

Making Conscious Sedation More Efficient By Custom Made Nasal Hood

Abstract

Background: Nitrous oxide was first synthesized in the 1700s. It was inhaled recreationally for the feeling of euphoria it produced. It was not until the mid-1850s that it began to be used as a dental analgesic in England. Nitrous Oxide Oxygen Inhalational Sedation technique is very popular amongst dentists abroad. However its use amongst the pediatric dentists in India still remains elusive. One reason for this being a dearth of readily available equipment used for this technique.

Aim: To improve the efficiency of conscious sedation in a dental set up by making a custom made nasal hood using rubber base impression material.

Material & Method: Using Vinyl Polysiloxane impression material, Plastic measuring cup & nasal tube custom made nasal hood is prepared using chair side impression technique

Conclusion: This custom made nasal hood can be readily used in the dental operator for providing Conscious Sedation. Thus conscious sedation can be provided more effectively using this nasal hood specially with respect to pediatric patients

Key Words

Custom made Nasal Hood, Conscious Sedation, Nitrous Oxide Oxygen Inhalational Sedation, Pediatric Conscious Sedation

Introduction

Dental treatment is perceived as stressful for many children and a dental visit may invoke many anxieties. Often their coping skills are not sufficiently developed to deal with these situations and they experience fearful behavior. The consequences of dental fear in children include avoidance of dental care, behavior management problems and deterioration of dental health and general health. This can be taken care of by introducing Conscious sedation techniques in the dental management of child patient.

'The term procedural sedation has emerged by The American College of Emergency Physicians (ACEP). Procedural sedation is defined as "a technique of administering sedatives or dissociative agents with or without analgesics to induce a state that allows the patient to tolerate unpleasant procedures while maintaining cardio respiratory function. PSA is intended to result in a depressed level of consciousness that allows the patient to maintain oxygenation and airway control independently."^[1]

The gases used in Inhalation sedation that is primarily Nitrous oxide and oxygen were discovered by Joseph Priestley (1733–1804) an English scientist ,Carl

Wilhelm Scheele and Antoine Lavoisier respectively.^[2] However they had little knowledge about anesthetic properties of Nitrous oxide. Then in 1798 at Dowry Square in Clifton, Bristol Thomas Beddoes (1760–1808) founded the Pneumatic Institution for inhalation gas therapy. Beddoes employed chemist and physicist Humphery Davy (1778–1829) as superintendent of the institute, and engineer James Watt (1736–1819) to help manufacture the gases.^[3] During the course of his research at the Pneumatic Institution, Davy discovered the anesthetic properties of nitrous oxide.^[4]

The other physical properties of Nitrous Oxide are that it is a stable, non-irritating colorless gas with slightly sweetish odor and taste. Nitrous Oxide is an inhalation anesthetic. Nitrous oxide, comprising two nitrogen atoms and one oxygen atom, is a nonflammable gas that is liquid at room temperature. The mechanism of action is not well-understood, but is thought to be via the stimulation of endogenous endorphin release and, possibly, corticotropins and dopamine release. These biochemical actions create a euphoric effect that makes the patient less aware of pain.^[5]

For anesthesia, it is commonly used in a concentration of 50-70% in oxygen as

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part of a balanced technique in association with other inhalation or intravenous agents. A mixture of nitrous oxide and oxygen containing 50% of each gas is used to produce analgesia without loss of consciousness which is quite effective for dental procedures.

The first devices used in dentistry to administer the gas, known as Nitrous Oxide inhalers, were designed in a very simple way with the gas stored and breathed through a breathing bag made of rubber cloth, without a scavenger system and flowmeter, and with no addition of oxygen/air.^[6] Today these simple and somewhat unreliable inhalers have been replaced by the more modern relative analgesia machine, which is an automated machine designed to deliver a precisely dosed and breath-actuated flow of nitrous oxide mixed with oxygen, for the patient to inhale safely. The machine used in dentistry is designed as a simplified version of the larger anaesthetic machine used by hospitals, as it doesn't feature the additional anaesthetic vaporiser and medical ventilator. Relative analgesia machines typically feature a constant-supply flowmeter, which allow the proportion of nitrous oxide and the combined gas flow

rate to be individually adjusted. The gas is administered by dentists through a demand-valve inhaler over the nose.

The demand valve was invented on November 14, 1838 by Dr. Manuel Théodore Guillaumet of Argentan, Normandy in France. The demand valve being so bulky is not a very popular choice for delivering analgesia in dentistry.

However being such a useful adjunct in dental management of child patient nitrous oxide analgesia is not so popular amongst the pediatric dentists in India. One reason for this being that specific equipment is required for performing conscious sedation which is quite expensive. The Boyle's apparatus can solve this problem to some extent. But the issue regarding ideal nasal hood still persists.

This problem can be addressed by a custom made nasal hood which can easily be fabricated in the dental clinic and is quite cost effective. The technique described below not only helps us in making a nasal hood which is custom made but is also very simple non tedious and cost effective

Material & Methodology:

- Vinyl poly siloxane impression material (GC America Inc.)
- Plastic measuring cup (15mL Volume)
- Nasal tube which is provided with the Boyle's apparatus
- Scalpel with BP blade no.15
- Straight scissors
- Glass marker

Technique:

After the patient is made comfortable in the dental operatory, we proceed with impression technique. First the apparatus to carry the impression material is made using the nasal tube and plastic cup. Nasal tube of sufficient length (that would suffice to complete one circle around the head of the patient is measured and cut using BP blade). Now the plastic cup is adjusted on the patient's nose & markings are made on it using glass marker (wide U shaped notch on the cup to fit it snugly on the nasal bridge & a wide V shaped notch on either side near the ala of the nose for accommodating the nasal tube) and cut accordingly (Fig.1), just enough to completely adapt near the tip of the nose. The nasal tube is now placed along with this preadjusted cup



Fig 1: wide U shaped notch on the cup to fit it snugly on the nasal bridge & a wide V shaped notch on either side near the ala of the nose for accommodating the nasal tube



Fig 5: Inner view of the custom made nasal hood



Fig 2: Long Semilunar cut is made in the nasal tube opposing the nostrils



Fig 3: Putty loaded nasal cap along with the nasal tube placed over the nose



Fig 4: Final putty loaded nasal cap after trimming out the excess material

opposing the nostrils and markings are made near the nostrils on the tube to cut a hole (i.e. a semilunar cut was made along one wall of the nasal tube keeping the contiguous wall intact) so that a continuous connection can be established through the nasal tube for uninterrupted supply of gases (Fig.2). This apparatus is now used to carry the putty impression material. Two scoops each of base and catalyst paste is taken and mixed thoroughly to get a uniform color and consistency. Two small balls of this impression material is first placed near the ala of the nose and the nasal tube is adjusted on it such that the hole cut in it closely approximates the nostrils. The plastic cup is filled with the impression material and placed on the nasal tube and pressed so that the impression material flows over the upper lip and extends completely over the tip of the nose. (Fig.3) The material is allowed to set & any excess material flown in the nostrils & nasal tube is removed using a scalpel (Fig.4). Thus our custom made nasal hood for conscious sedation is ready to be used in the dental operatory. (Fig 5)

Discussion

There are different means of delivering inhalational analgesia that include use of nasal cannula & mask covering nose and mouth. Nasal cannula though may seem to be very comfortable for patients to use still has a major drawback of air dilution due to which desired "Smothering feeling" of analgesia is not readily achieved. Also stable level of analgesia was difficult to maintain due to large and variable air dilution factor.^[7]

Mask covering nose & mouth besides being uncomfortable to many patients hinder the operating procedure, so their

use in dental procedure remains out of question.

With nasal hood, analgesia is achieved quickly & comfortably. Goldstein et al in 1968 emphasized the use of nasal hood inhalational analgesia for dental procedure. However they did mention the need of better equipment as a means for providing optimum inhalational analgesia.^[7]

A wide variety of nasal hoods are available in the market for conscious sedation. However they are not custom made so at times it becomes difficult to use them with full efficiency especially in children, as children are in a continuous growth phase & huge variation is seen in their anatomy of nasomaxillary complex. Moreover they are quite costly and small sized nasal hoods for pediatric patients can't be readily procured at times. As a result despite of being such a useful procedure conscious sedation is not so popular amongst dentists in India.

There is a dire need for a nasal hood that is easily available in all sizes so that the conscious sedation procedure can be performed with maximum efficiency.

This custom made nasal hood made using chair side rubber base impression technique fulfills all these requirements.

Advantages of this custom made nasal hood are that it can be easily and instantly fabricated in the dental operatory. It is custom made so comfortable for the patient also thereby improving patient compliance. No cumbersome procedure required to make this type of nasal hood therefore it can be done as a chair side technique with help of dental assistant. This custom made nasal hood provides highly efficient conscious sedation.

Summary

This technique describes an accurate and simple and highly efficient method of making a custom made nasal hood that can be used for conscious sedation in the dental operatory.

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