

Sedation & Analgesia

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Moderate Sedation/Analgesia

DEFINITION:

- Reduction of the level of consciousness induced by medications (like narcotic +/- benzodiazepine)
- to facilitate the acceptance of a procedure,
- with **preservation of purposeful response to verbal commands, either alone or with the addition of light tactile stimulation.**

There is preservation of:

- **Protective reflexes,**
- **Airway patency,**
- **Spontaneous ventilation,**
and
- **Cardiovascular function.**

Moderate Sedation/Analgesia

Points to Consider

Not all procedures need sedation & analgesia:

- preference and comfort

50% of complications in endoscopy are cardio-pulmonary;

- sedation increases their risk.

Complications from sedation/analgesia are more likely with:

- **a)** Co-morbidities
 - cardiac, pulmonary, renal, hepatic, neurologic, ..., and other disorders,
 - malnutrition, & morbid obesity
- **b)** Complexity and length of procedure,
- **c)** Urgency,
- **d)** Larger caliber of instrument in esophagus,
- **e)** Old age

Monitoring

- **DEFINITION**: Assessment of patient before, during and after an event.
- **PORPOUSE**: Detects early signs of distress before compromise of vital functions.
- **OPERATOR**: endoscopist and endoscopy assistant.
- **PARAMETERS**:
 - Pulse,
 - Respiratory rate or ventilation, Capnography
 - Blood pressure,
 - Neurological status/consciousness,
 - Pain distress,
 - Skin changes.

MONITORING

PARAMETER	TECHNIQUES
Consciousness / Neurologic Status	-Response to voice -Response to touch -Quantified by: -MOAA/S or Ramsay scale, or -Bi-Spectral Index Monitoring (BIS).
Ventilation	-Pulse oximetry + Respiration rate, or -Capnography
Perfusion / Cardiac Rhythm	-Blood pressure + Pulse + Skin warmth -Selective EKG (Hx arrhythmia or MI)
Pain	-Skin warmth and perspiration -Face expression -Voice

Modified Observer's Assessment of **Alertness/Sedation (MOAA/S)** or Ramsay Scale

Usual Goal

Colonoscopy = 3

EGD = 2

Responsiveness	Score
Agitated	6
Alert, responds to name, in normal tone call	5
Lethargic, responds to name, in normal tone call	4
Responds after name called loudly or repeatedly	3
Responds after mild prodding or shaking	2
Does not respond to mild prodding or shaking; (purposeful response to painful trapezius squeeze)	1
Does not respond to deep stimulus (trapezius squeeze)	0

Deep Sedation

Anesthesia

Automated Monitoring Equipment

Bi-spectral Index of Sedation (BIS)

- Evaluates EEG parameters of the frontal cortex corresponding to different levels of sedation, giving a numeric score.
 - Lower score indicates deeper sedation.
 - **BIS of 70 to 90 is consistent with "Moderate Sedation".**
- Correlates well with "Modified Observer's Assessment of Alertness/Sedation"
- BIS of 70 – 85 gives best patient satisfaction, but respiratory depression occurs in 20%.
- Confounding Factors:
 - Patient movement,
 - Respiration,
 - Skeletal muscle contraction.

Automated Monitoring Equipment for Perfusion, Ventilation, and Cardiac Rhythm

Automated Monitoring Equipment

Pulse Oximeter

- Transcutaneous measurement of ratio of venous to arterial blood,
 - Done by % absorption of light wave-length of 660 & 940 nm.
- "O₂ Sat" calculated by mathematical algorithm.
- Assumes absence of methemoglobin and carboxyhemoglobin.

Automated Monitoring Equipment

Pulse Oximeter

■ False reading in:

- **Low body-core temperature,**
- **Vasoconstriction,**
- **Hypotension,**
- **Deep skin pigmentation,**
- **Hb S disease,**
- **Sickle cell crisis,**
- **Methemoglobinemia,**
- **Carboxy-hemoglobinemia,**
- **Blue nail polish.**

Automated Monitoring Equipment

Automated Sphygmomanometer

Oscillometric measurement of peak oscillation magnitude of arterial flow, which reflects “**mean arterial pressure**” and pulse.

Appropriate cuff size is critical.

Mathematical algorithm calculates systolic and diastolic pressure.

- Underestimates high blood pressure, and
- Overestimates low blood pressure.

When in doubt, use **manual sphygmomanometer**.

Automated Monitoring Equipment

ECG Monitor

- Continuous display of single-lead ECG.
 - Ideally with printout capability.
- Reading affected by improper placement of electrodes, poor skin contact, and deep breathing.
- Area of skin contact for each electrode should be at least 3 cm² (2 cm diameter), to minimize risk of electro-cautery burn.
- Distortion of S-T segment is common.

Automated Monitoring Equipment

Capnography

Measured by infrared spectroscopy:

- Waveform tracks “absorption peak of CO₂” at 4200 nm wave length.
- Real time graphic assessment gives visual demonstration of ventilatory status.

Can be “end tidal” or transcutaneous.

- End tidal with waveform is used in Monitoring

Limitation:

- In non-closed system (not intubated), using a modified nasal cannula, measurement may be inaccurate due to mix of expired air and dead-space air.

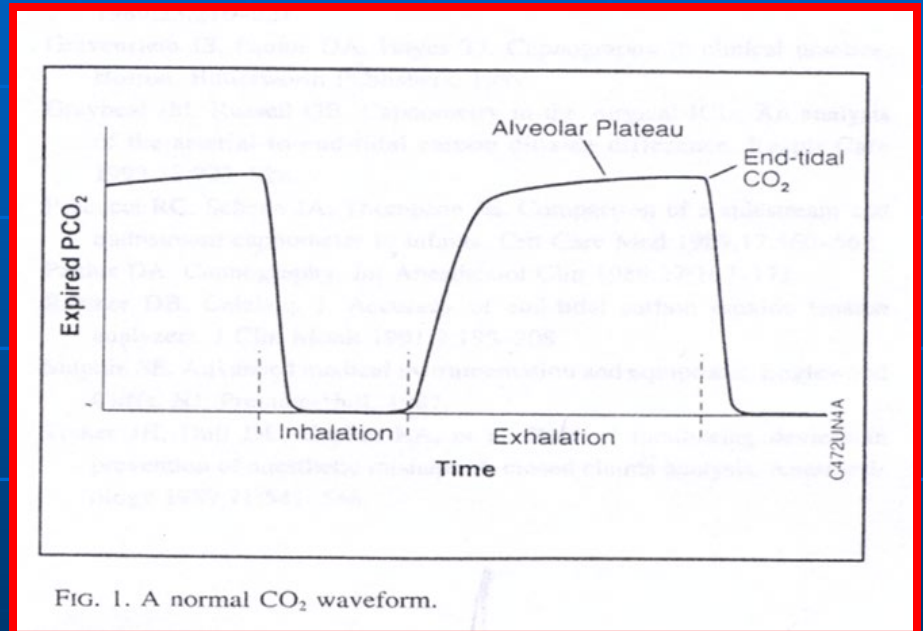
Automated Monitoring Equipment

Capnography

- **Especially useful:**
 - Deep sedation (Propofol)
 - Difficult to sedate patients
 - Prolonged diagnostic/therapeutic procedures
 - When adequate visual assessment can not be done
 - When O₂ supplementation is given ?
 - ASA Status III or IV ?
- **The ASA requires use of Quantitative Waveform Capnography for Moderate Sedation since July 2011.**
- **AGA + ACG + ASGE (02/2012):** There are insufficient data to demonstrate that improved clinical outcomes or care quality derive from the use of capnography in adults undergoing targeted moderate sedation for upper endoscopy and colonoscopy. The adoption of the revised ASA Standard will unnecessarily add cost, inefficiency and waste to a healthcare system already overrun with excess costs and waste.

ETCO₂ Waveform

- Normal End-Tidal CO₂ (ETCO₂) should be 35-45 mmHg.
 - Hypoventilation > 45 mm Hg
 - Hyperventilation < 35 mm Hg
- It is a direct measurement of ventilation,
- Indirectly measures metabolism and circulation.
 - A decrease in perfusion (low cardiac output) will lower the delivery of carbon dioxide to the lungs and will cause a decrease in ETCO₂, observable on the waveform and the numerical measurement.



Obstructive Airway Waveform

- Causes “shark fin” waveform
 - With or without prolonged expiratory phase
 - Can be seen before actual obstruction attack
- **Indicative of Bronchospasm** (asthma, COPD, allergic reaction)
 - **Mild Dz:** Low ETCO_2 indicating hyperventilation & tachypnea
 - **Severe Dz:** High ETCO_2 due to CO_2 retention
- Useful for Differential Dx:
 - Wheezing with Square normal wave = CHF/Pulmonary edema
 - Wheezing with “shark fin” = bronchospasm.
- Management: Bronchodilators (Albuterol, Atrovent, or Epinephrine)

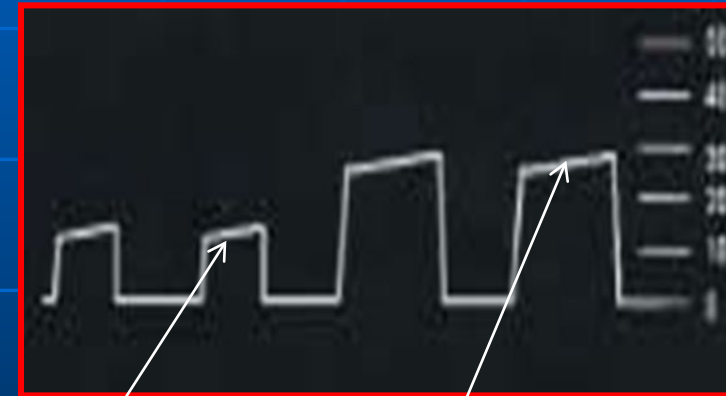


“Shark fin” waveform

Use of ETCO₂ in CPR

- **Evaluates the effectiveness of chest compressions:**
 - High quality chest compressions: ETCO₂ of at least 10-20 mmHg.
 - Low ETCO₂ value (< 10 mmHg) during CPR in an intubated patient: quality of chest compressions needs improvement.
- **Identification of ROSC:**
 - After cardiac arrest, "Return of Spontaneous Circulation" increases ETCO₂ to 35-45 mm Hg.

Return of Spontaneous Circulation: ETCO₂ increases to 35 mm Hg



15 mm Hg
on good CPR

35 mm Hg
and climbing

Pre-Procedure Evaluation

Pre-Procedure Evaluation

- Indication
 - procedure & sedation.
 - Brief Hx
 - diseases, allergies, medications, anesthesia
 - Risks:
 - bleeding, airway compromise.
 - Fasting status
 - clear liquids=2h,
 - light meal=6h
 - Pregnancy status
- **Ride to home**
 - IV access
 - Baseline vital signs
 - Informed consent:
 - procedure, sedation, blood products.
 - Teaching to decrease anxiety.
 - Time Out:
 - patient name, SSN or MRN, and procedure.

GUIDELINE: The findings of the Pre-Procedure assessment should be documented before initiating sedation.

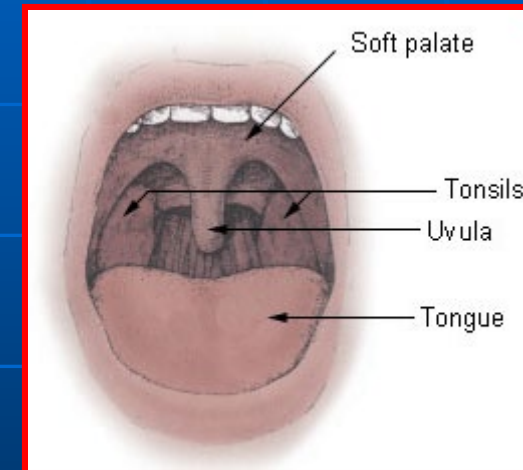
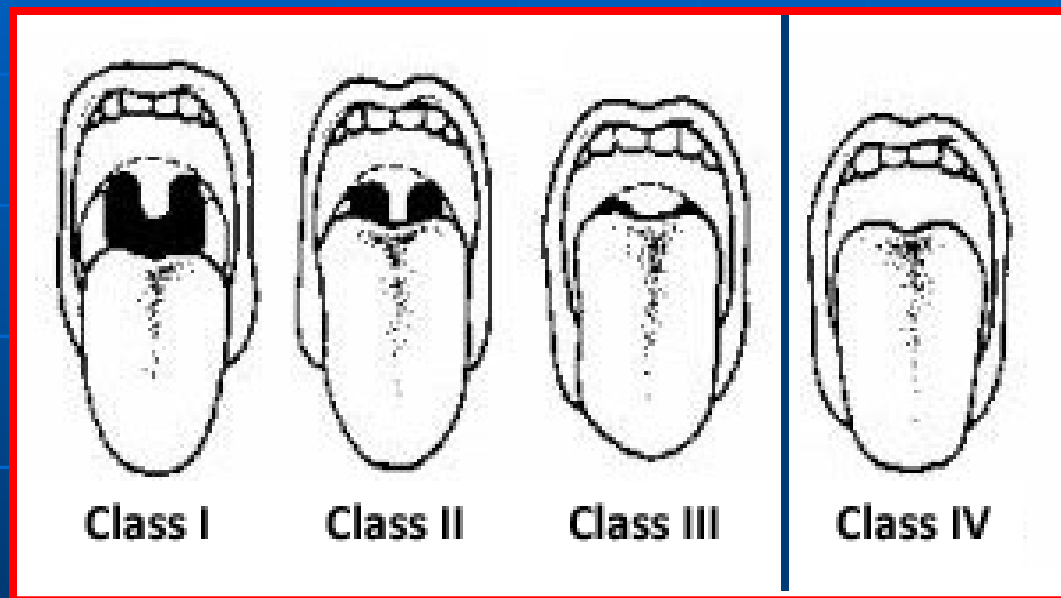
Minimal Information Needed Before Sedation & Endoscopy

- **Airway**: stridor, snoring, sleep apnea, advanced RA of neck, obesity, neck mass, cervical spine disorder, tracheal deviation, large tongue, large tonsils, small jaw, laryngospasm.
 - **mouth < 3 cm,**
 - **non-visible uvula** (Mallampati class IV),
 - **hyoid-mental distance < 3 cm,**
 - **large neck size,**
 - **loose teeth, dental prosthesis,**
 - **inability to extend cervical spine.**

Mallampati Airway Classification System

This system is a method for quantifying the degree of difficulty of endotracheal intubation based on amount of posterior pharynx that can be visualized.

The exam is performed with the **patient sitting with the head in a neutral position** and the mouth open as wide as possible



Class I: soft palate, fauces, uvula, pillars visible. No difficulty.

Class II: soft palate, fauces, portion of the uvula visible. No difficulty.

Class III: soft palate, base of uvula visible. Moderate difficulty.

Class IV: hard palate only. Severe difficulty; **Needs anesthesia support.**

Laryngospasm

Dealing with Laryngospasm

- **Uncontrolled spasm (glottic closure) of the vocal cords.**
- May be provoked by mucus, blood, saliva, locally instilled medications, acrid smell, manipulation of airway, pain, or visceral distention.
- May be incomplete (some air movement is present, inspiratory stridor, accessory respiratory muscles use) or complete (complete airway obstruction, no respiratory sounds; chest & diaphragm movement may be present, but not effective — "paradoxical breathing")

Treatment (procedures and sequence):

- Stop the procedure to avoid any additional stimulation
- Suction oropharynx if the local irritants are suspected to be the cause of laryngospasm.
- **Call Anesthesiologist or in-house airway management resource stat while attempting a jaw thrust and mask ventilation with 100% O₂**
- Consider Lidocaine IV bolus 0.5–0.8 mg/kg

Sleep Apnea

- **Cessation of air flow > 10 sec during sleep, with arterial hypoxemia and hypercarbia.**
- Pre-sedation assessment should include associated signs and symptoms: morning headaches, overwhelming somnolence during normal waking hours, loss of initiative, memory problems, etc.
- CPAP after the procedure results in significantly fewer desaturation episodes.
 - Ask patients who use CPAP to bring their personal CPAP machines.
- Sleep apnea patients are at increased risk for developing hypoxemia after the procedure and they should receive written discharge instructions to avoid taking any CNS depressants or consuming alcohol in the immediate post-procedure period.
 - In some cases, 24-hrs in-house observation may be considered.
- Consider scheduling anesthesia involvement.

Treatment of Aspiration

- Stop procedure, turn patient's head to the side and suction oropharynx.
- Place in Trendelenburg position to prevent flooding of the airway.
- Apply 100% O₂ by face mask and check for bilateral breathing sounds.
- If patient remains hypoxic, admit for 24 h observation.
- If (and only if) particulate matter aspiration is suspected: Intubation and bronchoscopy to remove the aspirated material.
- Empirical **antibiotic** treatment only in **immunocompromised** patients, or if the patient aspirated **feculent materials**.
- No benefit from empirical steroids administration.

Minimal Information Needed Before Sedation & Endoscopy

■ Respiratory:

- COPD,
- Home O₂,
- Tobacco abuse,
- Asthma,
- Active pulmonary TB.

■ Previous anesthesia:

- Adverse reaction,
- Difficult intubation,
- Paradoxical response to sedation.

Minimal Information Needed Before Sedation & Endoscopy

■ Cardiac:

- CHF,
- Arrhythmia,
- Recent MI,
- Unstable angina,
- Pacemaker,
- AICD.

- History of endocarditis*,
- Prosthetic valve*,
- Vascular graft < 1 year*,
- Surgical pulmo-systemic shunt*,
- Cyanotic heart disease*

*** Endocarditis prophylaxis currently not recommended**

Minimal Information Needed Before Sedation & Endoscopy

■ Neuro-Psych:

- Seizures,
- Neuro-muscular disease,
- Oro-pharyngeal dysphagia,
- Panic disorder,
- Chronic benzodiazepine,
- Chronic narcotic,
- Alcohol abuse,
- Drug abuse.
- Use of MAO inhibitor
[phenelzine (**Nardil**), tranylcypromine (**Parnate**)] or SSRI

Substances of Abuse

Cocaine: Potent vasoconstrictor; has direct negative effects on the heart as well as causing coronary vasospasm, dysrhythmia and seizures.

Marijuana: Produces mild-moderate sympathetic stimulation, increases heart rate and myocardial oxygen consumption, sometimes produces orthostatic hypotension. **Severe tachycardia warrants cancellation.**

Amphetamines: Chronic abuse leads to tolerance and psychosis. Catecholamine stores may be depleted.

Ecstasy/Molly/MDMA: Chemically resembles a combination of amphetamine and mescaline. Most common complications include hyperthermia, mental status changes, tachycardia, tachypnea, profuse sweating. **No procedure should be performed till at least 6 hours since last consumption.**

Minimal Information Needed Before Sedation & Endoscopy

■ Others:

- Cirrhosis,
- Renal insufficiency,
- Diabetes,
- Cachexia,
- Blood-borne pathogens
 - Hepatitis B,
 - Hepatitis C,
 - HIV,
- Bleeding disorder,
- Thrombocytopenia,

- Warfarin,
- Heparin,
- LMWH
 - Enoxaparin, Dalteparin.
- Fondaparinux (Arixtra)
- Antiplatelet:
 - Dipyridamole, ASA
- Thienopyridines:
 - Clopidogrel, Prasugrel, Ticlopidine, Ticagrelor.
- GP IIb/IIIa inhibitors
 - Tirofiban, Abciximab, Eptifibatide
- Xa Inhibitors:
 - Rivaroxaban, Apixaban, Edoxaban.
- PAR-1 inhibitor
 - Vorapaxar
- Direct Thrombin Inhibitors:
 - Dabigatran, Argatroban, Bivalirudin

ASA and Mortality

Class	Definition	Approximate Mortality Rate
I	A normal healthy patient	0.06–0.08%
II	A patient with mild systemic disease and no functional limitations	0.27–0.4%
III	A patient with moderate to severe systemic disease that results in some function limitation	1.8–4.3%
IV	<i>A patient with severe systemic disease that is a constant threat to life and functional incapacity</i>	7.8–23%
V	<i>A moribund patient who is not expected to survive 24 hours with or without surgery</i>	9.4–51%
VI	A brain-dead patient whose organs are being harvested	
E	The procedure is an emergency (for example, "2E") Emergency increases the risk of complications	

Classes IV & V likely need anesthesia support or are done in ICU

Guidelines for Anesthesiology Assistance

- Prolonged or therapeutic endoscopy requiring deep sedation or general anesthesia
 - Anticipated intolerance, paradoxical reaction or allergy to standard sedation regime
 - Severe comorbidity (ASA class 4 and higher)
- Increased risk of airway obstruction
 - History of stridor
 - History of severe sleep apnea
 - Dysmorphic facial features
 - Trisomy 21
 - Pierre-Robin syndrome
 - Jaw abnormalities
 - Retrognathia
 - Micrognathia
 - Trismus
 - Severe malocclusion

Guidelines for Anesthesiology Assistance

Oral abnormalities

- Oral opening < 3 cm in adults
- Protruding incisors
- Macroglossia
- High arched palate
- Tonsillar hypertrophy
- Mallampati score of 4

Neck abnormalities

- Decreased hyoid-mental distance (< 3 cm in adults)
- Short thick neck
- Limited neck extension
- Cervical spine disease (eg, advanced rheumatoid arthritis) or trauma
- Severe tracheal deviation

JH Criteria for LVAD to have Endoscopy under Moderate Sedation in Endoscopy Suite

- Patient can be sedated with Moderate-Sedation if all are true:
 - LVAD Implanted more than 30 days earlier.
 - Pulse Pressure > 15 mm Hg (BPs – BPd).
 - Reliable Blood Pressure, with BP-Cuff or Doppler.
 - No Obstructive Sleep Apnea.
 - No COPD on Home Oxygen.
 - Perfusionist Available for the Endoscopy (Ext. 8384).

Risk Factors for Cardio-Pulmonary Complications of Moderate Sedation

- Hospitalized status.
- Ischemic heart disease.
- Moderate to severe pulmonary disease.
- Baseline $\text{SaO}_2 < 95\%$.
- Age > 70 years.
- ASA III & IV.
- Procedure Specific:
 - Urgent or Emergent.
 - Use of Supplemental oxygen (helps in EGD).

Agents for Sedation/Analgesia

Considerations

Use of O₂ supplementation:

- At "Room air": O₂ saturation falls before hypoventilation, but
- With supplemental O₂: hypoventilation and arrhythmia/arrest may occur without O₂ de-saturation;
- **Recommend:** start O₂ after 1st desaturation and be extra careful with further sedative use.

Combined narcotic + benzodiazepine are synergistic in:

- sedative effect and
- respiratory depression

Considerations

Best sequence to give the drugs:

- **1)** Diphenhydramine/Promethazine/Droperidol (if used)
- **2)** Narcotic,
- **3)** Benzodiazepine

Idiosyncratic responses:

- excitation or panic;
- most frequently due to benzodiazepine:
 - try Flumazenil +/- cancel

Considerations

- In pregnancy:
 - **Only procedures with strong indication.**
 - **Timing:**
 - If possible, wait until second trimester.
 - Minimize duration of procedure.
 - Obtain obstetric support for complications
 - **Assess fetus:**
 - Confirm presence of fetal heart sounds before sedation and after the procedure, then document them in the note.

Considerations

- In pregnancy:

- **Position:**

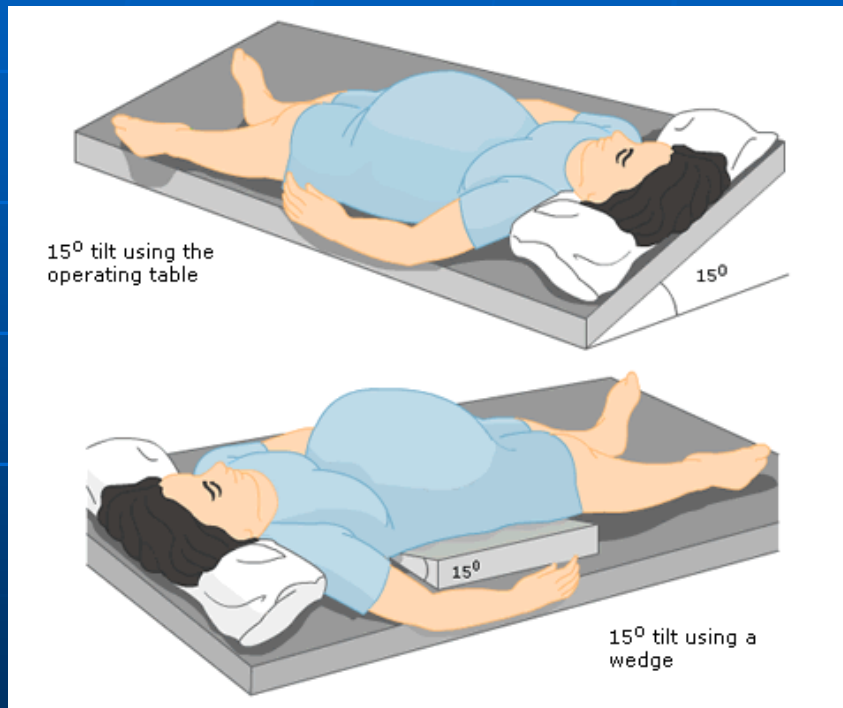
- Patient in Left lateral position or with a Left pelvic tilt (to avoid IVC & aortic compression)

- **Medication:**

- lowest possible dose,
 - Category A or B if possible: Propofol, ketamine, benadryl; less often meperidine (category C) (preferred over fentanyl)

Position for Endoscopy Pregnancy

Left pelvic tilt



Left Lateral Decubitus



Agents for Sedation/Analgesia

Fentanyl

Meperidine

Midazolam

Remimazolam

Diazepam

Ketamine

Diphenhydramine

Promethazine

Droperidol

Propofol

Fospropofol

Dexmedetomidine

Nitrous Oxide

Opioids Families

Cross to different family for drug allergies

■ PHENANTHRENES

- **Morphine**
- Codeine
- Hydrocodone
- Oxycodone
- Hydromorphone
- Oxymorphone
- Levorphanol
- Buprenorphine
- Butorphanol
- Naloxone
- Heroin

■ DIPHENYLHEPTANES

- Methadone
- Propoxyphene

■ PHENYLPIPERIDINES

- **Meperidine**
- **Fentanyl**
- Sufentanyl
- Alfentanyl
- Remifentanyl

■ BENZOMORPHANS

- Pentazocine
- Loperamide
- Diphenoxylate

Fentanyl (1)

Effect: Potent synthetic Mu-receptor agonist analgesic.

Equivalency: Fentanyl 100 mcg = morphine 10 mg = meperidine 75 mg

Onset: 1 circulation or 1.5- 2 min.;

Peak: at 5 min.; redistributes from fat after 13 min.

Half-life: 2 hours (up to 10 hours)

Dose: 1-2 mcg/kg IBW. **Initial:** 50-100 (**75**) mcg, **Subsequent:** 25-**50** mcg **q**
2-3 min

Fentanyl (2)

Risks:

- Potent respiratory depressor; reduces brain-stem response to high CO₂ and low O₂
- With high initial dose “wooden chest”: muscle rigidity and clonic movements
- Small fall in SVR; rare vagally-mediated bradycardia
- Cough suppression, itching, pupillary const.

Cautions: Reduce dose in elderly, cachexia, renal insufficiency

Pregnancy (Cat C): probably safe in low dose (Meperidine preferred)

Breast Feeding: OK to breast feed any time.

Reversed: by Naloxone

Meperidine (1)

- **Effect:** Synthetic Mu-receptor agonist analgesic.
- **Equivalency:** Meperidine 75 mg = morphine 10 mg = fentanyl 100 mcg
- **Onset** at 2 min.;
- **Peak** at 10 min.
- **Half life:** 4 hours
- **Dose: Initial:** 25-75 (**50**) mg IV; **Subsequent:** 12.5-25 mg q 5 min.
- **Cautions:**
 - Elderly have high levels b/o low protein binding and elimination; decrease dose by 25-50%.
 - Slow clearance in cirrhotic; reduce dose
- **Pregnancy (Cat C):** preferred agent
- **Breast feeding:** hold for 24 hours.

Meperidine (2)

Risks:

- Causes respiratory depression and hypotension;
- Disorientation, hallucinations, nausea, tachycardia, headache.
- Convulsions from active metabolites.
- **Serotonin Syndrome:**
 - **Hypertensive crisis and death with:**
 - MAO inhibitors (phenelzine-Nardil, tranylcypromine-Parnate), and
 - Less often with Selective Serotonin Reuptake Inhibitors (SSRI's).

Reversed: by Naloxone (Narcan)

Midazolam (1)

Effect:

- Binds to benzodiazepine receptors in spinal cord, brain-stem, cerebellum, limbic system and cerebral cortex.
- Potentiates GABA inhibitor effects.
- Anxiolytic, sedative, hypnotic that causes anterograde amnesia.

Peak effect: in 3-5 min

Half life:

- 2-3 hours (10 h in elderly);
- longer in dose > 10 mg,
- has inactive metabolites.

Midazolam (2)

Dose:

- **Single-agent:** 0.07 – 0.1 mg/kg IBW (5-7 mg).
MAX: 0.3 mg/kg IBW
- **Combination:** initial **1-2 mg** IV followed by 0.5-**1 mg q2 min.**

Risks:

- respiratory and cardiovascular depression,
- ventricular irritability,
- blunted heart rate response to hypotension (in deep sedation)
- Agitation, involuntary movements, blurred vision, nausea and vomiting (< 2%).

Midazolam (3)

Cautions:

- Is 3-4-fold stronger than diazepam
- Older than 65-year-old are more sensitive.
- Often responsible for idiosyncratic reactions.

Pregnancy (Cat D): use only if

- meperidine alone is not enough, and
- only after first trimester.

Breast feeding: hold for 4 h.

Reversed: by Flumazenil.

Patient Difficult-to-Sedate

Diphenhydramine

Histamine-H1 receptor antagonist: anticholinergic & sedative effect.

Risk: hypotension, dizziness, blurred vision, dry mouth, epigastric discomfort, urinary retention & wheezing.

Advantage: Modest stimulation of ventilation.

Dose: 25-50 mg IV

Onset of action: 2-3 min; peak 60-90 min

Duration of action: 240 min

Pregnancy: category C; B in 3rd trimester.

Promethazine

- **Phenothiazine:** anti-histaminic, sedative, anti-emetic, anticholinergic effect.
- **Mechanism:**
 - Increase effect of sedatives.
 - Blocks postsynaptic dopaminergic receptors in brain and has alpha-adrenergic inhibitory effect.
 - Competitive inhibition of H1 receptors.
- **Risks:** hypotension, respiratory depression, neuroleptic malignant syndrome, extrapyramidal effect, oculogyric crisis.
- **Dose:** 12.5-25 mg IV slowly, < 25 mg/min.
- **Onset:** 2-5 min; peak unknown
- **Duration:** 120-180 min.
- **Pregnancy:** category C

Oropharyngeal Anesthesia

(only skunks spray)

- Adds very little to comfort if sedation and/or analgesia if given.
- **Risk:** decreased gag reflex may facilitate aspiration (do not give in emergency procedure, GI bleed, or PEG)
- Absorption of the drug can cause
 - a) arrhythmia (lidocaine) or
 - b) methemoglobinemia (benzocaine) with cyanosis, altered mentation and brownish blood (Rp: 1% Methylene blue 1-2 mg/kg [7-15 ml] IV over 10-15 min.)
- **Pregnancy:** Lidocaine "gargle/spit" is Category B

Antagonists

Naloxone

Flumazenil

Atipamezole (for Dexmedetomidine)

Naloxone (1)

Effect:

- Competitive antagonist of opioids.
- Reverses respiratory depression (1st choice), analgesia, pupillary constriction, dysphoria, coma, and convulsions due to narcotics.

Peak: 1-2 min. IV; 2-5 min. SQ.

Half-life: 1-2 hour.

Pregnancy (Cat B): OK to use except in opioid dependency.

Dose:

- a) To continue procedure: 0.1-0.2 mg IV q 2-3 min for respiratory depression.
- b) To abort procedure: 0.4 mg q 2-3 minutes. May need to repeat in 1-2 hours.

Naloxone (2)

Monitoring post-reversal:

- a) Fentanyl = 2 hour
- b) Meperidine = 4 hour

Risk:

- Pain, agitation, nausea, vomiting, tachycardia, arrhythmia, pulmonary edema.
- Withdrawal syndrome in opioid-dependent.

Flumazenil (1)

Effect: Synthetic, water soluble, benzodiazepine antagonist.

Cautions:

- Does not alter benzodiazepine bio-availability nor kinetics (re-sedation may occur)
- Delayed reversal of respiratory depression (less effective; second choice to naloxone)

Peak effect: 2-5 min.

Duration: 15 min -2 hours.

Pregnancy (Cat C)

Flumazenil (2)

Dose:

- **Initial:** 0.2 mg IV,
- **Subsequent:** 0.1 mg q 3 min (usually 0.5 mg, total).
For re-sedation, repeat in 20 min. MAXIMUM: 2 mg
- Can be given at continuous infusion 100 – 400 mcg/hour.

Monitor for re-sedation for:

- a) Midazolam < 10 mg = **2 hour.**
- b) Midazolam > 10 mg or Diazepam any dose = **4 hour.**

Risk: Seizures in benzodiazepine-habituated.

Management of Airway in Sedated Patient

- **Auditory/tactile stimulation** of the patient.
- **Lateral head tilt:**
 - results in tongue displacement to the side, away from the posterior pharynx.
- **Chin lift:**
 - permits anterior movement of the mandible with elevation of the airway soft tissue anteriorly).
- **Jaw thrust:**
 - provides significant anterior displacement of the mandible, stretches the neck, and moves supra-epiglottic soft tissue anteriorly.

Management of Airway in Sedated Patient

- NOTE: Airway obstruction not relieved by previously mentioned measures signifies oversedation and may require immediate consultation by an anesthesia provider.
- Nasal/oral airway insertion
- Insert LMA or similar supraglottic adjunct device (Training is required to insert this adjunct)
- Pharmacological reversal of sedative/analgesics

Discontinuation of Monitoring

Aldrete Score ≥ 9

Points	Respiration	Oxygen saturation	Consciousness	Circulation	Activity
2	Able to take deep breath and cough	SaO ₂ >95% on room air	Fully awake	BP $\pm$ 20 mm Hg baseline	Able to move 4 extremities
1	Dyspnea/shallow breathing	SaO ₂ = 90%–95% on room air	Arousable on calling	BP $\pm$ 20–50 mm Hg baseline	Able to move 2 extremities
0	Apnea	SaO ₂ <90% even with supplemental O ₂	Not responding	BP $\pm$ 50 mm Hg baseline	Able to move 0 extremities

Monitoring may be discontinued, and patient discharged to home or appropriate unit when **Aldrete score is 9 or greater**

Patient should also be able to **dress and walk independently.**

Post-Procedure

Patient returns to baseline
or near-baseline status:
Aldrete Score.

Written instructions for:
diet, to resume activities,
phone # to call for
problems.

Medicine Reconciliation: no
change, added medications,
medications temporarily
held or discontinued.

Follow-up arrangements.

Complete written report for
medical record and treating
physician(s).

Complete billing form with:

- pre-procedure diagnosis/indication,
- all services given + bill for Moderate Sedation (if given).
- post-procedure diagnosis (billing form must correlate perfectly with endoscopy report).

Check all Path., cytology
and microbiology results

Informed Consent

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Informed Consent

Based on principle of self determination

Should follow process of disclosure and discussion

Should be obtained for any Procedure or Treatment that involves significant risk.

- In Research, informed consent is always needed.

Obtained from patient, unless incompetent or unable to consent. Then from person legally authorized.

Helps to build strong Doctor-Patient relationship

Disclosure

- Information that a reasonable and prudent physician would disclose in similar situation, and
 - **A)** Information that reasonable and prudent person, in a patient's position, would like to know, **or**
 - **B)** What the actual patient wants to know

Elements of Information

- **Diagnosis or Indication for the intervention**
- **Nature and purpose of treatment**
- **Risks**
- **Benefits**
- **Alternatives (more and less hazardous)**
- **Prognosis without the procedure or treatment.**

Endoscopy Informed Consent

Areas to Cover

Sedation/Analgesia

Planned **Procedure** and **possible interventions** that may be needed as result of findings.

Blood or blood products (in case of need)

Inform about possible need for open surgery (but consent is not obtained here)

Informed Consent in VAMC

iMED

You MUST choose ALL THREE, while you go through iMED.

Procedure: EGD, Colonoscopy, EGD/Colonoscopy, ERCP, Liver Bx, or Paracentesis (all subcomponents are part of “mother procedure”)

Sedation: Moderate sedation with other procedure vs Anesthesia.

Blood: Blood Transfusion

Complications of Colonoscopy and EGD

	Cardio-Pulmonary	Perforation	Bleed	Mortality	Infection	Pain	Post-Electro coagulation Synd.	Gas Explosion
Colon	Hypoxia 0.23% Hypotension 0.48%	0.1 - 0.3%	Screening 0.1 - 0.6% 0.21% Polypectomy 0.87%	Colonoscopy Specific 0.007%; All Cause 0.07%	Transient bacteremia 4% Infection is rare	5 - 11%	0.1% - 0.03%	9 reported cases
EGD	0.58%	0.004% - 0.009%	Very rare	No data	Transient bacteremia 8% Infection is rare	Rare		

Documentation of Consent

Should **reflect the process**: Procedure-specific consent

Should be in **simple**, layman, 5th grade level **language**.

Document separately that informed consent was obtained (Sedation form, Endo-report)

Witnessing no longer required

Pitfalls

Patient **unable to comprehend:** language, sedation, intellect,
...

Voluntariness: avoid duress or coercion.

Incompleteness: consent for EGD does not include dilation.

**TO OBTAIN INFORMED CONSENT IS THE
RESPONSIBILITY OF THE PHYSICIAN; DO NOT DELEGATE.**

Exceptions to Obtain Informed Consent

Emergency: life threatening condition in patient unable to consent, without time to find representative of patient

Therapeutic Privilege: disclosure likely to cause emotional or physical harm

Waiver: patient waives right to disclosure

Compulsory: legally mandated treatment.

Questions ?

Summary of Pre-sedation & Endoscopy History

- Stridor, snoring, sleep apnea
- Home O2
- COPD
- RA of neck
- Dental prosthesis, loose teeth
- CHF
- Recent MI, unstable angina

- Arrhythmia
- Pacemaker
- AICD
- Hx. Endocarditis*
- Prosthetic heart valve*
- Vascular graft < 1y*
- Surg. Pulm-system shunt*
- Cyanotic heart dz*

* **Endocarditis prophylaxis is not recommended** anymore

Summary of Pre-sedation & Endoscopy **History**

- Active pulmonary TB
- Asthma
- Hx. difficult intubation
- Paradoxical sedation reaction
- Adverse reaction to sedation/anesthesia
- Seizures
- Oro-pharyn dysphagia

- Chronic benzodiazepine
- Chronic narcotic
- Alcohol abuse
- Street-drug abuse
- MAO inhibitor use (Nardil, Parnate)
- Cirrhosis
- Renal Insufficiency
- Diabetes mellitus

Summary of Pre-sedation & Endoscopy **History**

- Bleeding disorder
 - Thrombocytopenia
 - Coumadin/warfarin
 - Heparin
 - Low molecular weight heparin (lovenox, innohep, normiflo, fragmin)
 - Plavix, Ticlid
- HIV infection
 - Hepatitis B or C

Summary of Pre-Sedation & Endoscopy

Physical Exam

- Obesity
- Cachexia
- Neck mass
- Tracheal deviation
- Mouth < 3 cm
- Hyoid- mental distance < 3 cm
- Non-visible uvula
- Cervical extension
- Neck size
- Loose teeth, dental prosthesis
- Evidence of volume overload
- Cyanosis
- Artificial valve click
- Wheezing

Ramsey Sedation Scale

Score	Responsiveness
1	Patient is anxious and agitated or restless, or both
2	Patient is cooperative, oriented and tranquil
3	Patient responds to commands only
4	Patient exhibits brisk response to light glabellar tap or loud auditory stimulus
5	Patient exhibits a sluggish response to light glabellar tap or loud auditory stimulus
6	Patient exhibits no response

Antibiotic Prophylaxis Required

ASGE 2003 & AHA 2007

Procedure	Diagnosis	Regimen (1 hour pre-procedure)
Liver Biopsy	Bilio-Enteric anastomosis PSC w recurrent infection ?	-Cipro 750 mg po -Amp 2 gm IV + Gent 1.5/kg
ERCP or EUS guided FNA	Suspected biliary obstruction Pancreatic pseudocyst	-Amp 2 gm IV + Gent 1.5/kg -Cipro 750 mg po
PEG	Everybody	Cefazolin 1 gm IV + oral care
Any	Cirrhotic with GI bleed	Cipro 500 mg po BID x 7 days Norfloxacin 400 mg BID x 7 days Ceftriaxone 1 gm IV QD x 7 days

Anticoagulation & Endoscopy

ASGE 2003

PROCEDURE Type & Risk	Anticipated Procedure	Thrombotic Risk	Action
URGENT	-GI bleed treatment	Any	Give FFP until INR 1.5-2.5
ELECTIVE LOW RISK	-EGD, Colon, Enterosc, EUS, ERCP w/o sphincterot, (+/- Stent/Bx)	Any	Proceed if INR is not Supratherapeutic
ELECTIVE HIGH RISK	-Polypectomy, dilation, FNA, Sphincterotomy, variceal treatment, PEG, Laser therapy	Low DVT, Bioprosthetic valve, Mech Ao valve, A fib w/o valv dz	-Discontinue Warfarin 3-5 d before. -Reinstitute after procedure
ELECTIVE HIGH RISK	-Polypectomy, dilation, FNA, Sphincterotomy, variceal treatment, PEG, Laser therapy	HIGH A.Fib w valv dz, Mech Mitral valve, Mech valv w prev thromboemb	-Discont 3-5 d before, -IV heparin while subtherapeutic -D/C heparin 4-6 h before; restart 2-6 h after -Restart Warfarin

Low Molecular Weight Heparin and Non-Aspirin Antiplatelet Agents ASGE 2005

DRUG	PROCEDURE	ACTION
Lovenox, Normiflo, Fragmin, Innohep	Polypectomy, Sphincterotomy, Dilation, FNA, Variceal Rp, Ablation	Discontinue at least 8 hours before
Lovenox, Normiflo, Fragmin, Innohep	Forceps Bx, Stent without cut, Diagnostic endoscopy	No change in Therapy
Plavix Ticlid	Polypectomy, Sphincterotomy, Dilation, FNA, Variceal Rp, Ablation	Discontinue 7-10 days before
Plavix Ticlid	Forceps Bx, Stent without cut, Diagnostic endoscopy	No change in Therapy