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Review Article

Common Analgesics for Relieving Pain in Pediatric Dentistry (Overview)

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Received: March 09, 2020; **Published:** September 30, 2020

Abstract

Dental pain is a type of pain that one commonly feels inside, around the tooth or even around the gums and bones. Tooth pain can be constant or intermittent and occurs either on its own or due to an external stimulus. Avoid dental pain that is felt during special occasions such as eating or sleeping is very difficult and parents should know what the causes of the toothache are so that they take it immediately into consideration to be treated. All traditional or modern home remedies, medicines, etc. can at best relieve the pain for a limited period of time. Although for relieving the acute pain, parents should refer to the dentist to find the causes and resolve that.

Parents often are wondering which drugs should be used to relieve the children's toothache and what analgesics are appropriate for them without any side effects! In this article we emphasize on the most recommended analgesics.

Keywords: *Dental Pain; Medicines, Analgesics; External Stimulus; Acute Pain*

Introduction

Although drugs have analgesic effects, dental pain is relieved by the dentist. So, drugs are important in controlling pain before and after dental treatment. Four pain reliever groups are used to control dental pain: NSAIDS; Acetaminophen; Opioids, and Steroids. NSAIDS are the drugs commonly administered in dentistry for the management of pain and swelling. Of these medicines, Paracetamol and Ibuprofen are the most widely used in pediatric dentistry [1]. Of course, there are other drug groups whose analgesic effects may be effective in relieving pain and controlling pain in the treatment of dental patients. Some of these drugs are used for pain centers due to their focal effects, and some are also used to control psychosomatic or non-dental pains. Anti-depressants, Gabapentin, Ketamine and etc. are among these drugs, which are beyond the scope of this article. Pain control recommendations, especially recommendations for the use of medications for patient awareness when is needed in emergency situations.

The fact is that there are many factors involved in controlling pain. Referring to the dentist is, of course, the main base of dental pain control.

Non-steroidal anti-inflammatory drugs (NSAIDs)

This group of medications binds to plasma proteins [2] and has a peripheral effect on inhibiting the synthesis of prostaglandins [3], but it has been shown that they also have an effect on the central nervous system in controlling pain [4]. It has been reported that some children experience pain following dental procedures, such as tooth extraction, pulpotomy, and SS crowns [5] which Ibuprofen, Paracetamol, Diclofenac, and Tramadol have been used to manage their pain [6]. Ibuprofen is the main and almost the best drug in this group, which has been shown to be effective in controlling dental pain for many years. Other drugs are also included in this group for dental pain. For

example, Etodolac has less gastrointestinal effects [7] but is not recommended for use in pediatric children and the safety and efficacy of Etodolac in children have not been established [8,9]. Ketoprofen has more potent effects on pain control [10]. Aspirin can also be considered as one of the most effective drugs in the group.

The use of ibuprofen in the second and third trimester of pregnancy may be associated with the onset of asthma in the child [11]. Diclofenac and ibuprofen are generally related to low birth weight in the second and third trimester of pregnancy [11]. The risk of bleeding increases with the use of these drugs in the third trimester [11].

Acetaminophen

This drug is known as Paracetamol (Para- acetyl aminophenol) in many parts of the world. Paracetamol is the most widely used as a pain reliever for children. Acetaminophen inhibits the prostaglandins so that producing analgesia with no peripheral anti-inflammatory action [12]. Because of the hepatotoxicity of acetaminophen, the recommended maximum dose for adults is 4 grams in 24 hours for this drug [13]. Paracetamol hepatotoxicity in children with doses as low as 20 mg/kg/day has been reported in a few studies [14]. Acetaminophen is one of the recommended drugs for controlling pain at the time of pregnancy, but it is not completely safe [15].

In a few studies, the relationship between acetaminophen and asthma in children and the association of acetaminophen with pregnancy and childbirth problems are mentioned [16]. Acetaminophen is often combined with other drugs as an analgesic and should be taken into account in the total dose received by patients. Theoretically, acetaminophen like NSAIDs may have the ability to reduce the prostaglandin production of inflammation, but the fact is that this does not occur in therapeutic doses, and the anti-inflammatory effect of acetaminophen is very low.

The maximum daily dose which can be prescribed is 4000 mg of acetaminophen for adults [17]. Overdose can lead to severe liver damage. In other words, small doses of acetaminophen can be detrimental to the liver even if acetaminophen levels are not in the toxic range [17]. Acetaminophen can increase PT in patients who are taking anticoagulants [18]. One of the common side effects of this drug is rash [19]. The rare reported adverse reactions have included Thrombocytopenia [20] and Anemia [21]. Acetaminophen is suitable for controlling toothache in children and can be used at a dose of 15 mg/kg every four hours [16].

Aspirin

In cases other than tooth extraction or oral surgery, Aspirin is a good medicine for relieving toothache. Aspirin is a medication to relieve toothache but because of its no significant effects at low doses, it is not popular in dentistry as a powerful pain reliever.

Aspirin at specific doses is a good anti-inflammatory and analgesic which has little side effects. Children and adolescents should not be prescribed aspirin by the dentist for their toothache. Some parents may apply Aspirin on the gum or aching tooth of young children. This is not recommended at all because it gives rise to soft tissue to burn. Aspirin will delay the clot formation [22] and should not be used in patients with problems such as bleeding [23] or peptic ulcers [24]. Aspirin-containing analgesics are contraindicated for pediatric pain management in most situations. Pediatric dentists do not prescribe this medicine for relieving dental pain especially during a viral illness (such as a common cold) because the child would be prone to a serious condition known as Reye syndrome [25].

Opioids

This group of drugs does not have much effect on the control of dental pain alone and are often used in combination with other medications [26]. The mechanism of action of Opioids is on central nervous system, but it has been shown to have a topical analgesic effect [27]. Codeine and other Opioids may cause side effects such as drowsiness, lightheadedness, dizziness, sedation and shortness of breath, nausea, vomiting, and sweating [28].

The US Food and Drug Administration warn that taking Tramadol and Codeine drugs can cause serious respiratory problems and even death consequences in infants and children and hence, should not be used in children [29]. Opioids analgesics (Codeine) combined with NSAIDs for treatment of moderate to severe post-operative pain in children and adolescents [30].

Tramadol is a drug that is only approved for pain relief in adults, and codeine-containing medications are often sold without a prescription in some countries. The US Food and Drug Administration have now warned against using these drugs in children under the age of 12. In April 2017, the FDA issued a warning to restrict the use of codeine and Tramadol medicines in children and breastfeeding mothers. They should refrain from breast-feeding during taking this medicine as they may transfer some of these compounds to their babies [31].

Pediatric dentists are very precarious and waver to prescribe Opioids analgesics for pediatric patients for fear of dependency, hence, in case of dental pain; it should be used in a short duration [32]. On the other side, parental education, effective use and fewer side effects of non-Opioids analgesics, it has made parents turn to these analgesics for relieving dental pain of their children.

Corticosteroids

The mechanism of pain relief of corticosteroids is achieved by inhibiting the migration of polymorph nuclear cells, leukocytes, phagocytes, and inhibiting vasodilatation by inhibiting the arachidonic acid cycle. This mechanism means that pain and swelling can be alleviated by these drugs after removing the debris and inflammatory factors. This mechanism means that pain and swelling can be alleviated by these drugs after removing the debris and inflammatory factors [33].

Dental corticosteroids are used to relieve the discomfort and redness of some mouth and gum problems, oral ulcerative and vesiculobullous lesions such as Aphtus Stomatitis [34], Lichen Planus [35], Behcet's syndrome [36], Pemphigus vulgaris [37], Erythema multiforme (EM) and Stevens-Johnson syndrome (SJS) [38], mucous membrane pemphigoid [36] and management of post-operative morbidities associated with maxillofacial surgeries [39].

Unfortunately, some patients may experience endodontic pain at moderate to severe levels especially after pulpotomy or pulpectomy which the non-steroidal analgesic cannot alleviate this pain. Hence, the horrible pain may be reduced by administration of glucocorticoid steroids.

Glucocorticoid has been used as a pulp-capping agent [40], an intracanal medicament [41] and systemically [42] for pain reduction and inflammation in post endodontic procedures.

Children and teenagers who must use this medicine should be checked often by their doctor. Dental corticosteroids may be absorbed through the lining of the mouth and, if used too often or for too long a time, may interfere with growth in children. In other words, one side effect that is unique to children associated with long-term systemic corticosteroid use is growth suppression in babies, children, and teenagers [43].

Several studies have pointed that the use of corticosteroids during early pregnancy is associated with a potential increased risk of orofacial clefts [44].

Cortisone due to inhibition of the arachidonic acid cycle has many drug side effects and has many interactions with patients' systemic conditions and use of some medications. Although dentists are always worried about, the study has been shown that single doses of these drugs in case of emergency, have no known side effect [45]. In systemic fungal infections and allergies to corticosteroids, these drugs are absolutely contraindicated [46].

Schimmer and Parker showed that even single doses of corticosteroids for the control of dental pain has no obvious adverse effect [47].

Combinations of analgesics

It possible to achieve the maximum pain relief through various pain control mechanisms (central and peripheral) with the application of the combination of analgesic even with the low dose of each medicine [48]. The combination of acetaminophen and ibuprofen has been suggested in many studies as a good analgesic compound in both children and adults [49] and there is no need to use exotic and complex painkillers to control dental pain!

In many systemic conditions, corticosteroids should be used cautiously and in very limited doses, so corticosteroids are not used in dentistry either in the first line of pain control or in the second line of pain control!

Simultaneous administration of cortisone and NSAIDs (such as Ibuprofen) also may lead the patient more likely to have gastrointestinal problems [50].

In a research which was conducted in Hamedan Medical Sciences University, the aim was to compare the effect of acetaminophen and ibuprofen solely, and combination of these two drugs in relief of dental pain following tooth extraction in children. The results of the present study have also shown that pre-treatment with ibuprofen significantly decreased post-operative pain and the need for analgesics during the first 24 h following pulpotomy and SSC placement in primary molar teeth [51].

Conclusion

The basic mechanism of pain in infants, young children and adolescents are somehow similar to adults but in neonates, we are able to see some differences in the physiological mechanism of pain. Modern pain management for children has advanced over the last two decades.

Several groups of analgesic drugs used in pediatric dentistry practice which the most frequent are NSAIDs and Paracetamol. In spite of other groups of analgesic (such as Opioids and Corticosteroids) that have usages in dentistry especially in adults, they are rarely prescribed in children due to frequent adverse effects, only in particular conditions. The pain management in children and elderly has some limitations accompanied by safety concerns and dose reduction.

Although dental pain management in children requires expertise, the strategy of pain relief should be based on the prevention of pain which ensures better treatment success before painful procedures.

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Volume 9 Issue 10 October 2020