



Intravenous Conscious Sedation Drugs-Uses, Indications and Contraindications in Dentistry.

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ABSTRACT-

Conscious sedation has emerged as a vital tool in addressing patient anxiety and optimizing dental procedures. This manuscript provides an in-depth exploration of the applications, indications, and contraindications of intravenous conscious sedative drugs, specifically Midazolam, Dexmedetomidine, and Propofol, in the context of dentistry. It underscores the critical importance of patient selection and safety for individualized care. As the field of sedation dentistry continues to evolve, a nuanced understanding of these intravenous agents remains essential for dental professionals to provide effective and patient-centered treatment.

KEYWORDS : Intravenous Sedation, Hypnosis, Propofol, Dexmedetomidine, Midazolam

INTRODUCTION:

In order to help patients manage their dental anxiety and phobias, conscious sedation is one type of sedation utilized in dentistry. A sedative is used to control the patient's level of consciousness so they can stay composed and receptive to spoken instructions or mild physical stimulation (1,2). It is typically given in a hospital or outpatient clinic by a nurse or medical professional, albeit not always by an anesthesiologist (3). The patient experiences little to no memory of the surgery because to the amnesia-like effect of sedative medications. By providing this kind of dental experience in a secure setting, patients who are anxious or afraid of the dentist, or who have a phobia of the dentist, can receive the necessary operative procedures with relative ease to keep their oral cavity healthy. Drug-induced depression, is another name for conscious sedation (4). Conscious sedation, as opposed to general anesthesia, allows the patient to remain awake and aware of their surroundings during the entire process. Sufficient spontaneous breathing sustains cardiovascular function, and no interventions are required to keep the patient's airway patent (5).

WHAT IS CONSCIOUS SEDATION?

A minimally depressed level of consciousness, that retains the patient's ability to maintain an airway independently & respond appropriately to physical stimulation & verbal commands (AMERICAN DENTAL ASSOCIATION, 1993) (6,7). Conscious sedation is sometimes known as monitored anesthesia care, conscious sedation, or twilight sedation. Is frequently employed for minor surgeries or less complicated procedures (8). The medication is delivered by an intravenous (iv) line, often known as a peripherally inserted central catheter (PICC), and provides sedation levels ranging from mild to deep (9). Furthermore, sedative medicines cause drowsiness and slow respiration in patients. This approach allows the patient to remain alert and aware throughout the therapy, making it appropriate for instances where complete unconsciousness is not necessary. This method ensures patients comfort and cooperation during numerous medical treatments. The level of sedation a patient experiences depends on several factors, including the type of procedure they undergo and their body response to anesthesia. Age, medical condition, and health habits may also affect the type of anesthesia a patient receives (10).

INTRAVENOUS ROUTE OF SEDATION IN DENTISTRY:

Dentistry uses intravenous sedation as the most common route of administration for medication. It bypasses the liver's first pass metabolism (5). Peripheral veins are easy to access due to their superficial placement on the skin and are often preferred route of administration of medication. The upper extremity tends to be the preferred site of intravenous medication due to a lower rate of thromboembolism (thrombosis) compared to the lower extremities. Medial veins such as the median basilic veins in the arm or metacarpals in the hand's dorsum can be used in the upper extremity. The foot's dorsal venous Plexus can also be used (11). Bolus administration is a single, large dose rapid/slowly administered as a single unit, such as furosemide. Slow IV injection involves adding the drug into a bottle with dextrose or saline, such as dopamine infusion in cardiac shock. This route allows for 100% bioavailability

with a rapid onset of action, making it suitable for emergency use. For example, midazolam can be administered intravenously and sedation can occur in 2-4 minutes. Large volumes of fluids, such as dextrose and highly irritant drugs, such as anticancer drugs, can be administered using this route, allowing for constant plasma concentration (12). However, once the drug is injected, it cannot be stopped. Administration of the drug via the intravenous line can cause local irritation and can lead to necrosis. Other drawbacks include strict aseptic requirements and the inability to self-administer the drug. Furthermore, the needle tip must be in the vein and depot preparations must not be given.

SIGNIFICANT FACTORS ASSOCIATED WITH INTRAVENOUS SEDATION IN DENTISTRY:

INDICATIONS:

- Alleviating dental anxiety and phobia.
- Supporting special needs patients.
- Ensuring comfort during extended dental chair time (2,13,14).
- Managing sensitive gag reflexes.
- Facilitating complex or lengthy Procedures.

CONTRAINDICATIONS:

- Patient who are Allergic or sensitive to medications Used.
- Unsuitable for patients with specific medical conditions due to potential risk associated with the disorder
- Medication interactions can affect eligibility of the patient for sedation (13,11,15).
- Not recommended during pregnancy, especially in the first trimester (16).

INTRAVENOUS SEDATION DRUGS IN DENTISTRY:

Conscious sedation or moderate sedation, is a procedure to relieve anxiety and depress the level of consciousness in patients, before dental surgical procedures. It is usually performed by physicians in their office, with the administration of sedatives and pain relievers (analgesic). The doctor uses low doses of rapid- and short-acting anesthetic agents to achieve minimal or moderate sedation (17).

The drugs that are commonly used for procedural sedation and analgesia include the following:

1. MIDAZOLAM: - Midazolam is a short-acting, water-soluble benzodiazepine. It has anxiolytic, sedative, hypnotic, anticonvulsant, muscle-relaxant, and anterograde amnesic effects (18).

USES :-

• induction and maintenance of anesthesia
• status epilepticus when intravenous administration of other medications is not feasible
• high rate of tolerance
• used for anxiolysis and hypnosis during the maintenance phase of general anesthesia and is also superior to thiopental in the maintenance of anesthesia (20).

DOSAGE :- • mg slow IV 5 to 10 minutes before the procedure is necessary .

Adult dose: 1 to 2.5

- A total dose greater than 5 mg is not usually necessary .
- In cases of severe illness, particularly if the patient is in poor general condition or of advanced age, the initial dose must be reduced to 1 to 1.5 mg. Total doses greater than 3.5 mg are not usually necessary.
- Children : 0.2 mg/kg, 10 to 15 minutes before the intervention (20 ,21) .

INDICATIONS:-

• induction and maintenance of general anesthesia.	• Pediatric sedation
• intramuscular premedication and sedation.	• Anti epileptic Drug
• intravenous conscious-sedation.	• oral premedication (19)

CONTRAINDICATIONS:-

• acute angle-closure glaucoma
• hypotension and shock
• Careful dose adjustment is necessary in cases of kidney and liver diseases, alcohol, and drug-dependent individuals.
• Caution is necessary for pregnant individuals, children, and individuals with comorbid psychiatric conditions.
• Administration in elderly individuals and acutely ill patients requires caution to prevent the accumulation of active metabolites.
• Extra precautions should be taken in critically ill individuals as dose accumulation can occur (20,22) .

2. DEXMEDETOMIDINE:- Dexmedetomidine is a selective and potent α_2 -adrenoceptor agonist that is used for its anxiolytic, sedative, and analgesic properties (23,24) . Dexmedetomidine-based sedation is characterized by patients ease of being awakened and minimal impact on respiration. This makes it a good option for procedures such as awake craniotomies and conscious sedation (8,9).

USES :-

• Sedation in intensive care units (ICUs)
• Anesthesia induction and maintenance
• Reducing opioid use during surgery
• Sedation for procedures such as Intubation
• Managing agitation or delirium in Critically ill patients (23)

DOSAGE :-

- For anesthesia , loading dose of 1 mcg/kg over 10-20 minutes followed by a maintenance infusion in the range of 0.2- 0.7mcg/kg/hr. The rate of infusion can be increased in increments of 0.1mcg/kg/hr or higher.
- When used as an adjunct for peripheral nerve block, the dose of dexmedetomidine is usually 1 mcg/kg to achieve the desired prolongation (25) .
- Pediatric dose : - The loading dose for 10 mins of Dexmedetomidine is 1 $\mu\text{g}/\text{kg}$, or midazolam 0.2 $\mu\text{g}/\text{kg}$, followed by a continuous infusion (dexmedetomidine 0.5 $\mu\text{g}/\text{kg}/\text{hr}$, or midazolam 6 $\mu\text{g}/\text{kg}/\text{min}$) (26,27) .

INDICATIONS :-

• sedation of initially intubated and mechanically ventilated adult patients during treatment in an intensive care setting.
• The drug is continuously infused in mechanically ventilated adult patients prior to extubation, during extubation, and post-extubation.
• Sedation of non-intubated adult patients prior to and/or during surgical and other procedures.
• Sedation of non-intubated pediatric patients aged 1 month to less than 18 years prior to and during non-invasive procedures (27,28) .

CONTRAINDICATIONS :-

• Hemodynamic instability, second- or third-degree atrioventricular block, bradycardia (<50bpm),
• cerebrovascular disease
• hypersensitivity to the drug substance
• intracranial hypertension or in patients with autonomic dysfunction (e.g., secondary to spinal cord damage)
• Cannot be administered for patients under neuromuscular blockers
• not suitable sedating agent for deep sedation cases (RASS under -3) (29) .

3. PROPOFOL :- Propofol is a versatile intravenous anesthetic agent used for induction and maintenance of anesthesia and also as intravenous sedative . Is preferred for its quick action and recovery over thiopentone, especially in day care cases (30) .

USES :-

• Anesthesia induction for patients 2-3 years old (or < 3 years with IV access)
• Anesthesia maintenance for patients > 2months old
• Sedation during procedures under monitored anesthesia care
• Sedation for intubated, ventilated ICU patients
• Status Epilepticus, refractory (children and adults)
• Treatment of refractory postoperative nausea and vomiting (31).

DOSAGE :-

- Generally, start with an initial bolus dose of 0.5–1.0 mg/kg for adults or 1.5–2.0 mg/kg for children.
- Children: induction dose can be increased by 50% : maintenance dose can be increased by 25 to 50%
- Titrate every 1 to 3 minutes to effect with boluses of 0.25–0.5mg/kg (adults) or 0.5-1.0 (children) (32) .
- Thus for sedation the drug plasma concentration is – 1 mcg/ml to 1.5mcg/ml
- Thus for general anesthesia the drug plasma concentration is - 2mcg/ml to 10 mcg/ml (30,33,34)

INDICATIONS :-

• Anticonvulsant (good agent in cerebral oedema and seizures)
• Initiation and maintenance of Monitored Anesthesia Care (MAC)
• Combined sedation and regional anesthesia
• Intensive Care Unit (ICU) sedation of intubated, mechanically ventilated patients
• Anti-emetic drug for chemotherapy
• It is safe to induce general anesthesia in obstetric patients (35) .

CONTRAINDICATIONS :-

• Propofol injectable emulsion is contraindicated in patients with a known hypersensitivity to propofol .
• patients with a history of anaphylaxis to eggs, egg products, soybeans or soy products (31) .

CONCLUSION:-

In conclusion, the use of intravenous conscious sedative drugs in dentistry has proven to be a valuable and safe approach in managing anxiety and discomfort among patients. This literature review has highlighted significance of few commonly used drugs , their mechanisms of action, and their respective advantages and limitations. Dentists and dental professionals now have a deeper understanding of the options at their disposal, enabling them to tailor sedation techniques to the specific needs of their patients. While safety and proper patient selection remain paramount, the evolving landscape of sedation dentistry continues to enhance the overall dental experience, making it more accessible and comfortable for a broader spectrum of individuals. As research and clinical practice continue to evolve, it is clear that intravenous conscious sedation will play an increasingly vital role in modern dental care, ultimately benefiting both patients and practitioners.

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