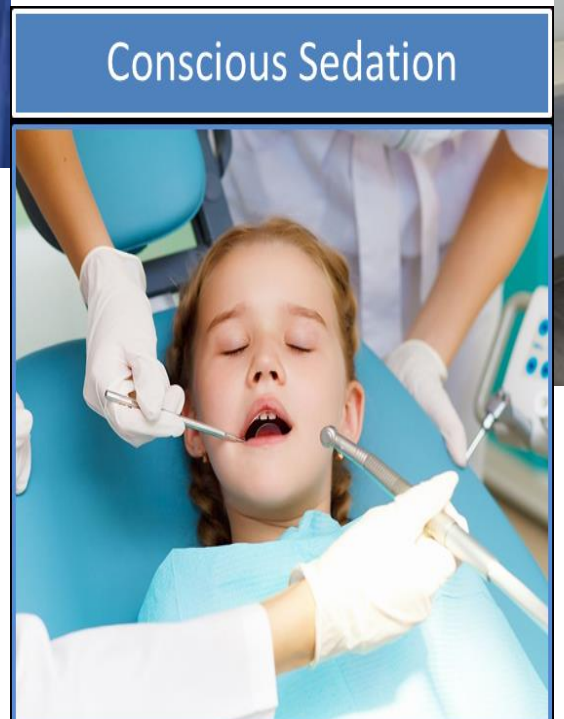
Conscious sedation and general anesthesia



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Sedation in dentistry :

Sedation in dentistry has been a **controversial topic** due to questions being raised over its safety, especially in dental chair. **Dental fear and anxiety are not only common in children** but **also significantly prevalent among adults due to high intensity of pain**.
Sharing of airway between the **anesthesiologist and the dentist remains the greatest challenge**.

Conscious sedation is a technique in which the **use of a drug** or **drugs produces a state of depression** of the central nervous system (CNS) **enabling treatment to be carried out**, but during which verbal contact with the patient is maintained **throughout the period of sedation**. The drugs and techniques used to provide conscious sedation for dental treatment **should carry a margin of safety wide enough to render loss of consciousness unlikely**.
Conscious sedation retains the **patient's ability to maintain a patent airway independently** and **continuously**

Conscious sedation is a **drug-induced depression of consciousness** during which the **patient responds purposefully** to **verbal commands**, **either alone** or **accompanied by light tactile stimulation**. No interventions are required to maintain a **patent airway**, and **spontaneous ventilation** is adequate. **Cardiovascular function is usually maintained**.

Careful presedation evaluation with **respect to airway**, **fasting**, **and understanding about the pharmacodynamics** and **pharmacokinetics of the drugs** must be **established**.

Availability of airway management equipment, venous access, and appropriate intraoperative monitoring and well-trained staff in the recovery area must be ensured.

Conscious sedation can be administered through various routes such as **oral**, **intramuscular**, **intravenous**, and **inhalational**

CHALLENGES IN DENTAL CONSCIOUS SEDATION

The challenges in dental conscious sedation are as under:

1.Shared airway between the **dentist** and the **anesthesiologist**

2.Phobia and anxiety

3.Coexisting medical conditions such **as cardiac anomalies**, **mental instability**, and **epilepsy**

4.Chances of **arrhythmias during surgery due to trigeminal nerve stimulation**

5.Enlarged tonsils and **adenoids in children** likely to **precipitate respiratory obstruction**

6.Risk of patient **losing consciousness**, **respiratory,** and **cardiovascular depression**

7.**Vasovagal syncope due to the dependent position of legs in dental chair**.

The anesthesiologist should be well prepared to **face** and **tackle all the anticipated challenges as enumerated above**. A detailed and thorough **presedation checkup comprising assessment of airway**, **cardiorespiratory system**, any **congenital abnormality**, **medication history**, and **allergy must be done.**

The operating area should be well equipped with all the resuscitation drugs/equipment required to resuscitate the patient in case of emergency

INDICATIONS FOR CONSCIOUS SEDATION

1-Dental phobia and anxiety

2-Traumatic and long dental procedures

4-Medical conditions aggravated by stress such as angina, asthma and epilepsy

5.Children more than 1 year of age

6.Mentally challenged individuals

7.Ineffective local anesthesia due to any reason. PREPARATION FOR CONSCIOUS SEDATION

Preparation for conscious sedation involves the preparation of patients as well as preparation in an operating area to meet any unforeseen challenges.

Patient preparation

1.Consent for treatment: Valid informed consent is necessary for all patients receiving dental care under conscious sedation, and this should be confirmed in writing. In case of children, valid consent should be signed by the legal guardian

2.Presedation checkup: Patient's detailed history and examination are performed so as to classify according to

the American Society of Anesthesiologists (ASA) classification. Only patients who satisfy the criteria of ASA Grade I and II should be considered for sedation in dental surgery outside hospital. For pediatric patients, it is recommended that only the ASA Grade I patients are sedated outside a hospital environment

C-detailed airway examination is done for pediatric patients to look for adenotonsillar hypertrophy or any other anatomical airway abnormalities. In case of any underlying medical or surgical condition, the concerned specialist should be consulted for optimization before taking up the patient for dental procedure

ASA class	Description
I	A normal healthy patient
II	A patient with mild systemic disease
III	A patient with severe systemic disease
IV	A patient with severe systemic disease that is a constant threat to life
V	A moribund patient who is not expected to survive without the operation
VI	A declared brain-dead patient whose organs are being removed for donor purposes
E	Suffix for patients undergoing emergency procedures

D-Fasting instructions: Preoperative fasting for sedation is controversial and considered unnecessary by some authorities within dentistry for conscious sedation. Airway reflexes are assumed to be maintained during moderate and minimal sedation. It is not clear where the point of loss of reflexes lies. The chances of inadvertent oversedation and loss of protective airway reflexes at some point cannot be ruled out

E-For elective procedures using conscious sedation, the 2-4-6 fasting rule applies (that is 2 h for clear fluids, 4 h for breast milk, and 6 h for solids.). For emergency procedures where the fasting cannot be assured, the benefits of treatment and risk of the lightest effective sedation can be analyzed. Delaying the procedure may benefit the patient.

Operating/procedure setup

The institution/clinic should have **monitoring** and **resuscitation equipment** and trained manpower available to handle any emergency situation.

Monitoring: Monitoring equipment such as ECG, pulse oximeter, $ETCO_2$, NIBP, and defibrillator should be handy in working condition

Crash cart should be available with all the resuscitation equipment and drugs required to resuscitate a patient

Every procedure should be carried out after ensuring the availability of appropriate size suction catheter, adequate oxygen supply, functioning flowmeters and tubings for **oxygen delivery to patient**, and appropriate-sized airway equipment.

Pharmacology of Drugs Used for Conscious Sedation

It is mandatory to secure an **intravenous (IV) li**ne with the help of an appropriate-sized IV cannula before administering any drug or inhalational anesthesia. In many cases, mild anxiolytic along with local anesthesia is sufficient to reduce fear and anxiety in the patient.

Nitrous oxide

Mixture of nitrous oxide (N_2O) and oxygen is used as a sedative. N_2O is a colorless gas used as an inhalational anesthetic agent. It is an anxiolytic/analgesic agent that causes CNS depression and varying degree of muscle relaxation and euphoria with hardly any effect on the respiratory system.

Recent research shows analgesic effects of **N_2O is initiated by the neuronal release** of endogenous opioid peptides with **activation of opioid receptors** and **descending gamma-aminobutyric acid (GABA)** and **noradrenergic pathways that modulate nociceptive processing at the spinal level**.

Anxiolytic effect involves the activation of $GABA_A$ receptor through benzodiazepine-binding site. The anesthetic effect appears to be caused by **inhibition of N-methyl-D-aspartate (NMDA) glutamate receptors**, thus removing its excitatory influence in the nervous system.

The technique employs subanesthetic concentrations of N_2O delivered along with oxygen from dedicated machinery through a nasal mask. **The N_2O/oxygen delivery systems are manufactured with oxygen fail-safe devices that stop the flow of N_2O when the flow of oxygen is stopped**. The safety mechanism ensures delivery of **at least 30% oxygen** in all situations. N_2O has low tissue solubility and high minimum alveolar concentration which enables rapid onset of action coupled with a rapid recovery; thus ensuring a controlled sedation and quick return to normal activities. It is very safe as the patient remains awake and responsive and reflexes are retained. **The use of N_2O** is **contraindicated** in patients with **common cold**, **porphyria**, and **COPD.**

Sevoflurane

Sevoflurane is an ether **inhalational anesthetic agent** with **low pungency**, a **nonirritant odor**, and a **low blood–gas partition coefficient**. Its low solubility facilitates precise control over the depth of sedation and rapid and smooth induction and emergence from sedation.

Sevoflurane, therefore, remains an **ideal induction agent before starting infusion of a total IV anesthetic** such as **propofol** to maintain sedation.

Benzodiazepines

Benzodiazepines, including **diazepam** and **midazolam**, have proved to be **safe and effective for IV conscious sedation**. Their sedative and selective anxiolytic effects and wide margin of safety contribute to their popularity in dentistry. Apart from anxiolysis and amnesia, **benzodiazepines are known to possess skeletal muscle relaxation and anticonvulsant activity**; however, these drugs have no **analgesic properties**. Mechanism of action **is through GABA-mediated opening of chloride channels**. They have **high lipid solubility** giving **rise to rapid onset of action**.They are normally added to N_2O/oxygen for conscious sedation, as N_2O produces the **analgesic effects**. The most commonly used **benzodiazepine is midazolam**. Its high first-pass metabolism makes it a short-acting one. It is used for **conscious sedation** in the **pediatric dentistry**. It is mixed with a **sweet vehicle**, such as simple **syrup**, and used **orally either via drinking cu**p or through a **syringe without needle** and **deposited in the retromolar area**. Syrup can **be given 20 min before the procedure**.

Dose under 25 kg is **0.3–0.5 mg/kg** in adults but should be administered in a **hospital setup only**. It can also be given **intramuscularly**, **intravenously**, **rectall**y, and **nasally**. Its effects are **enhanced by various drugs** such as **opioids**, clonidine, antidepressants, antipsychotics, erythromycin, antihistaminics, alcohol, and antiepileptics and **should be avoided or used with caution.**

All practitioners using these drugs must have **flumazenil**, the specific **benzodiazepine receptor antagonist**, as one of the **emergency drugs** in the institution. **Flumazenil causes rapid reversal of all benzodiazepines**. However, it is contraindicated in patients taking **benzodiazepines for seizure disorder** or **high doses of tricyclic antidepressants**.

Ketamine

Ketamine, a phencyclidine derivative, is an **N-Methyl-D-aspartate receptor (NMDAR) antagonist**. It is a unique drug giving complete anesthesia and analgesia with preservation of vital brain stem functions. This "**dissociative**" state has been described as "a functional and neurophysiological dissociation between the neocortical and limbic systems." Dissociation results in a state of lack of response to pain with preservation of cardiovascular and respiratory functions despite profound amnesia and analgesia, described as "Catalepsy." This trance-like state of sensory isolation provides a unique combination of amnesia, sedation, and analgesia. The eyes often remain open, though nystagmus is commonly seen. Heart rate and blood pressure remain stable and are often stimulated possibly through **sympathomimetic actions**. **Functional residual capacity** and **tidal volume are preserved** with **bronchial smooth muscle relaxation** and **maintenance of airway patency and respiration**.

The most commonly seen **disadvantage of ketamine** is **emergence phenomenon** which occurs in **5%–50% of adults** in 0%–5% **in children. Ketamine increases salivary and tracheobronchial mucus gland secretions, so it is recommended to use an antisialagogue before administering ketamine**.

The emetic side effect of ketamine producing an **incidence of vomiting in 10% of children** can be lessened by administering atropine which reduces salivary flow.

Laryngospasm reported in 0.4% of cases can be managed with positive pressure ventilation with 100% oxygen.

Ketamine can be given intramuscularly at a dose of 3–4 mg/kg or intravenously at a dose of 1–2 mg/kg .However, administering **a lower dose of the drug may be safer to achieve adequate levels of sedation in children** due to the problem of potential severe respiratory depression.

Propofol

Propofol is chemically described as **2,6-diisopropylphenol**. Being **insoluble in water**, it is available in **white**, **oil-in-water emulsion which facilitates IV delivery of this fat-soluble agent**. Propofol is readily oxidized to quinine which turns the suspension yellow in color after approximately 6 h of exposure to air. Propofol exerts its hypnotic actions by activation of the central inhibitory neurotransmitter **Gamma-aminobutyric acid (GABA).**High lipophilicity ensures rapid onset of action at the brain, and rapid redistribution from central to the peripheral compartment **causes quick offset of anesthetic action**

Elimination half-life is 2–24 h. The most significant hemodynamic effect is **a decrease in arterial blood pressure** and **heart rate**. Sedative doses actually have little or no effect on the respiratory system. Apfel *et al.* studied six interventions for the prevention of postoperative nausea vomiting (PONV) and found that the use of propofol reduced risk for PONV by 19%.[17] Sedative doses are not analgesic, and a large proportion of patients experience pain on injection. To use an antecubital vein instead of a hand vein for the propofol, lidocaine admixture is a simple and effective way to avoid pain. Volatile anesthetic agents are used for the induction of anesthesia to avoid the struggle to get IV access before the child is asleep. With sevoflurane, propofol is given usually at a dose of 1 mg/kg body weight, followed by maintenance dose ranging from 0.3 to 4 mg/kg/h.[18]

Opioids

All of the **above-mentioned drugs** do not have **analgesic effects except ketamine**. **Opioid analgesic**, therefore, needs to be supplemented. **Fentanyl is a short-acting opioid 60–80 times** more **potent than morphine** and with a **rapid onset of analgesia** and **sedation**.

Duration of action is 30–60 min. Fentanyl can be administered by **parenteral**, **transdermal**, **nasal**, and **oral routes.** A "lollipop" delivery system is more acceptable to children than any other route. Fentanyl being a lipophilic drug is absorbed from the buccal mucosa, metabolized in the liver, and secreted in the urine. Recommended dose is 1 μg/kg/dose IV which can be repeated by **1 μg/kg increments if required**. **Constipation**, **nausea**, and **vomiting** are **common side effects**. Dose-dependent respiratory depression and occasionally bradycardia and chest wall rigidity are associated with rapid IV injection.

Sufentanil : **Sufentanil** is a **synthetic opioid analgesic drug**, which **is 5–10 times more potent than its parent drug fentanyl** and **500 times as potent as morphine**. It has **shorter distribution** and **elimination half-lives**. For outpatient surgery, **IV sufentanil produces equivalent anesthesia** to isoflurane or fentanyl. **Recovery is rapid,** and **postoperative analgesia requirement is less**.However, side effects such as **reduced chest wall compliance** and **high incidence of nausea** and **vomiting** and **prolonged discharge time** as compared to **midazolam** make it an unpopular **choice for premedication**

Complications and medicolegal considerations:

Clinicians who provide conscious sedation should be able to **recognize** and manage sedation-related complications. With regards to **inhalational sedation**, there are few potential complications which may occur. These include **equipment failure, inadequate sedation, poor patient experience and, rarely, nausea or vomiting.**
Conscious sedation is a common treatment modality for patients with dental anxiety.
In adults, **intravenous sedation using** Midazolam is the most **common method of conscious sedation**. For inhalational sedation, **Nitrous Oxide and Oxygen are used frequently**. Clinicians should be aware of the potential complications associated with **delivery of intravenous sedation** which can occur **pre-**, **peri-** and **post-sedation.**
An awareness of the **pharmacology of the drugs as well as careful patient assessment** and monitoring can help clinicians to **anticipate and reduce complications** such as
minor post treatment complications occurred in

agitation

sleepiness

drowsiness

pain

dental bleeding

Information and Consent Form

Consent

A dentist has a legal obligation to **obtain the valid** and **voluntary consent of the patient** to the treatment proposed. Consent is a **continuous communication process** and not just a single one-off event-it should be established and **reaffirmed verbally** with the **patient at all stages of treatment**.

Where sedation is provided then the patient should also provide written consent. It is important to remember that a signature on a **form can be misleading** and the mere presence of such a signature does not guarantee that the consent obtained is valid

Intravenous sedation makes lengthy or complex dental treatment more comfortable and easy for you. It can help remove anxiety, stress, discomfort, memory and awareness of the procedure. You enjoy a relaxing sleep whilst you maintain your ability to breathe
for yourself, maintain your reflexes and your ability to respond to us if required. You will still receive a local anesthetic after you are sedated. Following your procedure you will be given appropriate recovery time in which you will be closely monitored

These risks include but are not limited to:

1. You may be relatively aware of the procedure.
2. You may experience nausea and vomiting.
3. You may remain drowsy and lack time and space judgment after the procedure is completed. This could last up to 8 hours.
4. Discoloration of the skin or bruising in areas of access to veins or attempted access may persist for some time.
5. You may experience complications including but not limited to respiratory depression, persistent generalized
pain, areas of numbness, swelling, bleeding, allergic reactions and pneumonia.
6. There is an **EXTREMELY** remote possibility that complications may require transportation to a hospital for
treatment. Serious complications may result in brain damage, myocardial infarction, cardiac arrest, stroke, coma or death.

Things to know prior to your sedation appointment:

1. You will need an escort.. The onset of the medication is almost immediate and the peak effects last approximately an hour. After that, it starts wearing off and most peop le feel back to normal after 24 hours. For safety reasons do not drive or operate machinery for 24 hours following your sedation.
2. You should not eat or drink anything for at least 8 hours prior to your surgery to ensure a safe and effective sedation procedure.

Sedation
Consent

I _____ hereby consent to the

procedures described below which have described to me by

_____ (Surgeon).

1. The administration of Conscious Sedation by intravenous injection and

2. The following dental procedure(s)

_____ _____

_____ _____

_____ _____

I also consent to such further or alternative operative procedures as may be

found necessary during the procedure and to the medications necessary for

the purpose of this procedure.

Alternatives have been fully discussed.

Sign (patient/ representative): _____

Date: _____

I confirm that I have explained the nature and explained the nature and effect

of the above procedure to the person who has signed above.

Sign: _____
Date:

3.Please let us know if:

a.you have a known allergy to benzodiazepines (Valium, Ativan, Versed, etc.) or Fentanyl

b.you are pregnant or breast feeding

c.you have liver or kidney disease

d.you have severe asthma , respiratory,or significant seizure disorder

e.you have narrow angle glaucoma f.

you have a diagnosed supraventricular tachycardia

g.you are taking nefazodone (Serzone) or levodopa (Dopar or Larodopa).

4.If you are taking an MAO inhibitor (Marplan, Nardil, Emsam, or Parnate) inform the Doctor as this is a contraindication to sedation.

5.If you are taking any illegal drugs, inform the doctor as this could adversely affect the sedation drugs.

6.Read the “post operative” instructions and follow them. Call our office .

If you have any questions or concerns. After hours, the answering service will be able to reach the doctor on call.

I understand these considerations and am willing to abide by the conditions stated above. I have had an opportunity to ask questions and have had them answered to my satisfaction.

Signed (patient)_____

Date__

_____

Signed (guardian if <18

_____ Date_____

Doctor _____ Date_____

Fundamentals of general anesthesia

General anesthesia is commonly used to facilitate dental treatment in patients with anxiety or challenging behavior, many of whom are children or patients with special needs.
When performing procedures under general anesthesia, dental surgeons must perform a thorough pre-operative assessment, as well as ensure that the patients are aware of the **potential risks and that informed consent has been obtained**.
Such precautions ensure optimal patient management and reduce the frequency of morbidities associated with this form of sedation. Most guidelines address the management of pediatric patients under general anesthesia. However, little has been published regarding this **method in patients with special needs**.

The field encompasses a **wide variety of patients**, including those with **intellectual disabilities**, physical impairments, **psychiatric problems**, and **complex medical backgrounds** .

In many cases, these conditions can have significant effects on oral health. Additionally, they often influence the manner in which patients receive oral healthcare.
Part of the role of the special needs dentist is to adapt dental treatment to the individual needs of the patient. In many situations, this may necessitate **pharmacological sedation**, ranging from **minimal sedation**—achieved through oral, transmucosal, or **inhalation anxiolysis—**to **deeper forms of sedation and general anesthesia**

General anesthesia is **a state of unconsciousness produced by an anesthesiologist where the patient does not remember or feel anything during the procedure**. In addition, the patient remains still and does not move. The anesthesiologist must monitor the patient continually and ensure that the patient remains safe until the patient emerges from anesthesia.

Due to the complexity of this type of care, the office should have special monitoring and emergency equipment to ensure patient safety. In fact, there are national standards that require additional gas equipment and alarms when dental offices provide general anesthesia.

First, the patient and their family should meet with both the dentist and the anesthesiologist for a consultation prior to the day of surgery. During this consultation, **the dentist will decide** if the treatment requires general anesthesia. If it does, then the anesthesiologist will discuss the option of general anesthesia for dental care and ensure that you are healthy enough to have this performed at a Category 1 compliant office.

The dental assessment of any patient undergoing general anesthesia would ideally involve a thorough clinical examination and pre-operative radiographs to allow a treatment plan to be established. This would facilitate appropriate **informed consent** and **adequate planning for the procedure**.

As mentioned above, one of the main indications for treatment of patients under general anesthesia **is their lack of compliance during basic procedures**—often including examination. As a result, a large part of treatment planning comprises estimations of the patients' treatment needs, as well as ensuring that adequate time, facilities, and equipment are available to accommodate these needs.
There has been minimal discussion in the literature about whether other forms of sedation are sufficient to increase cooperation in patients with special needs and thus enable a more thorough pre-operative assessment

Not all patients are good candidates for general anesthesia in an office.

During the consultation, the anesthesiologist will also review the risks and benefits of anesthesia, answer all the patient's questions , and review pre and post operative instructions.

One of these instructions is the last time atient can **eat** or drink before surgery appointment.

***General anesthesia is a pharmacologically produced state of unconsciousness*.**

This is what patients routinely **receive during medical procedures at the hospital or outpatient surgical facilities**.
During general anesthesia, a patient **does not react or remember any of the surgical procedure**.
A trained anesthesia provider should administer **such a state of anesthesia**.

Ideally, that anesthesia provider **should not be the same person doing the surgical procedure**, especially in **children or patients with special healthcare needs**.

Patients should realize that **general anesthesia is quite different than "just going to sleep."** While under **general anesthesia**, the patient must be **monitored continuously** and **may need physiologic support from the anesthesiologist**, such as **assistance with breathing**. Although most medical procedures could be **accomplished with local and regional anesthesia**
it is generally **expected that general anesthesia will be provided**.
The opposite is true in dentistry, where most dental procedures are provided under local anesthesia (nerve blocks) without sedation or anesthesia. **This need not be the case though.**
The treatment area should look more like an operating room than your normal dental operatory. It should also have sufficient room to accommodate the team and emergency equipment such as a stretcher. In addition, we strongly recommend that you have met your dentist and anesthesiologist prior to the procedure and that they answer any and all of your questions fully.
Remember, general anesthesia for dentistry is aregular trip for patient to just any dental office.
Drugs used for anesthesia are CNS depressants with action that can be induced and terminated more rabidly than conventional sedative and hypnotics
Most sensitive site of action for general anesthetics is the reticular activating system of the brainstem (RAS).
Anesthetic dose: does not cause **depression of cardiac**, **vasomotor** or **respiratory centers**
Has a small margin of safety.

Stages of G. anesthesia

Stage 1:analgesia

•Decreased pain awareness, sometimes with amnesia, conscious may be impaired but not lost

Stage 2:disinhibition

Delirium, excitation, amnesia, enhanced reflexes, irregular respiration and incontinence

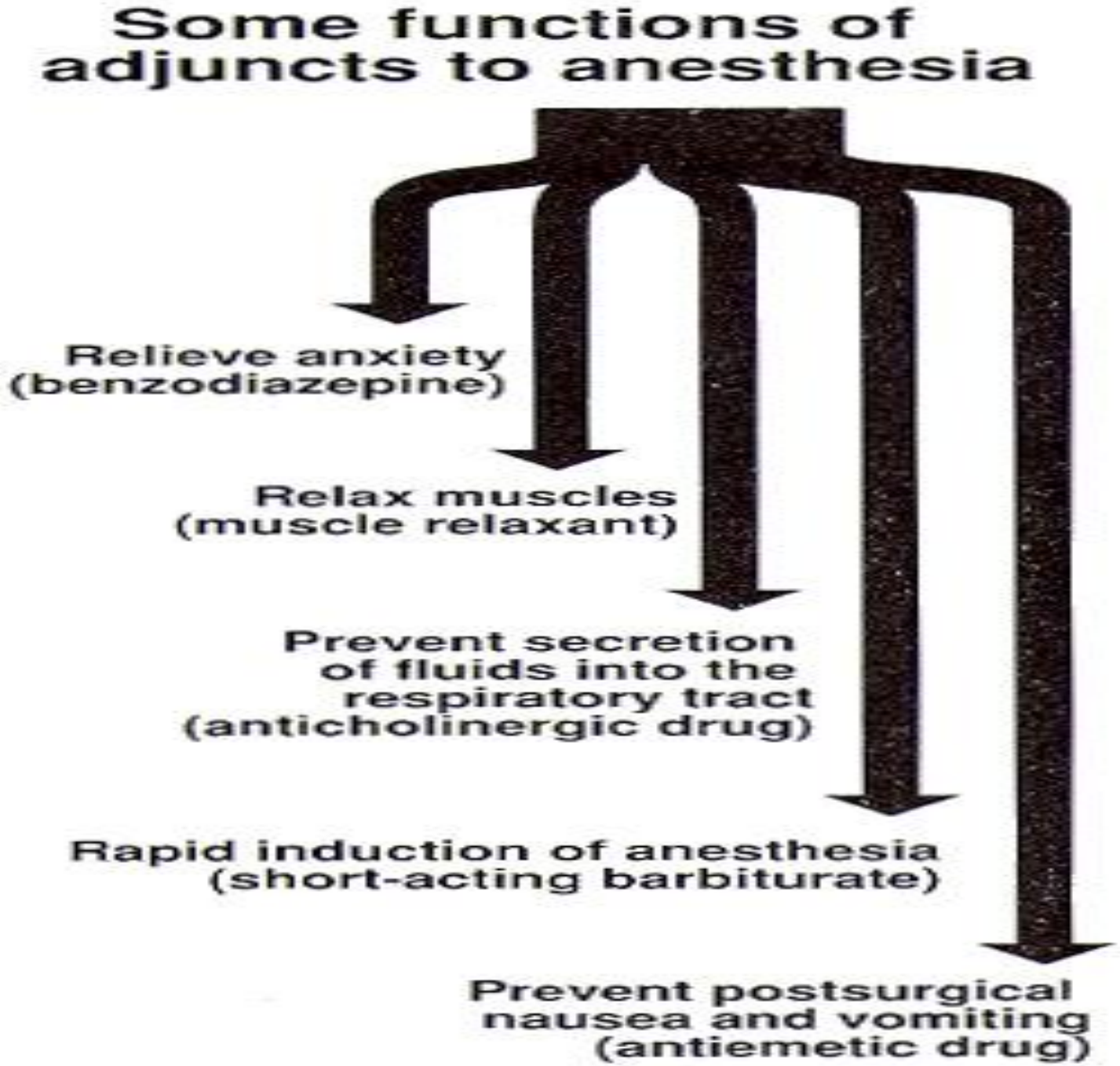
Stage 3: surgical anesthesia

•Unconsciousness, no pain reflex, regular respiration and maintained blood pressure

Stage 4:medullary depression

•Severe CVS and respiratory depression and the patient require pharmacological and ventilatory support

Preanaesthetic Medication



Anesthesia protocols

1. **Induction and maintenance for general anesthesia:**
   - For extensive surgical procedure
   - The protocol commonly includes IV drug for induction, inhaled agent (with or without IV) for maintenance and neuromuscular junction blockers to cause muscle relaxation
2. **Conscious sedation techniques:**
   - For minor procedure, that combine IV agent with local anesthetics
   - These can provide profound analgesia, with retention of the patient ability to maintain a patent airway and response to verbal commands
3. **Neuroleptanalgesia:**
   - combine a major neuroleptic (droperidol) and a potent opioid analgesic (fentanyl) to produce a detached, pain-free state. (state of analgesia and amnesia)
4. **Dissociative anesthetic**
   - Produced by ketamine
   - The patient is patient remains conscious but has marked catatonia, analgesia, and amnesia

- **Airway Assessment**
- This picture represents a Mallampati Class One airway. The entire uvula and tonsillar pillars are seen. This individual should be easy to mask ventilate or to intubate with a laryngoscope and endotracheal tube.

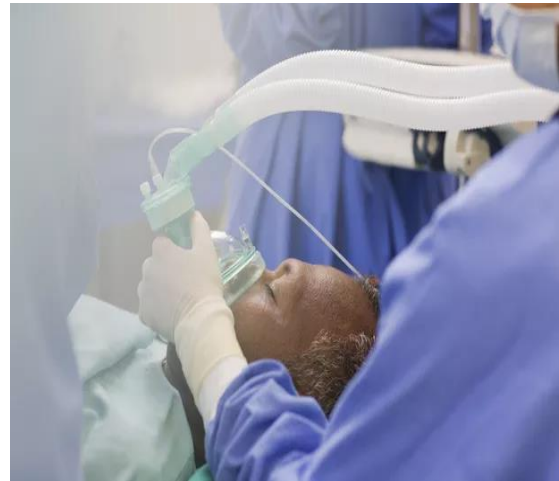
- This picture represents a Mallampati Class Three airway. None of the uvula or tonsillar pillars are seen. This individual may hard to mask ventilate, and quite difficult to intubate

- This image is representative of an extremely short thyromental distance, indicating tremendous difficulty in tracheal intubation, and possible difficulty establishing a satisfactory mask seal.

Provider Responsibilities

Intraoperative Responsibilities

- Informed consent signed prior to sedation
- Name, dose, route and time of all medications documented
- Procedure begin and end times
- Prior adverse reactions
- Pre-medication time and effect
- Vital Signs
  - BP
  - Heart Rate
  - Respiratory Rate
  - Oxygen Saturation
- Level of ConsciousnessPost-operative Responsibilities
- Vital Signs at least every 5 minutes
  - BP
  - Heart Rate
  - Respiratory Rate
  - Oxygen Saturation
  - Level of Consciousness



ASA Classification	Definition	Examples
ASA I	A normal healthy patient	Healthy, non-smoking, no or minimal alcohol use
ASA II	A patient with mild systemic disease	Mild diseases only without substantive functional limitations. Current smoker, social alcohol drinker, pregnancy, obesity (30<BMI<40), well-controlled DM/HTN, mild lung disease
ASA III	A patient with severe systemic disease	Substantive functional limitations; One or more moderate to severe diseases. Poorly controlled DM or HTN, COPD, morbid obesity (BMI ≥40), active hepatitis, alcohol dependence or abuse, implanted pacemaker, moderate reduction of ejection fraction, ESRD undergoing regularly scheduled dialysis, history (>3 months) of MI, CVA, TIA, or CAD/stents.
ASA IV	A patient with severe systemic disease that is a constant threat to life	Recent (<3 months) MI, CVA, TIA or CAD/stents, ongoing cardiac ischemia or severe valve dysfunction, severe reduction of ejection fraction, shock, sepsis, DIC, ARD or ESRD not undergoing regularly scheduled dialysis
ASA V	A moribund patient who is not expected to survive without the operation	Ruptured abdominal/thoracic aneurysm, massive trauma, intracranial bleed with mass effect, ischemic bowel in the face of significant cardiac pathology or multiple organ/system dysfunction
ASA VI	A declared brain-dead patient whose organs are being removed for donor purposes	

Complications of General Anesthesia

Most healthy people tolerate general anesthesia without issue. Those who do suffer side-effects or complications typically have mild, transient symptoms that are easily managed. The following are possible complications of general anesthesia:

- Sore throat
- Nausea and vomiting
- Damage to teeth
- Lacerations (cuts) to the lips, tongue, gums, throat
- Nerve injury secondary to body positioning
- Awareness under anesthesia
- Anaphylaxis or allergic reaction
- Malignant hyperthermia
- Aspiration pneumonitis
- Respiratory depression
- Stroke
- Hypoxic brain injury
- Embolic event
- Cardiovascular collapse, cardiac arrest
- Death

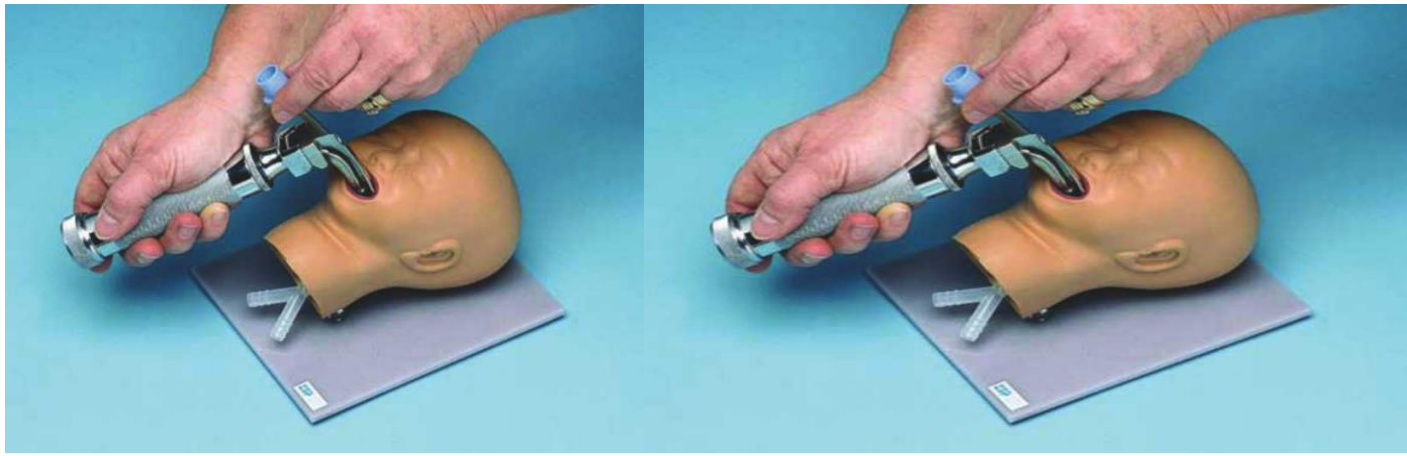
Awareness Under Anesthesia

Awareness during general anesthesia seems to be **one of the biggest concerns** for patients, but is very rare. Approximately **1-2 patients per 1000 general anesthetics may briefly become aware of their surroundings**, but usually do not feel pain.

In extremely rare instances, a patient can have awareness of their situation and experience pain while under general anesthesia.

Because of paralytics given to facilitate surgery, the patient may not be able to move to make others aware of their distress. People who truly experience this level of awareness may **develop psychological issues similar to post-traumatic stress disorder (PTSD).**

Certain situations are associated with a **higher risk of some level of awareness**. Also known as unintended **intra-operative awareness, it may occur with:**



•Emergency surgery
•Trauma surgery
•Cesarean surgery under general anesthesia
•Heart surgery involving cardiopulmonary bypass
•Depression
•Daily alcohol use
•Errors by the anesthesiologist-may may include improper monitoring of the patient and/or the amount of anesthesia administered during a procedure


THANK YOU