy, steel crowns and extractions. The evaluation of the degree of comfort was conducted with the help of the visual analog technique through expressive faces, and the Frankl scale of behavior, at the time of the puncture and anesthetic infiltration.

Procedure

Before starting with the study, the parents and/or guardians of the patients were informed about the research and what it entailed. Those who agreed to participate signed an informed consent form. We used *Tell-Show-Do* behavior management technique, with the selected patients, later; we applied the local anesthesia according to the group to which they belonged. Prior to puncture all the participants in the study, topical anesthetic was applied for 3 minutes. It was mentioned that prior to the implementation of the research, a pilot study was performed, in which was noticed that the average application time of anesthesia with the conventional technique was 2 minutes, and the time of application with anesthetic technique controlled by

computer was 4.07 minutes ± 1.29 minutes, so we decided to standardize infiltrate times.

RESULTS

With both techniques maxillary anesthesia was performed more than mandibular anesthesia (Fig.1). The procedures performed during this study were divided into: sealants of pits and fissures, Pulpotomy, steel crowns and extractions (Fig. 2). With regard to the efficiency of both techniques, the results presented were identical (Fig. 3). The degree of acceptance of the treatment with both techniques resulted similar according to the results (Fig. 4). The results in this study show that both anesthesia techniques have the same percentage of success and acceptance.

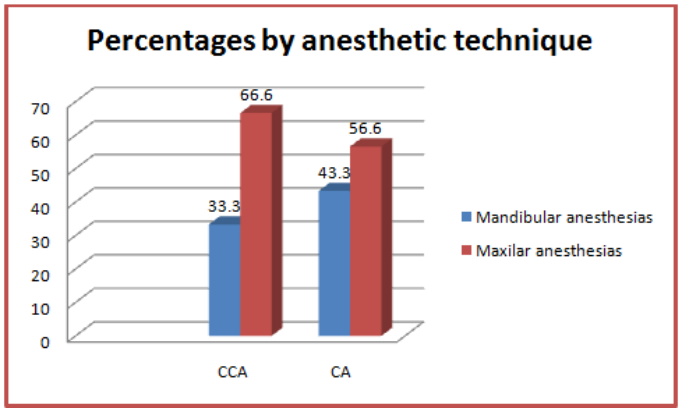


Fig. 1. CCA=Computer Controlled Anesthesia, CA=Conventional Anesthesia

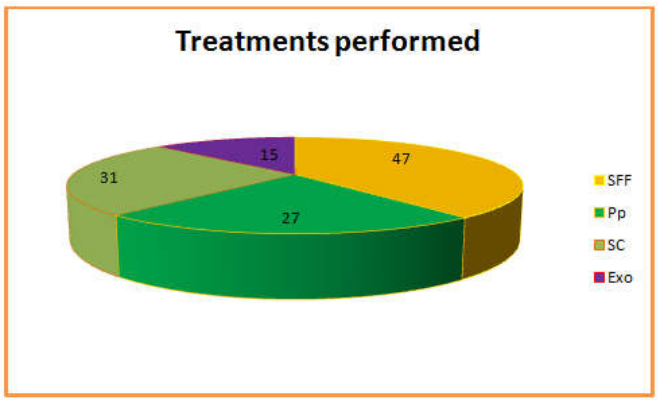


Fig. 2. SFF=Sealer of Fosetas and Fissures, Pp=Pulpotomy, CA=Crown of Steel, Exo=Exodontias

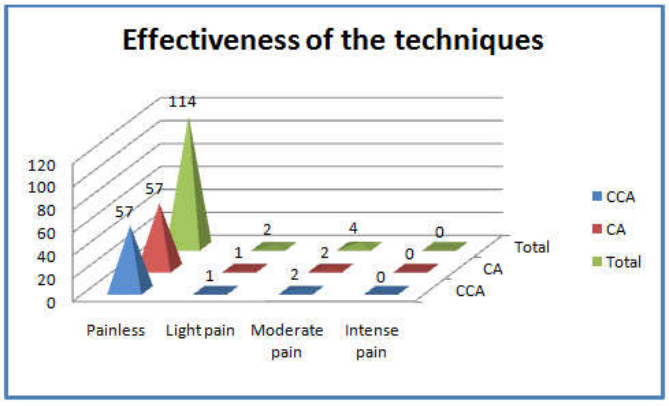


Fig. 3. Degree of effectiveness achieved for each anesthetic technique

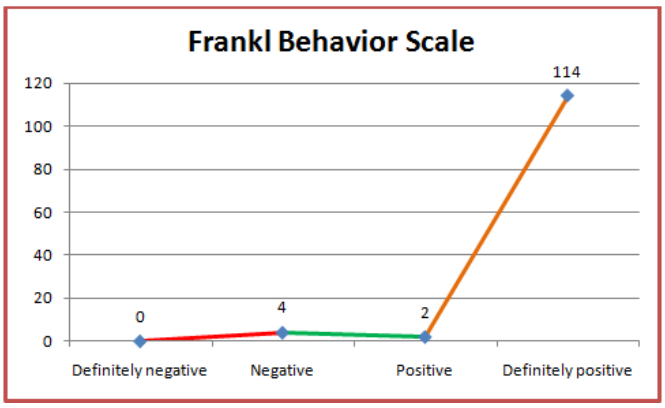


Fig. 4. Degree of acceptance of treatment

DISCUSSION

The results demonstrated by the present research agree with the ones of Dr. Eugene R. Casagrande in which it was found that CCA was comfortable in 90% of the study cases, with those from Dr. Burke, of the University of Glasgow, who mentions that his patients found the CCA comfortable. But in the other hand, our finds contrast with the results displayed by Dr. Ziag Aghdadi, who found the CCA more comfortable (53.6%) than the conventional anesthesia (35.7%). We assume therefore that this lack of concordance could be due to the timing of anesthesia through the conventional technique, since as it showed the pilot study, time is too short or too quick during infiltration, expanding the tissues until the small first dose makes its anesthetic effect in the zone of infiltration. Another important factor is the time, and the application, or not, of the topical anesthetic since it reduces the sensation of puncture with the needle, these two factors may give greater acceptance of CCA for showing greater control during puncture.

Conclusion

To compare and analyze the results displayed in this research, it can be conclude that:

- Both techniques are well accepted by the patients
- The comfort displayed by the patients during the application of the local anesthesia is equal for both techniques
- The absence of syringe can be an important psychological factor for the acceptance of the treatment in a patient with fear to syringes, and
- From the operator's side, the CCA technique represents a greater control during dental needle puncture, and it less tiring than the conventional technique.

REFERENCES

Abeer M. Zwain, 2006. Local anesthetic quality in pedodontic department, College of Dentistry/ University of Baghdad. J BaghColl Dentistry, 18(2):96-99)

Abhishek Dhindsa, I.K. Pandit, Nikhil Srivastava, NeerajGugnani. 2011. Comparative valuation of the effectiveness of electrical dental anesthesia vs 2% lidocaine in several smaller pediatric dental procedures: A clinical study. ContemporaryClinDent, 2(1): 27-30.

Anca MariaRãducanu, Victor Feraru, Claudiu Herteliu and Reghina Anghelescu, 2009. Assessment of the Prevalence

of Dental Fear and its Causes Among Children and Adolescents Attending a Department of Paediatric Dentistry in Bucharest. Oral Health and Dental Management in the Black Sea Countries (OHDMBSC) Vol. VIII No. 1:42-49.

De Carvalho, R.W., de Carvalho Bezerra Falcão, P.G., de Luna Campos, G.J., de Souza Andrade, E.S., do Egito Vasconcelos, A.C. and da Silva Pereira, M.A. 2013. Prevalence and predictive factors of dental anxiety in Brazilian adolescents. *J Dent Niño (Chic),* Jan-Apr; 80(1):41-46.

Edward A. Shipton. 2012. "New Delivery Systems for Local Anaesthetics—Part 2," Anesthesiology Research and Practice, Article ID 289373, 6 pages. doi:10.1155/2012/289373

Eric M. Katch, 1986. Applications of Transcutaneous Electrical Nerve Stimulation in Dentistry. AnesthP rog, May-Jun; 33(3):156–160.

Faezeh Ghaderi, Shahin Banakar, Shima Rostami. 2013. Effect of pre-cooling injection site on pain perception in pediatric dentistry: "A randomized clinical trial". Dental Research Journal / November / Vol 10 / Issue 6:790-794

KavitaRai, Amitha M. Hegde, Mary Jacob & R. NarayanaCharyulu. 2014. Comparative Evaluation Of The Efficacy Of Lignocaine And Benzocaine Patches For Various Dental Treatments In Children, NUJHS Vol. 4, No.1;:28-34.

Klingberg G. 1995. Dental fear and behavior management problems in children. A study of measurement, prevalence, concomitant factors, and clinical effects.. Swed Dent J Suppl., 103: 1-78.

Konstantinos Nikolaos Arapostathis Nikolaos Nestoras Dabarakis ,Trilby Coolidge, Anastasios Tsirlis ,NikolaosKotsanos. 2010. Comparison of Acceptance, Preference, and Efficacy Between Jet Injection INJEX and Local Infiltration Anesthesia in 6 to 11 Year Old Dental Patients. AnesthProg., 57 (1): 3-12.

Kreider, K.A., Stratmann, R.G., Milano, M., Agostini, F.G. and Munsell, M. 2001. Reducing children's injection pain: lidocaine patches versus topical benzocaine gel. Pediatr Dent 23:19-23)

Langthasa, M. R., Yeluri, Jain, A.A. and MunshiUn, K. 2012. Comparison of pain perception in children using syringe comfort control and conventional injection technique during pediatric dental procedures. *J india SocPedod Anterior Dent.,* 30: 323-8

Lee, S.H. and Lee, N.Y. 2013. An alternative local anaesthesia technique to reduce pain in paediatric patients during needle insertion. *European Journal of Paediatric Dentistry* vol. 14(2):109-112.

Louis, P., Gangarosa, Augusta, Ga. 1974. Iontophoresis for surface local anesthesia. JADA, Vol. 8 8:125-128

Malka Ashkenazi, Sigalit Blumer, Ilana Eli. 2005. Effectiveness of computerized delivery of intrasulcular anesthetic in primary molars. JADA October. Volume 136, Issue 10, Pages 1418–1425.

Munshi, A.K., Hegde, A.M. and Girdhar, D. 2000. Clinical evaluation of electronic dental anesthesia for various procedures in pediatric dentistry. *J Clin Pediatr Dent.,* 24(3):199-204.

Murat Yenisey, 2009. Comparison of pain levels with controlled computer techniques versus conventional anesthesia in prosthetic treatment. *J Appl Oral Sci.,* 17(5): 414–420.

Muthulaakshmi, G. 2015. Local Anesthesia In Pediatric Dentistry-An Update. IJPT| July| Vol. 7 | Issue No.1 | 3200-3209

Shiu-yin Cho, Bernadet K Drummond, Michael H Anderson, Sheila Williams. 1998. Effectiveness of electronic dental anesthesia for restorative care in children. *A.A. Pediatric Dentistry-20*(2):105-111.

Sluka, K.A. and Walsh, D. 2003. Transcutaneous Electrical Nerve Stimulation: Basic Science Mechanisms and Clinical Effectiveness. *The Journal of Pain,* Vol 4, No 3 (April):109-121.

Soad A. Abdelmoniem and Sara A. Mahmoud. 2016. Comparative evaluation of passive, active, and passive-active distraction techniques on pain perception during local anesthesia administration in children. *Journal of Advanced Research* (7):551–556.

Stecker, S.S., Swift, J.Q., Hodges, J.S. and Erickson, P. R. 2002. Should a Mucoadhesive Patch (DentiPatch) Be Used for Gingival Anesthesia in Children? AnesthProg 49:3-8.

Thoppe-Dhamodharan, Asokan S, John B-J, Pollachi-Ramakris¬hnan, Ramachandran P, Vilvanathan P. 2015. Cartridge syringe vs computer controlled local anesthetic delivery system: Pain related behaviour over two sequential visits – a randomized controlled trial. *J ClinExp Dent.,* 7(4):e513-518.

Todd Asarch, Keith Allen, Brett Petersen, SorayaBeiraghi. 1999. Efficacy of computarized local anesthesia device in pediatric dentistry. AAPD, 21(7):421-424.

Vikrant Kasat, Aditi Gupta, RuchiLadda, MiteshKathariya, Harish Saluja, Anjum-AraFarooqui. 2014. Transcutaneous electric nerve stimulation (TENS) in dentistry- A review. *J ClinExp Dent.,* 6(5):e562-568.

Von Baeyer, C.L. 2006. Children's self-reports of pain intensity: Scale selection, limitationsand interpretation. Pain Res Manage, 11(3):157-162.

Wright, G.Z., Weinberger, S.J., Marti, R. and Plotzke, O. 1991. The effectiveness of infiltration anesthesia in the mandibular primary molar region. Pediatr Dent 13: 278-83.

XiaoliGao, S.H. Hamzah, Cynthia Kar Yung Yiu, Colman Mc Grath, B.A,. BDentSc and Nigel M. rey. 2013. Dental Fear and Anxiety in Children and Adolescents: YouTube Qualitative Study. *J Med Res internet.* Feb; 15 (2): e29.

Yen Lai Kee and Prasanna Neelakantan, 2014. Local Anesthetics in Dentistry – Newer Methods of Delivery.International *Journal of Pharmaceutical and Clinical Research,* 6(1): 4-6

Yogesh-Kumar Thoppe-Dhamodharan, SharathAsokan, Baby-John John, GeethaPriya Pollachi-Ramakris¬hnan, Punithavathy Ramachandran, Praburajan Vilvanathan. 2015. Cartridge syringe vs computer controlled local anesthetic delivery system: Pain related behaviour over two sequential visits–a randomized controlled trial. *J Clin Exp Dent.,* 7(4):e513-8.

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