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Conscious sedation in Pediatric Dentistry: A review Literature.

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ABSTRACT: The safe sedation of children for procedures requires a systematic approach abstract that includes the following: no administration of sedating medication without the safety net of medical/dental supervision, careful presedation evaluation for underlying medical or surgical conditions that would place the child at increased risk from sedating medications, appropriate fasting for elective procedures and a balance between the depth of sedation and risk for those who are unable to fast because of the urgent nature of the procedure, a focused airway examination for large (kissing) tonsils or anatomic airway abnormalities that might increase the potential for airway obstruction, a clear understanding of the medication's pharmacokinetic and pharmacodynamic effects and drug interactions, appropriate training and skills in airway management to allow rescue of the patient, age- and size-appropriate equipment for airway management and venous access, appropriate medications and reversal agents, sufficient numbers of appropriately trained staff to both carry out the procedure and monitor the patient, appropriate physiologic monitoring during and after the procedure, a properly equipped and staffed recovery area, recovery to the presedation level of consciousness before discharge from medical/dental supervision, and appropriate discharge instructions.

Keywords: conscious sedation, nitrous oxide, hypoxia, diffusion, hypoxia.

I. INTRODUCTION:

The term conscious sedation is defined as, "A medically controlled state of depressed consciousness that allows the protective reflexes to be maintained; retains the patient's ability to maintain a patent airway independently and continuously; and permits an appropriate response by the patient to physical stimulation or verbal command."The safe sedation of children involves careful pre-sedation evaluation, careful evaluation of airway for large tonsils or any anatomic abnormality, appropriate fasting guidelines for elective procedures, a understanding about pharmacodynamics and pharmacokinetics effects of sedating drugs used, appropriate sized airway equipment and venous access and appropriate intraoperative monitoring, properly equipped staff in recovery area and proper discharge criteria.

Sedation drugs can be administered through various routes such as oral, nasal, intramuscular, intravenous (IV), subcutaneous, and inhalational routes. Patient selection is of utmost importance in administering conscious sedation in pediatric dentistry. The American Society of Anesthesiologists (ASA) scale of Physical Fitness (Craig and Skelly, 2004)6 may be useful to classify patients when risk is anticipated
, ASA 1: Normal healthy patient
ASA 2: Patient with mild systemic disease
. ASA 3: Patient with severe systemic disease (limits activity).
ASA 4: Patient with severe incapacitating systemic disease. ASA 5: Moribund patient with poor prognosis
ASA5: Moribund patient with poor prognosis (<24 hours).

Body: OBJECTIVES OF CONSCIOUS SEDATION

Conscious sedation techniques possess several characteristics that differentiate them from unconscious modalities. In general, conscious techniques:

1. It should alter the patient's mood, thus making him psychologically receptive to dental treatment
. 2. It must allow the maintenance of consciousness throughout the procedure.
3. It must result in patient cooperation. Numerous studies carried out at the University of Pittsburgh have shown that chair side

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productivity is increased by a minimum of 30% when conscious sedation is utilized for dental procedures (Bennett, in preparation). 4. It should raise the pain threshold that is usually beneficial particularly when long appointments are contemplated.

Problems of Dental Pediatric Anesthesia Main problems have been divided into:

Surgical factors: As airway is shared by the anesthesiologist and dentist, it may be soiled with blood or debris and stimulation of trigeminal nerve increases chances of arrhythmia during surgery.

Pediatric issues

1. They may have enlarged tonsils and adenoids thus increasing chances of respiratory obstruction
2. They are uncooperative and communication may be challenging
3. Many medical conditions can co-exist such as epilepsy, reflux, and cardiac anomalies
4. They are needle phobic and highly anxious
5. High autonomic activity thus increasing chances of arrhythmias and vasovagal response
6. Gastric emptying may be delayed
7. Problems of ambulatory anesthesia.

Drugs Used for Conscious Sedation

An IV line should be secured before giving any drugs even if we use inhalation anesthesia. Many sedative drugs are used along with local anesthetics and which are usually sufficient to reduce fear and anxiety among children. Nitrous Oxide and Oxygen Mixture Nitrous oxide is a gas and used as the inhalational anesthetic agent. It has anxiolytic and sedative properties with varying degree of analgesia and muscle relaxation. Recent studies suggest both gamma-aminobutyric acid type A (GABA A) and N-methyl-D-aspartate (NMDA) receptors are affected. It has a long history of safe use providing moderate sedationfor minimally moderately painful procedures.

Benzodiazepines They provide anxiolysis, sedation/hypnosis, skeletal muscle relaxation, anterograde amnesia, respiratory depression, and an anticonvulsant effect[14] but have no analgesic properties. Mechanism of action is through GABA-mediated opening of chloride channels. Benzodiazepines (BZD) have a wide margin of safety between therapeutic and toxic doses. They have high lipid solubility so have a rapid onset of action.

Ketamine : Ketamine is NMDA antagonist. It is a dissociative agent, which makes a state of catalepsy that gives sedation, control of pain and amnesia. Ketamine has advantages over other drugs in its relative cardiovascular steadiness and restricted affect on therespiratory mechanics. Recovery occurs in 30–120 min, which allows for patient discharge in a reasonable time after the procedure. It is a dose-related cardiovascular stimulant. Even in children with congenital heart disease, it caused clinically only minor increases in heart rate and mean pulmonary artery pressure during catheterization.

Atropine tends to lessen the emesis by reducing the increase in salivary flow.[23] Laryngospasm has been reported in only 0.4% of cases, 8 and has been managed with 100% positive pressure oxygen.[24] Ketamine can be given intramuscularly at 3–4 mg/kg or intravenously at 1–2 mg/kg. Ketamine can be given in doses of 2.5 mg/kg with nitrous oxide/oxygen, promethazine, atropine, and diazepam.[25] Tucker also used IV ketamine at an induction dosage of 0.6 mg/kg and a maintenance dosage of 0.4 mg/ kg every 10 min. Diazepam and nitrous oxide/oxygen were administered concurrently in 60 patients with good results.[26] Administering a lower than recommended dose of a drug may be safer than the heavy doses to achieve adequate levels of sedation in some children, with their attending problem of potentially severe respiratory depression.

Propofol: Propofol is a water-immiscible oil which is formulated as an emulsion with a soya oil base to facilitate injection. The elimination half-life is between 2 and 24 h. However, its duration of clinical effect is much shorter because Propofol is rapidly distributed into peripheral tissue, and its effects, therefore, wear off considerably within even a half hour of injection. This, together with its rapid effect and the moderate amnesia it induces makes it an ideal drug for IV sedation.[27] Sub-anesthetic doses of propofol used for IV conscious sedation infusion facilitated operative dental treatment in anxious children.[28] IV induction by ketamine or propofol remains a problem because of the difficulty in obtaining vascular access in the awake and frightened child. Potent volatile anesthetic agents are used for induction of anesthesia to avoid the struggle to get IV access before the child is asleep. With sevoflurane, dose of propofol used is an initial loading dose, (usually 1 mg/kg body weight) and the maintenance dosage needed to achieve satisfactory sedation, ranging from 0.3 to 4 mg/kg/h.[

Sevoflurane: Sevoflurane is a potent volatile anesthetic with low blood-gas solubility[31] resulting in fast onset and offset (induction often within 1 min). Sevoflurane is, therefore, ideal for induction before infusion of a total intra-venous anesthetic such as propofol to maintain the sedation.

Chloral Hydrate: Chloral hydrate is a chlorinated derivative of ethyl alcohol that can act as an anesthetic when administered in high doses. It is a weak analgesic and psychosedative with an elimination half-life of approximately 8 h. In small doses, mild sedation occurs and in intermediate doses, natural sleep is produced. It depresses blood pressure and respiratory rate. It may cause oxygen desaturation and prolonged drowsiness. Because of gastric irritation nausea and vomiting are also common complications. In larger doses, myocardial depression and arrhythmia can occur. Prolonged sedation and paradoxical reactions are reported so monitoring after sedation required. Generally considered one of the safest sedative agents, chloral hydrate does have the potential for causing unexpectedly deep levels of sedation as well as upper airway obstruction in some patients. Chloral hydrate is contraindicated in children with heart disease as well as those with renal or hepatic impairment. Recently, there has been concern that there is a risk of carcinogenesis, especially when used repeatedly. It has been used for routine sedation for many years.

Sufentanil: Sufentanil is 10 times more potent than fentanyl. Several instances of reduced chest wall compliance have been reported in children after nasal sufentanil, as well as a higher incidence of nausea and vomiting and a prolonged discharge time when compared to nasally administered midazolam. These potential side effects and prolonged hospital stay after nasal sufentanil makes it an unpopular choice for premedication.

II. CONCLUSION:

Sedation should be considered as part of management of pain and dental anxiety, to make the treatment a pleasant learning experience. Conscious sedation is a safe method with a wide safety margin that can be used effectively in managing dental fear and anxiety and can reduce the need for general anesthesia. Inhalation sedation using nitrous oxide is the recommended choice for conscious sedation in children. Intravenous sedation should be prescribed carefully and used only in adolescents over the age of 12 years.

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