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REVIEW ARTICLE

THE USE OF NITROUS OXIDE IN DENTAL IMPLANT: LITERATURE REVIEW

[1]Ana Larisse Carneiro Pereira, [1]Jefferson David Melo de Matos, [2]Natividade da Costa Siebra, [3]Bruna Caroline Gonçalves de Vasconcelos and *[4]John EversongLucena de Vasconcelos

[1]School of Dentistry, University Center UNILEÃO, Juazeiro do Norte, Ceará, Brasil
[2]Specialist in Public Health, Faculty Kurios, Juazeiro do Norte, Ceará, Brasil
[3]Master's Degree of Orthodontics, San Leopoldo Mandic, Campinas – São Paulo
[4]Professor of Oral Implantology, Dentistry Department, Centro Caririense de Pós-Graduação CECAP, Juazeiro do Norte, Ceará, Brasil

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ABSTRACT

Objective: to demonstrate how to use nitrous oxide during dental implant procedures in dentistry and its main advantages, disadvantages, recommendations and contraindications by means of literature review.
Methodology: the main electronic data base for library catalogue was used in this study (PUBMED, SCIELO and BVS), from 2000 to 2016, with the following keywords: dental implant, conscious sedation and nitrous oxide. Seventeen articles were selected by set out inclusion criteria and twelve of them were excluded for not being literature review works, nor systemic or case report, neither did them approach advantages or disadvantages of nitrous oxide during surgery and demonstrate the most important situation of the nitrous oxide use in Dentistry**.**
Results: the works showed that the use of nitrous oxide during surgery procedures is a feasible alternative when it comes to the patient being afraid or anxious, Thus, making the patient more cooperative to the proposed treatment, since it acts in the nervous system, by causing a slight depression in the brain cortex. In some situations, the advantage provided by using thistechnique may not work in the patient, putting his life at risk. In such cases, the procedure must be aborted and maneuvers must be performed.
Conclusion: This technique is considered to be safe in dentistry, for the anxiolytic and analgesic effect guarantee safe surgery procedures, however it is required the professional to be qualified for doing so.

INTRODUCTION

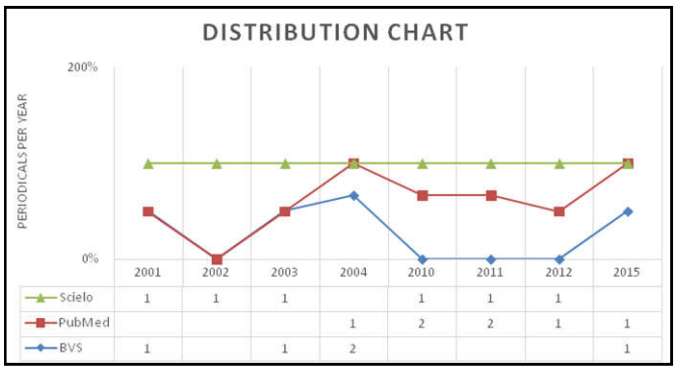
Nitrous oxide was discovered in 1772 by researcher Joseph Priestley, firstly used to treat diseases like tuberculosis and gastric. Later, the chemist and physicist HumphreuDaw had noticed a relief for the symptoms that represent the inflammation conditionafter inhaling nitrous oxide when treating pericoronitis (CALDAS L AF, 2004). After that, Daw published a compendium in 1800 -Researches, Chemical and Philosophical; Chiefly Concerning Nitrous – announcing that the nitrous oxide could reduce physical pain and could be used in surgeries when there's no risk of too much bleeding (DAHER, 2012). The nitrous oxide (laughing gas) it's a gas used to reduce the patient's anxiety and fear during dental treatment, making the patient more cooperative in a faster and safer way, besides diminishing pain awareness. Such gas acts on the nervous system providing a minimal depression on the breathing center and low action on the brain cortex (MITRA, 2007). Administrated by means of a nasal mask (developed to be used in dentistry) nitrous oxide is a transparent gas, presenting low solubility, not irritating, not suffering alteration, which explains the non-existence of relevant side effects. Pharmacologically, nitrous oxide acts from the interaction with glutamate receptors. According to Guedel plan it is seen that sedation with N2O/O2 has action in stage 1, causing a minimal depression of consciousness (anxiolysis), however, preserving breathing, protection reflex action, and response to verbal stimuli. Psychological factors act directly on pain threshold, so increasing sensibility. Emotional factors, anxiety and imbalance caused by tension prior to the dental procedures are factors always present in the psychological frame that can disturb the professional service to the patient (ANDRADE,

Corresponding author: John EversongLucena de Vasconcelos
Professor of Oral Implantology, Dentistry Department, Centro Caririense de Pós-Graduação CECAP, Juazeiro do Norte, Ceará, Brasil.

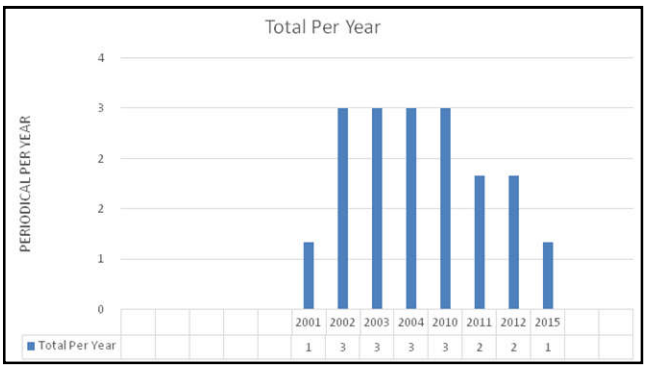
2002). Anxiety can be classified in: panic attack and general anxiety. The first ones, respectively, are periodic and consist of an uneasy feeling with palpitation, chest pain, difficult breathing, sweating, trembling, and other physical gestures. At a second moment, it can be shown as an excessive worry, besides spasms, trembling, muscle tension, diarrhea, fatigue, tachycardia, and others (ORLANDO, 2003). The objective of this research is to show the use of the nitrous oxide during dental implant in dentistry, its main advantages and disadvantages, indication and contraindication.

MATERIALS AND METHODS

The main electronic library catalogue data base of PUBMED (www.pubmed.gov), SCIELO (www.scielo.org), and BVS (www.bvsalud.org) were used in this study from 2000 to 2016 with the following keywords: dental implant, conscious sedation and nitrous oxide. Eighteen articles which fit in the inclusion criteria were selected: literature review works, systemic works and case report, that showed advantages and disadvantages of using nitrous oxide in surgery and demonstrating the main situations of its use in Dentistry.



Graph 1. Distribution Chart



Graph 2. Amount of articles relating the years of publishing

Table 1. Results shown according to the authors' approaches

Author / year	Published Article	Type of study
Caldas , LAF.; Gamba, CG/ 2004 [1]	Revista Naval	Literature Review
Daher et al., 2012 [2]	BMC Oral Health	Literature Review
Mitra et al., 2015 [3]	Indian Journal of Anaesthesia	Literature Review
Cavalcante, SR.; Nunes, RR/ 2003 [4]	RevistaBrasileira de Anestesiologia	Literature Review
Andrade, SC.; Santos, BR/ 2004 [5]	Revista ABO	Analytical
Andrade M., 2002 [6]	Revista ABO	Literature Review
Orlando S., 2003 [7]	RevistaBrasileira de Odontologia	Literature Review
Ekbom et al., 2011 [8]	Archive of Pediatrics and Adolescent Medicine	Analytical
Klein et al., 2011 [9]	Pediatric Dentistry	Analytical
Aga., 2001 [10]	Rio de Janeiro: AGA	Literature Review
Amarante et al., 2003 [11]	RevistaBrasileira de Odontologia	Literature Review
Ada., 2012 [12]	American Dental Association	Literature Review
Jackson, DL.; Johnson, BS/ 2002 [13]	Dental Clinics of North America	Literature Review
Patel S., 2010 [14]	SAAD Dig. – NCBI	Literature Review
Lacerda et al., 2010 [15]	RevistaBrasileira de CirurgiaBuco-Maxilo-Facial	Case Report
Andrade M., 2002 [16]	Revista ABO	Literature Review
Brunick, A.; Clark, M/ 2010 [17]	Dental Assistant	Literature Review

RESULTS

The works showed that the use of nitrous oxide during surgery is a feasible alternative when it comes to the patient being afraid and anxious, making the patient more cooperative to the proposed treatment, since it acts in the nervous system, by causing a slight depression in the brain cortex. In some situations, the advantage provided by using such technique may not work in the patient, putting his life at risk. In such cases, the procedure must be aborted and maneuvers must be performed.

DISCUSSION

Conscious sedation happens by the association of N2O (nitrous oxide) and O2 (oxygen) gases. When they are inhaled the nitrous oxide is transported to blood, until it gets to brain cortex level, so generating a slight depression. The gases must present a means of 50% to 70% nitrous oxide and 30% oxygen, making sure the N2O inhaled be enough and the O2 be in a level the human body can stand (EKBOM K, KALMAN, 2008). Conscious sedation technique requires a number of devices such as inhalation mask, compressed oxygen (a green cylinder), nitrous oxide(a blue cylinder), adevice to measure blood pressure, flowmeter, wrist oxymeter and pressure regulating valves (KLEIN, 2011). The use of nitrous oxide in dentistry has several advantages, as to say: it has no affinity with any structure of the human body or blood, for it is insoluble, its odor is pleasant, it doesn't suffer any alteration and that is why it is eliminated without suffering metabolizing and it comes to effect three to five minutes after inhalation starts (AGA, 2001). Even though this technique is indicated for situations when the patient is facing fear, anxiety, hyperactivity, physical or mental disturbances and happiness it also presents some disadvantages such as: equipment and gases withhigh cost, it may not reach the expected clinical effects in case of tolerant patients, it may fail in just case the team has not been well trained to put the technique into practice since its

efficiency depends on the gases being inhaled through the nose (Amarante, 2003). The use of nitrous oxide must follow a protocol. If sedation gets too strong the first thing to do is to reduce the nitrous oxide flow. If the patient doesn't wake up sedation must be aborted together with the clinical procedures being realized in addition to keep the patient under 100% oxygen inhalation for five to eight minutes (American Dental Association, 2012). Therefore, the professional must start sedation with 6L/min of pure oxygen, and, after two minutes, start using 10% nitrous oxide, progressively increasing the quantity 10% each minute until it reaches the expected sedation level (Jackson, 2002). In procedures like these, the professional must be prepared for any complication that might occur and be able to administer first aid techniques, keeping the patient alive until medical help comes. Basic life support or the so called Life ABC must be used before any urgency or emergency situations (Patel, 2010). Before starting sedation, it is necessary to instruct the patients about analgesia, the wearing of large clothes, especially around the neck, hip and arms, bladder emptying, so avoiding diuresis in the middle of the process and asking to remove the removable prosthesis (Lacerda, 2010). The use of nitrous oxide also has contraindications such as: patients with respiratory infections, nasal septum deviation, increased tonsils, cleft palate, mouth breather, patients with a non-cooperating behavior at a high level who reject to wear the mask, expectant mothers in the first trimester, chronic lung diseases, psychiatric, schizophrenic and psychotic patients. These are conditions that can disturb the continuity of the procedure (Andrade, 2002 and Brunick, 2010).

Conclusion

It can be concluded from this study that: Sedation with nitrous dioxide and oxygen does not cause any cardiovascular alterations, what maintains hemodynamic and respiratory stability. The anxiolytic and analgesic effect guarantee safe surgery procedures. The technique is considered to be safe in dentistry, however it is required the professional to be qualified for doing so. Besides providing the patient with a smoothing and relaxing feeling, it also allows lowering the dose of anesthetic increases the effect of local anesthetic and instillsa quiet work environment for the professionals.

Conflict of interests

The authors declare they do not have any conflict of interests.

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