

Turning Nerves Into Nirvana- A Review On Distraction Techniques In Pediatric Dentistry

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ABSTRACT:

Children with dental fear and anxiety try all means to avoid or delay dental treatment, and it results in the deterioration of their oral health. Distraction is the technique of diverting the patient's attention from what may be perceived as an unpleasant procedure. The available studies show that the distraction techniques can be very effective during dental treatment for the management of dental fear and anxiety in children, including those with special abilities. However, the evidence of their efficacy is very low, so more future studies and research comparing the different distraction techniques among children of different age groups is recommended in order to have a more accurate knowledge of them and thus be able to implement them in the dental office. This review article throws light on the different distraction techniques that can be utilised by a Pediatric dentist to make the child patient cooperate for dental treatment.

Keywords: Pediatric dentistry, Behaviour management, Distraction

INTRODUCTION:

Pain management is extremely important for infants and toddlers. Insufficient pain relief may cause long-term changes in pain understanding and perception and determine specific pain-related behavioural expressions. Procedural-pain-associated stress and discomfort have long-term negative effects on patients and their parents/caregivers. It may contribute to eating and sleeping disorders, provoke post-traumatic stress disorder, diminish social skills, or increase fears.

When used correctly, Non pharmacological measures are able to not only control procedural-related pain and anxiety but also lower doses of required medication and in some cases even avoid pharmacological painkillers. Children seem to be more scared at the sight of the needle rather than the prick of the needle. Local anesthesia injection to a child with high levels of anxiety has been found as the most stressful procedure without considering the age, gender, or years of professional experience for general dentists and pedodontists. Inferior Alveolar Nerve Block has been graded to be the most painful local anesthesia.

General anesthesia or sedation can be good choices for managing severely anxious children or patients who are not able to cooperate efficiently, but children with lower levels of anxiety and fear should be managed with traditional behavioral guidance techniques. Distraction strategies have been effective methods for stress and anxiety reduction during local anesthesia administration. Distraction may reduce the pain perception by involving the child's focus and attention. Active forms of distraction actively involve the child resulting in more positive output compared to passive distraction^{1,2}.

NEUROBIOLOGY AND PHYSIOLOGY OF PAIN:

The International Association for the Study of Pain defines pain as, "An unpleasant sensory and emotional experience linked to confirmed or possible tissue injury". The starting point of the pain pathway is irritation of the nociceptors. Nociceptors have pain-sensitive axon terminals which spread throughout most body tissues. They are responsive to thermal, chemical, and mechanical stimuli after birth. Noxious stimuli cause tissue injury and activate nociceptors indirectly when chemical substances (ions of potassium, serotonin, bradykinin, histamine, prostaglandins, leukotrienes, or substance P) are released. These agents trigger axon terminals and turn mechanical or chemical stimuli into action potentials, which is the start of the pain pathway.

The impulse is driven towards the central nervous system (CNS) by the axon of the first neuron. When the spinal cord (SC) is reached, the first neuron forms a synapse with a cell of the dorsal horn. The information is sent to the thalamus through the anterolateral system. The neurons of the SC dorsal horn form synapses with neurons of the ventral posterior nucleus and the impulse of pain are sent further to the primary and secondary somatosensory cerebral cortex. Together with emotional and cognitive components, nociceptive impulses form the full conception of pain in the cerebrum.

UNDERSTANDING PAIN IN PEDIATRIC PATIENTS:

It must be understood that a child's pain is very different from that which is experienced in adults. Different emotional and psychological factors can affect the child's pain comprehension and stimulate his/her response. The first step to good procedural pain reduction is initial pain and distress evaluation. Another difference of the pain pathway in children is the different structure of neural fibres. Impulses of pain are transmitted through A δ (myelinated) and C (unmyelinated) fibres. Even though myelination is not complete in the nervous system (NS) of a child, it does not mean that they cannot feel pain or the perception of it is not strong. Incomplete myelination determines a slower signal rather than a weaker one. Still, a slower transmission of a pain impulse is fully compensated by a shorter length of pain pathway in the Nervous System of a child.

DISTRACTION:

Pharmacotherapy and distraction are the most commonly used approaches to pain control in the pediatric dentistry. Although there are data to support the use of topical anaesthetic creams, vapocoolant cold spray and distraction in reducing pain, their use is not standardized across practitioners and settings.

Distraction has received recent attention and involves engaging children in cognitive or behavioural tasks to divert attention from painful stimuli to reduce both pain and distress. Numerous distractors with varying complexity have been used either together or in isolation. Audio, videotapes, stories, imagery, and concentrated breathing are some examples.

IDEAL DISTRACTOR:

An ideal distractor requires "an optimal amount of attention involving multiple sensory modalities (visual, auditory and kinesthetics) and active emotional involvement that ensures patient participation, to compete with signals from noxious stimuli.

MECHANISM:

The application of distraction assumes that "the perception of pain has a large psychological component." Thus, it is reasonable to assume that as the person's attention is drawn away from a noxious stimulus, the perception of pain is also reduced. The hypothesized mechanism of action is that the child "cannot attend to more than one significant stimulus at a time" and keeping in mind the Gate Control Theory of Pain, distraction stimulates the brainstem, which leads to the inhibition of pain perception.

DISTRACTION TECHNIQUES:

Distraction techniques such as music, videogames, virtual reality, or simple talk about movies, friends, or hobbies as well as cutaneous stimulation, vibration, cooling sprays, or devices are effective to alleviate procedural pain and anxiety. A choice of distraction technique should be individualized, selecting children who could benefit from non pharmacological pain treatment methods or tools. Distraction techniques may be active (patients will be interacting with distraction aid) or passive (pre-recorded distractions are used). Non pharmacological pain management may reduce dosage of pain medication or exclude pharmacological pain management. Most non pharmacological treatment methods are cheap, easily accessible, and safe to use on every child, so it should always be a first choice when planning a patient's care³. Based on an online search, the following distraction methods could be used to manage the behaviour of a child patient in a dental set up.viz.,

1. Audio Distraction Aids
2. Music
3. Gamification
4. Audio Visual Distraction
5. Virtual Reality
6. Ditto
7. Chris's Birds Assisted Therapy

8. Chris's Fish Assisted Therapy
9. Chris's Toys Assisted Therapy
10. Magic Trick
11. Music and Aroma Therapy
12. Vibration
13. Kaleidoscope
14. Bubble blower

AUDIO DISTRACTION AIDS:

'Audio distraction' is the non-aversive technique in which the patient listens to music throughout a stressful dental treatment procedure. According to study, Audio distraction did decrease the anxiety in pediatric patients to a significant extent. Moreover patients had an overwhelming response to music presentations and wanted to hear them in their subsequent visits.



MUSIC:

Music (recordings selected by a music therapist) may have a positive impact on pain and distress for children undergoing invasive procedures. Benefits were also observed for the parents and health care providers⁴. The presence of music played by professionals has a minor, but yet significant, effect on pain during invasive dental procedures. Gupta et al in the year 2017 from his study highlighted that changes were noticed in pain, heart rate and behaviour when subjected to upbeat and relaxing music⁵.



GAMIFICATION: (Game based intervention)

Game-based interventions alleviate preoperative anxiety during the induction of anaesthesia in children. This innovative and pleasurable approach can be helpful in the care of paediatric surgical patients. Game-based distraction is an

effective non-pharmacological resource in paediatric preoperative care. Such interventions reduce preoperative anxiety levels in children undergoing painful procedures⁶.



AUDIO-VISUAL DISTRACTION:

Audiovisual distraction (AVD) actively engages both the visual and auditory senses while inducing a positive emotional reaction, resulting in a relaxed experience. There are both active and passive audiovisual distractions. Active distraction includes playing PlayStation video games and using smartphones. Passive distraction includes watching cartoon with AV glasses or 3D video glasses.

The AVD is an effective distraction tool for young children during dental treatment regardless of child's subjective pain expression. AVD can effectively decrease the pain and anxiety of pediatric dental patients during anaesthetic injection⁷. Guinot et al in 2021 from his study unveiled that, when children were subjected to active audiovisual (play station video games) and passive audiovisual (cartoon film), significant differences were reported for pain between the experimental (P=0.013) and the control (P=0.016) groups. It was therefore concluded that both active and passive distraction methods were adapted by the patients⁸.



VIRTUAL REALITY:

Different distraction techniques have been used in dentistry and have shown great results in managing anxious pediatric patients especially during local anaesthesia administration. One of the recently invented techniques is virtual reality. Virtual Reality (VR) refers to “a human-computer interface that allows the user to interact dynamically with the virtual world, which is essentially a computer-generated environment.” The application of virtual reality as a distraction technique could possibly be superior to traditional distraction techniques because it offers more immersive images via the occlusive headsets that project the images right in front of the eyes of the user⁹.



Depending on the model of VR device used, it may block out the real-world (visual, auditory, or both) stimuli. However, a literature review revealed sparse investigations on the potential application of VR distraction in the pediatric dental setting. The marked decrease in salivary cortisol levels in the children using VR distraction further reinforces the effectiveness of the device in reducing stress in the children. We observed that, in children using the VR device, even when LA was administered, they barely showed any discomfort except for a few children who moved their extremities a little¹⁰.

Felemban et al in 2021 from his study put forth that, when patients were subjected to Audiovisual (virtual reality), regardless of the distraction, the females and the young age patients reported high mean face, legs, activity, cry and consolability (FLACC) scores ($P=0.034$ and $P=0.004$). Patients with high pulse rate at baseline, reported high mean Wong– Baker Faces (WBF) score ($P=0.031$ and $P=0.010$). Female subjects and the younger age and female dental patients were found to be more likely to appear with higher pain scores regardless of the distraction tool used in treatment¹¹.

DITTO™:

Ditto™ is a hand-held electronic medical device providing procedural preparation and distraction. The Ditto™ procedural preparation and distraction device is a useful tool alongside pharmacological intervention to improve the rate of burn re- epithelialization and manage pain and anxiety in child patients. Ditto™ could open newer possibilities in the reduction of anxiety in pediatric dental patients¹².



CHRIS'S BIRDS ASSISTED THERAPY:

It generally feels very soothing to listen to birds chirping early in the morning. Listening to birdsongs regardless of diversity improves anxiety and reduces paranoia. They also bring us joy and helps to alleviate our anxiety. These benefits increase many fold when we see the bird chirping with our own eyes. Bird songs can help to reduce stress and it gives our nervous system a much needed rest. CHRIS'S Birds Assisted Therapy is shown to be a promising method of anxiety control, a key to a successful pediatric dental practice.



CHRIS'S FISH ASSISTED THERAPY:

It has been proven, that keeping fish improves mental health and also helps to reduce anxiety. Research carried out by Plymouth University discovered that just watching fish in an aquarium 'led to noticeable reductions in participant's blood pressure and heart rate.' Watching fishes was beneficial and it improved the person's mood by reducing anxiety and depressive symptoms as well as paranoid symptoms. Using fishes as a background landscape could open new therapeutic possibilities in dental clinics, to reduce the anxiety among child dental patients¹³.



CHRIS'S TOYS ASSISTED THERAPY:

Fidget toys are designed to increase focus while alleviating other, more distracting habits, fidget toys give your hands something to do so the mind can effectively redirect its attention, and when needed, relax. Typically advertised towards children, fidget toys are handheld tools made to help users focus and decrease stress. The toys are also believed to improve learning ability. Toys in Dentistry creates a Winning smile in pediatric dental patients. Fidget toys give movements an outlet, which can help calm a child's nerves, relieve stress and serve as a distraction in an over stimulating dental environment¹⁴.



MAGIC TRICK

Thosar et. al., 2022 from his study stated that Magic trick is an effective method of Distraction during pediatric dental procedures¹⁵. Magic trick is able to facilitate two types of cooperative behaviour: (1) it expedites the movement of the child into the dental chair; and (2) it enables the dentist to take radiographs more easily.



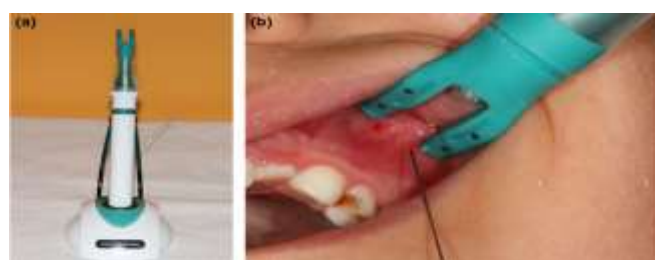
MUSIC AND AROMA THERAPY

James et al 2021 from his study unveiled the fact that upon comparison of music and aroma therapy with control group, significant reduction in anxiety levels, respiratory and pulse rate was detected with reference to Facial image scale (FIS) and VPT. Both the techniques produced the better results. However, the music distraction produced was found to be more effective¹⁶. Music therapy in combination with aromatherapy reduced children's anxiety and fear of dental services better than a single treatment.



VIBRATION

Hegde et. al., 2019 from his study stated that Vibration is an effective method of Distraction and pain control during Anesthetic dental procedures¹⁷. Combined external cold and vibrating devices can be an effective alternative in reducing experienced pain and fear in children undergoing infiltration dental anesthesia.



KALEIDOSCOPE

Aditya et al in 2021 from his study stated that kaleidoscope seems to be effective distraction methods and can be recommended as effective approaches to help alleviate children's dental anxiety during inferior alveolar nerve block procedures¹⁸.



BUBBLE BLOWER

Bahrololoomi et al in 2022 highlighted that the bubble blower used for the breathing exercises can be used as a beneficial and effective distraction method to reduce the moderate to severe anxiety and pain during the invasive dental procedures. using a bubble blower may be a beneficial option for behavioral management of 7–10-year-old children with moderate to severe anxiety specially for short-term interventions such as local anesthesia injection. As a play therapy, it can improve child-dentist relation. It is safe and inexpensive with a high acceptance from children and parents. Breathing exercise using a bubble blower may be an efficient distraction and relaxation method to decrease pain of 7- to 10-year-old children with moderate to severe anxiety during inferior alveolar nerve block¹⁹.



CONCLUSION:

For children displaying different emotions and behaviour, the impressions impinged in the heart by the first dental visit build memories that affect their behaviour during successive dental appointments. Distraction techniques such as music, videogames, virtual reality, or simple talk about movies, friends, or hobbies as well as cutaneous stimulation, vibration, cooling sprays, or devices are effective to alleviate procedural pain and anxiety. A choice of distraction technique should be individualized, selecting children who could benefit from non pharmacological pain treatment methods or tools.

DECLARATION OF PATIENT CONSENT

The authors certify that they have obtained all appropriate patient consent forms. In the form, the children's guardians have given their consent for their child's images and other clinical information to be reported in the journal. The guardians understand that their child's name and initials will not be published and due efforts will be made to conceal identity, but anonymity cannot be guaranteed.

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CONFLICTS OF INTEREST

There are no conflicts of interest.

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