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ROLE OF CONSCIOUS SEDATION IN MINOR ORAL SURGICAL PROCEDURES- A REVIEW ON VARIOUS SEDATIVE AGENTS

[1]DR.GAYATHRI GOPI, MDS, [2]SATHYA.K, CRRI, [3]DR. K. SENTHIL KUMAR, MDS, [4]DR.VANDANA SHENOY, MDS, [5]DR. K. MOHAMED AFRADH, MDS

[1]Reader, Department of Oral Maxillofacial Surgery, Thai Moogambigai Dental College and Hospital, Chennai, Tamil Nadu, India, Email Id: drgayathri20@gmail.com

[2]Junior Resident, Thai Moogambigai Dental College and Hospital, Chennai, Tamil Nadu, India, Email Id: sathyakrishnamoorthy78@gmail.com

[3]Professor, Department of Oral Maxillofacial Surgery, Thai Moogambigai Dental College and Hospital, Chennai, Tamil Nadu, India, Email Id: senthilomfs@gmail.com

[4]Professor, Department of Oral Maxillofacial Surgery, Thai Moogambigai Dental College and Hospital, Chennai, Tamil Nadu, India, Email Id: vandanashenoy2006@gmail.com

[5]Senior Lecturer, Department of Oral Maxillofacial Surgery, Thai Moogambigai Dental College and Hospital, Chennai, Tamil Nadu, India, Email Id: dr.afradh@yahoo.com

Correspondence Author: *Sathya. K, Junior Resident, Thai Moogambigai Dental College and Hospital, Chennai, Tamil Nadu, India

Address: No: 120, Vembuliamman Kovil Street, Harrington Road, Shenoy Nagar, Chennai-600030, Tamil Nadu, India

Contact No: 9940531346

Email Id: sathyakrishnamoorthy78@gmail.com

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Abstract:

Conscious sedation is an effective technique which causes controlled drug-induced depression of consciousness enabling treatment to be performed with verbal response. It helps to reduce anxiety and pain, minimize discomfort, and relax the patient during complex dental procedures such as restorations, root canal therapy, and minor oral surgeries. Several medications such as oral Diazepam or triazolam, Intra-Muscular Midazolam, Intra-venous Midazolam or Propofol and Nitrous-oxide inhalation were commonly used during

dental procedures as an alternative to general anesthesia. However, it is evident that these drugs also have the potential to cause life-threatening complications. Thus careful Pre-sedation evaluation of airway, cardiovascular system, and respiratory tract, systemic diseases, past medical history, congenital anomalies, and drug allergies assessment should be carried out. Hence the present review was carried out to briefly assess various pharmacological agents used to achieve sedation based on literature studies with special emphasis on its role in minor oral surgical procedures.

Keywords: Anxiolytics, Dental Extraction, Intranasal spray, Intra-venous, Ketamine, Midazolam, Sevoflurane.

Introduction:

Conscious sedation helps to reduce anxiety and pain, minimize discomfort, and relax the patient during complex dental procedures such as restorations, root canal therapy, and minor oral surgeries [1] It is an effective technique which causes controlled drug-induced depression of consciousness enabling treatment to be carried out with active patient's response to verbal communication through maintained airway independently [2]. This method is frequently indicated in patients presenting with phobia and anxiety to dental treatment, Children more than 1 year of age, traumatic procedures requiring prolonged treatment duration, mentally or psychologically challenged individuals and in certain medical conditions precipitated by stress such as angina, asthma and epilepsy [3, 4]. Several medications are used to produce adequate sedation administered through various routes such as oral, intramuscular, intravenous, intranasal spray, and inhalational however the clinical effect and outcome of these pharmacological agents are determined by patient's individual response to various drugs. The common side effects include drowsiness, transient loss of memory, delayed or slow reflexes, headache, and decreased blood pressure [5].

Conscious sedation could serve as an effective and efficient alternative sedative method in anxious patients during dental procedures compared to general anesthesia. Nonetheless this procedure is contraindicated in pregnancy, individuals with chronic obstructive pulmonary disease (COPD), chronic renal failure and drug related dependencies [6, 7]. Thus careful Pre-sedation evaluation of airway, cardiovascular system, and respiratory tract, systemic diseases, past medical history, congenital anomalies, and drug allergies assessment should be carried out. Hence the present review was carried out to briefly assess various pharmacological agents used to achieve sedation based on literature studies with special emphasis on its role in minor oral surgical procedures.

Methodology:

A structured literature search for articles written in the English language in PubMed/MEDLINE, EBSCOhost, Google Scholar, Scopus, and Web of Science databases was retrieved by using MeSH terms "Conscious sedation" OR "Sedation in dentistry" AND "Dental", "Oral Surgery" AND "Minor surgical procedures" "Sedation, Conscious sedation" OR "Oral Sedation", "Intravenous sedation", "Dental anxiety" OR "Dental Pain" OR "All Metadata" "Resorption"

Conscious Sedation in Oral Surgery:

Minor oral surgical procedures often lead to psychological and physiological disturbances in individuals with unpleasant experiences during their past dental visits or from fearful experiences shared by their friends/relatives [8]. Conscious sedation was the preferred choice of anesthesia to avoid general anesthesia because of their shorter duration, ease of procedure in patients with associated medical conditions and several other predisposing risk factors like fear of local injections. Among several drugs and routes of their administration oral Diazepam or triazolam, Intra-Muscular Midazolam, Intra-venous Midazolam or Propofol and Nitrous-oxide inhalation were most frequently recommended drugs [9].

Nitrous Oxide:

Nitrous oxide is a colorless, odorless gas with analgesic and anxiolytic property that causes effective central nervous system depression (CNS) used widely to manage anxiety and pain during minor oral surgical procedures such as extractions. It is indicated in fearful patients, individuals with special health care needs, high gag reflex and those requiring profound local anesthesia. Nitrous oxide/oxygen inhalation is administered slowly at an acceptable rate of 5-6L/min with concentration of N_2O not exceeding beyond 50% to produce anxiolysis/analgesia. When nitrous oxide is combined with midazolam or fentanyl, alone or in combination, a deeper level of sedation can be reached with lower dosages of the benzodiazepine required. 50% nitrous with oxygen can produce minimal sedation and 70% nitrous combined with oxygen can produce moderate sedation [10, 11]. Studies have shown adolescent desaturation rate was lower than that of children that require administering 100% oxygen to the patient for 3–5 min even after complete dissolution of N_2O concentration. N_2O inhalation has several advantages such as easy to administer, rapid action, speedy recovery with wide safety margin however interfere with the nasal hood at the anterior maxillary region. The use of N_2O is contraindicated in patients with cold, tonsillitis, porphyria, pregnancy and pulmonary diseases like COPD [11, 12].

Benzodiazepines:

Benzodiazepines such as diazepam, midazolam are safer, selective sedative agents used commonly during minor oral surgical procedures in the field of dentistry. Midazolam is considered as a short-acting benzodiazepine and diazepam as a longer lasting benzodiazepine based on their metabolism and duration of action. These are potent anxiolytics, hypnotics, sedative with anticonvulsant and muscle relaxant properties [5, 13]. Averley et al in randomized controlled trial using IV midazolam combined with inhalation N_2O_2 or N_2O_2 /Sevoflurane observed benzodiazepines have rapid onset of action due to its high lipid solubility and rapid first pass-metabolism [14]. Kiran et al [8], Kunusoth et al [15] in their respective studies to assess the effectiveness of I.V Midazolam against Nasal Spray in minor oral surgeries observed significant decrease in blood pressure, reduce anxiety and pain, and minimize discomfort. 0.5mg to 1mg midazolam Intravenous injection administered over a period of 2 minutes is advised in patients undergoing implant surgery and augmentation procedures requiring more than 90mins of local anesthetic action.

On the other hand diazepam is given orally to relax patients who are anxious prior to dental treatment. Oral or sublingual doses (0.125mg to 0.25mg) of short acting benzodiazepines are safer and suitable for implant placement procedures [16]. Mazaheri et al [17], Shashikiran et al [18] evaluated efficacy of the intranasal and intramuscular route of diazepam and midazolam respectively and showed slightly increase in pulse rate irrespective of the route of administration of midazolam drug. The sedation and anxiolysis observed in patients with intranasal route of midazolam administration had better convenience and compliance when compared to the intravenous route. Flumazenil is used as an antagonist in case of over-dosage to produce reversal effects during surgical procedures.

Barbiturates:

Amobarbital and butabarbital are short-acting barbiturates used largely as pre anesthetic agents. Very-short-acting drugs include pentobarbital, methohexital and thiopental, medium-acting agents such as butalbital, Talbutal and long-acting mephobarbital and methylphenobarbital are currently available to produce a wide range of effects, from mild sedation to complete anesthesia. Barbiturates possess weak analgesic effects in the absence of other analgesics however has addiction potential and now largely been replaced by benzodiazepines. The common side effects include drowsiness, sedation, hypotension, nausea, headache, and skin rash [5, 19].

Ketamine:

Ketamine is a dissociative drug acts by producing complete analgesia, profound amnesia and sedation with preservation of cardiovascular and respiratory functions. Intramuscular injection of 3-4mg/kg or Intravenous dose of 1-2mg/kg is suggested to produce effective sedation. Howes described ketamine as a potent dissociation drug with well-maintained airway patency and respiration. Ketamine can cause relaxation of bronchial smooth muscle, increases heart rate, cardiac output, and blood pressure [20]. Heinz et al in a prospective, randomized double blind study observed increase in salivary flow on administration of ketamine and recommend the use of anti-sialagogue such as atropine before the procedure [21].

Propofol:

Propofol given intravenously activates central inhibitory neurotransmitters and re-distributes rapidly to facilitate quick offset of anesthetic and hypnotic actions. Sedative doses possess little or no significant effect on the respiratory or cardiovascular system. Propofol is a sedative-hypnotic that is often used for the induction and maintenance of deep sedation or general anesthesia. Apfel et al in a clinical trial found that the use of propofol reduced risk of postoperative nausea vomiting up to 19% [22]. Propofol is given usually with Sevoflurane at a dose of 1 mg/kg body weight, monitored by maintenance dose ranging from 0.3 to 4 mg/kg/hour. Sevoflurane is a low soluble, inhalation drug with low blood-gas partition coefficient used widely as an induction agent before Intravenous agents such as propofol to maintain quick, smooth and depth of sedation [23].

Opiods:

Meperidine is a subtype of phenylpiperidine opioids, which comprises of fentanyl, sufentanil, alfentanil, and remifentanil. Fentanyl is a rapid-onset, short-acting opioid drug administered by parenteral, transdermal, nasal, and oral routes to produce analgesia and sedation. Galeotti A et al recommended 1 μg/kg/dose which can be repeated by 1 μg/kg if required to achieve optimum sedation however constipation, nausea, vomiting, occasional bradycardia, chest wall rigidity are the most common side effects following intravenously injection [24]. The onset of action is immediate and the duration of action is 30 to 60 minutes after a 2-mL dose. Low-dose of about 1 to 3 mg/kg IV can produce analgesia for minor painful oral surgical procedures. Maintenance can be attained by using N_2O 50% to 60% with or without a benzodiazepine. Repeated administration of chloral hydrate carries a risk of carcinogenesis. Sufentanil is a short-acting synthetic opioid analgesic with shorter distribution and postoperative recovery time. The recommended dose for adults ranges between 25 to 50 mg in incremental doses to a maximum dose of 150 mg to produce sedation and analgesia lasting 45 to 90 minutes. Reduced chest well compliance, nausea, vomiting, long drug elimination time are significant side effects [25].

Conclusion:

Success of conscious sedation in minor oral surgeries depends on several factors like pre-sedation assessment, previous drug history, significant systemic conditions; selection of drug and mode of delivery, effectively trained staff, adequate monitoring tools along with knowledge and awareness on advantages and limitations. These techniques often used as an adjunct to local anesthesia in oral procedures also serves as an effective behavioral management technique. With advancement in successful conscious sedation techniques even the most uncooperative anxious patients can be treated without the fear of pain and uneventful procedure. However, few patients may still necessitate treatment using advanced multiple/anesthetic drug techniques or even general anesthesia that demands careful assessment and appropriate knowledge.

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