ISSN: 2230-9926

Available online at http://www.journalijdr.com

IJDR

International Journal of Development Research
Vol. 07, Issue, 09, pp.15410-15413, September, 2017

REVIEW ARTICLE OPEN ACCESS

CONSCIOUS SEDATION WITH NITROUS OXIDE IN ANXIOUS CHILDREN: A REVIEW

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ARTICLE INFO

Article History:

Received 04th June, 2017
Received in revised form
18th July, 2017
Accepted 09th August, 2017
Published online 30th September, 2017

Key words:

Nitrous oxide,
Conscious sedation,
Sedation in children,
Clinical research.

ABSTRACT

Introduction: During clinical practice, we can find patients with physical and mental behaviors who are not able to co-operate with dental care. Among them the anxiety and immaturity of children, which are the most frequent in the care. In order for us to achieve ease, safety and tranquility for the development of procedures, we may choose to use conscious sedation through premedication or sedation with nitrous oxide / oxygen. Thus, they are used in an adequate way so as not to compromise the patient's health. It is considered effective and great for pediatric treatments.

Objective: it was approached that conscious sedation for pediatric dentistry treatments brings safe and valid forms, especially in children who do not cooperate with care.

Methods: Experimental and clinical studies were included (case reports, retrospective, prospective and randomized trials) with qualitative and / or quantitative analysis. The words were included "nitrous oxide", "conscious sedation", "sedation in children", "clinical research".

Conclusion: Sedation with N2O is described by several professionals successfully during pediatric dentistry and is an excellent aid in controlling the behavior of children who are mildly or moderately anxious. Gas presents itself as an efficient sedative agent, promoting more relaxed and comfortable care for both the patient and the dentist.

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Citation: Amanda Aparecida Marques, Thaina Gracini da Silva, Leonardo Tadeu Wenzel Ferreira, Idiberto José Zotarelli Filho, Marcelo Augusto Rudnik Gomes, Patrícia Garani Fernandes and Leandro Moreira Tempest, 2017. "Conscious sedation with nitrous oxide in anxious children: A review", *International Journal of Development Research*, 7, (09), 15410-15413.

INTRODUCTION

The child may present a difficult behavior for the care of the Dentist (Nelson, 2017 and Hoeffe, 2017). The ideal is that the professional find a way to take away all the fear and anxiety of this patient. In this case one can choose the treatment of Conscious Sedation with Nitrogen Oxide (N2O), which brings fast, safe and satisfactory action for both the professional and the patient. This treatment allows a greater intervention, bringing great treatment options (Hoeffe, 2017). It is necessary for the Dentist to have the knowledge and experience to use such medication (Samur Ergüven, 2016). Nitrous Oxide Gas (N2O) along with oxygen, was the easiest way professionals found to control children's anxiety, fear, and insecurity (Nelson, 2017; Hoeffe, 2017 and Samur Ergüven, 2003). With gas medication is also guaranteed the absence of pain during dental treatment. This medication causes mild sedation in the patient, keeping him awake and calm during the treatment, thus talking normally with the professional and understanding perfectly everything that is happening (Tian, 2015). It is also indicated for odontophobic patients, because due to sedation it will feel comfortably safe and calm. This procedure is performed through a nasal mask, properly developed for dentistry and will be the mixture of gases (nitrous and oxygen) that will control the patient (American Academy of Pediatrics, 2006). The objective of the present study was to address the

fact that conscious sedation for pediatric dentistry treatments brings safe and valid forms, especially in children who do not cooperate with care.

MATERIALS AND METHODS

Experimental and clinical studies were included (case reports, retrospective, prospective and randomized trials) with qualitative and / or quantitative analysis. Initially, the key words were determined by searching the DeCS tool (Descriptors in Health Sciences, BIREME base) and later verified and validated by MeSh system (Medical Subject Headings, the US National Library of Medicine) in order to achieve consistent search.

Mesh Terms

The words were included "nitrous oxide" "conscious sedation", "sedation in children", "clinical research". For further specification, the "anterior maxilla" description for refinement was added during searches. The literature search was conducted through online databases: Pubmed, Periodicos.com and Google Scholar. It was stipulated deadline, and the related search covering all available literature on virtual libraries.

Series of Articles and Eligibility

A total of 40 articles were found involving sedation in children. Initially, it was held the exclusion existing title and duplications in accordance with the interest described this work. After this process, the summaries were evaluated and a new exclusion was held. A total of 25 articles were evaluated in full, and 16 were included and discussed in this study.

Literature Review

Anamnesis is a very important point in pediatric dentistry care, since it is the patient's medical history, where we must mention: cases of previous severe allergic reactions, history of diseases between the patient and close relatives, use of medications and hospital interventions (Nelson, 2017; Hoeffe, 2017 and Samur Ergüven, 2016). After a well-structured anamnesis we will have a successful drug therapy (Tian, 2015). The first attention is always that which will remain in the patient's memory and will affect the future personality, since anything strange seen or spoken will be one of the great reasons for not returning, and cause "fear" (Tian, 2015 and American Academy of Pediatrics, 2006). Being a different environment, new and with people where they are not of their coexistence, the children already establish a fear and their own insecurity (American Academy of Pediatrics, 2006 and Johnson, 2013). The parents are also the main cause of this case, since the anxiety of the same brings consequences for the reaction and behaviors of the children (Louon, 1994). Ideally, parents should not be present during care, so that the dentist can restore a trust between professional and patient (Fallah, 2013). Conscious sedation with nitrous oxide / oxygen should always be under monitoring, effectively controlling the airway, blood pressure, heart rate and vital signs of the patient (Mekitarian Filho, 2013 and Myles, 2004). For this the office should be basically prepared and structured with emergency equipment, respiratory masks and medications for allergic reactions (Goldman, 2003). Nitrous oxide, moreover, is soluble and does not mix with any component of the body (Rocca, 2000). For this reason their action is faster and their elimination will also be quick (Murray, 1990).

Advantages and disadvantages

There are several advantages in using the combination of oxide and oxygen by inhalation, such as: faster onset of action; The rapid recovery time due to the pharmacological characteristics of nitrous oxide and few side effects associated with sedation use (Nelson, 2017 and Hoeffe, 2017). Its administration is simple and painless, its onset is rapid, as is also, the end of the effect as soon as its inhalation is suspended (Samur Ergüven, 2007). N2O has the benefit of decreasing or even eliminating anxiety, reducing undesirable movements and reactions in dental treatment, increasing patient communication and cooperation, as well as tolerance to longer and more time-consuming treatments (Samur Ergüven, 2016 and Tian, 2016). As disadvantages to this technique are: the high cost of equipment, including gas; The fact that nitrous oxide is not a potent agent and may not achieve the desired clinical effects in a group of tolerant patients (American Academy of Pediatrics, 2006).

Indications

Sedation with N2O / O2 is very useful in children from 4 years of age (Fallah, 2013). Patients indicated for sedation are fearful, anxious or agitated children; Certain patients requiring special care, such as in muscle disorders and cerebral palsy (Mekitarian Filho, 2013).

Contraindications

Sedation of children under the age of 1 year is contraindicated, which is not relevant in the dental office (Hoeffe, 2017 and Samur Ergüven, 2016). It is contraindicated the use of N2O in cooperative children, patients with lung diseases, problems in the upper airways such as rhinitis, sinusitis, adenotonsillitis or nasal obstruction (Tian, 2015). The use of conscious sedation by oxygen and nitrous oxide should be used in the concentration of at least 30 to 40% oxygen in the gas mixture (Johnson, 2016).

Respiratory Physiology

Knowing the differences between the respiratory tract of a child and an adult is essential for the Dentist who uses sedation with N2O to be safely administered (Louon, 1994). Inhalatory Sedation With Nitrous Oxide in the Infant Patient (Fallah, 2013). The nostrils of the child, the oropharynx and the trachea are relatively narrow; any irritation of the mucous membrane can cause edema in this area, making proper ventilation difficult. Children have high metabolic rates, resulting in increased oxygen consumption (6 to 9 mL / kg per minute) compared to adults (3mL / kg per minute). For this reason, for sedation to be an effective experience for everyone, it is fundamental to know the characteristics of the respiratory system (Mekitarian Filho, 2013).

DISCUSSION

Moderate sedation also referred to as conscious sedation or sedation / analgesia is drug induced, during which the patient responds verbally to commands (American Academy of Pediatrics, 2006). No intervention is required to maintain the

patent airway. In order for the Dentist to successfully perform sedation of the patient, he must choose the ideal inhalation anesthetic, which must respect characteristics such as: allow rapid changes of depth of anesthetic planes, have a wide margin of safety, as well as be free of effects Adverse events at therapeutic doses (Johnson, 2013). Inhalation of N2O/O2 is a safe and effective technique for improved communication and reduced anxiety, need for careful selection as well as patient and practitioner safety should be considered prior to the use of N2O/O2 (Louon, 1994 and Fallah, 2013).

N2O is a strong analgesic and weak anesthetic, which is used for sedation / anesthesia. Its mode of action is through interaction with the CNS cell membranes (Myles, 2004). It is a stable, colorless gas with a slight sweet taste (Peyton, 2008).
Anesthetic agents in the form of gases express their action through differences in pressure gradients (Tunstall, 1981). In this case, N2O shifts from a higher pressure gradient to a lower pressure gradient, and solubility in blood and various tissues is an important factor in its (Tunstall, 1981 and Goldman, 2003). Thus, the interaction between a drug and brain tissue, adipose tissue, blood depends on a balance and is expressed in a sharing coefficient (Rocca, 2000). This value expresses the ease that the drug has to move from the alveoli to and between the remaining systems (Murray, 1990). The difference between the partial pressure of a gas in the gas phase and in the blood indicates how fast the anesthetic agent crosses the pulmonary membrane and enters the bloodstream (Kihara, 2003). This is called the gas / blood sharing coefficient. The gas / blood partition coefficient for N2O is 0.47, which means that it rapidly spreads from the alveolus into the bloodstream, ie a rapid induction (Kihara, 2003). It also has a low tissue solubility, since the fat / blood tissue partition coefficient is 2.3, not accumulating in the tissues, resulting in a rapid elimination after suspension (Kihara, 2003).

Adverse effects and complications

N2O has an excellent safety record, acute and chronic adverse events are rare, when administered by trained personnel, in carefully selected patients and with appropriate equipment and technique (Nelson, 2017 and Hoeffe, 2017). N2O is a safe and effective agent for controlling the behavior of children by the pharmacological form (Samur Ergüven, 2016). The risks involved in a sedation for children are relative to a variety of factors. It can occur from allergic reactions due to drug exposure to toxic reactions related to drug dosage (American Academy of Pediatrics, 2006). It is essential for the use of sedation a hospital environment or dental office where all the resuscitation material is available (Johnson, 2013). Should be Monitored for all vital reflexes (swallowing, coughing, crying, etc.) and should be preserved (Johnson, 2013). Regarding the depth of sedation, it is known that (70.0%) concentrations promote mild to moderate sedation, with a low occurrence of adverse effects, and are safe for sedation and analgesia, even in children under 3 years of age Of age (Louon, 1994). However, when deepening of sedation occurs, the patient presents a more serious risk of cardiovascular and / or respiratory changes. The state of consciousness must be constantly evaluated through verbal communication with the patient (Fallah, 2013). Nausea and vomiting are the most common adverse events, with a higher incidence when gas administration is prolonged at high concentrations (above 50.0% N 2 O) (Fallah, 2013 and Mekitarian Filho, 2013). Its incidence, however, varies with the patient's risk profile and the procedure, and with the prophylactic measures used (Myles, 2004). Another complication is residual hypoxia that may occur after the end of N2O administration (Peyton, 2008). Rapid release of this from the bloodstream to the alveoli can dilute the amount of O2 available to the patient. This complication is irrelevant when it comes to a healthy patient, however it is recommended that the patient receive 100% O2 for 3 to 5 minutes after the use of N2O is finished to prevent this phenomenon and possible headaches or disorientation (Tunstall, 1981). Rarer complications due to exaggerated sedation may be dysphoria, sweating, restlessness, panic, nightmares, tinnitus, and urinary incontinence were also observed (Goldman, 2003).

Technique of N2O administration and its monitoring

N2O should be administered only by individuals appropriately trained for this purpose (Samur Ergüven, 2016). It should be specialized in the use of such techniques, as well as how to deal with and respond to emergency situations that may arise (Tian, 2015). After careful selection of the patient and verification of the equipment, the choice of the ideal nasal mask size should be made (American Academy of Pediatrics, 2006 and Johnson, 2013). It is recommended to introduce 100.0 % O 2 for 1 to 2 minutes, followed by titration of N 2 O in 10.0 % intervals, not to exceed 50.0 %. The concentration of N2O can be decreased during the execution of simpler procedures (eg, restorations) and increased during the most stimulant (eg extraction, injection of local anesthetic) (Johnson, 2013). The response given by patients to the commands during dental treatments with N2O serves as a guide to their level of consciousness (Louon, 1994) Clinical monitoring includes the patient's response to physical and verbal stimuli, observing breathing and chest movements, airflow, respiratory rate, and skin color (Fallah, 2013). The success of sedation with N2O is also dependent on psychological confidence and patient prior preparation (Mekitarian Filho, 2013). For this reason, it is important to continue the traditional techniques of behavior control during treatment. Once the flow of N2O is completed, O2 should be used at 100.0 % for 3-5 minutes (Myles, 2004). This is the time required to eliminate all of the N2O from the body through the exhaust system, allowing full recovery of the patient, and to reduce occupational risk (Peyton, 2008).

Conclusion

Sedation with N2O is described by several professionals successfully during pediatric dentistry and is an excellent aid in controlling the behavior of children who are mildly or moderately anxious. Gas presents itself as an efficient sedative agent, promoting a more relaxed and comfortable care for both the patient and the dentist.

Conflict of interests: There is no conflict of interest between authors.

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