The beauty and the beast of IV sedation

Goals of sedation

- Patient
- Surgeon/interventionist
- anesthesiologist

Patient’s goal

- No pain
- Comfortable

Surgeon’s goal

- Patient remain immobile, resulting in a quicker, safer and more sterile procedure.
- No adverse event

Anesthesiologist’s goal

- Uneventful during sedation
  - No hypoxia
  - No apnea
  - No hypotension
  - No aspiration

Sedation

- Patient evaluation and preparation
  - Underlying disease, NPO
- Anesthesiologist/ well trained staff
- Equipment : monitor, emergency cart, supplemental oxygen
- Team communications: patient, surgeon, anesthesiologist

Patient evaluation and preparation

- Review previous medical records, identify abnormalities of major organ systems, need further medical consultation?
- Adverse experience with sedation
- History of difficult airway
- Current medications

Well trained staff

- Recognition of apnea and airway obstruction and treatment these problems.
- Members of team has a skills to establish intravascular access.
- Advanced life support skills (tracheal intubation, defibrillation, resuscitation medications)

Monitoring

- Blood pressure
- ECG
- Pulse oximetry
- End tidal carbondioxide
- BIS?

End tidal carbondioxide

Randomized Controlled Trial > Endoscopy. 2014 Mar;46(3):236-44. doi: 10.1055/s-0033-1359149. Epub 2013 Dec 11.

SULT

Capnographic monitoring of propofol-based sedation during colonoscopy

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PMID: 24338242 DOI: 10.1055/s-0033-1359149

End tidal carbondioxide

- The incidence of hypoxemia was significantly lower in patient with capnography monitoring compared with those receiving standard monitoring. (18% vs 32%)
- Risk factors of hypoxemia : age, high BMI, history of sleep apnea, total dose of propofol and total dose of ketamine

End tidal carbondioxide

- Patients receiving anesthesiologist-administered sedation developed hypoxemic events more often than those receiving NAPS or EDS.

- Patients who was sedated by anesthesiologist, sedation was deeper, a combination of sedative medication was used more often, and sedative doses were significantly higher compared with patient who was sedated by nurse or endoscopist.

BIS

Review > Dig Dis Sci. 2016 Mar;61(3):814-24. doi: 10.1007/s10620-015-3945-9. Epub 2015 Nov 3.

Bispectral Index Versus Standard Monitoring in Sedation for Endoscopic Procedures: A Systematic Review and Meta-Analysis

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Affiliations + expand

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Abstract

Background: Bispectral index (BIS) monitoring has been used as an objective measurement tool for sedation depth and has been proposed as a guidance to reduce the risk of intraprocedural over-sedation. However, the results of several studies evaluating the benefits of BIS monitoring for gastrointestinal endoscopy were not consistent.

BIS

- The total propofol consumption was significantly lower in the BIS group than non-BIS group.

- Recovery time, procedure time, adverse events were not significantly superior in the BIS group when compared with the non-BIS group.

BIS

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Bispectral index monitoring of the clinical effects of propofol closed-loop target-controlled infusion

Systematic review and meta-analysis of randomized controlled trials

Danyang Wang, MD, Zichen Song, MD, Chunlu Zhang, MD, and Peng Chen, MD*

Monitoring Editor: Ibtesam Hilmi.

Closed-loop system

The closed-loop system connects BIS and other anesthesia depth detectors to the computer executing TCI into a system that automatically adjusts the target concentration and independently forms a closed feedback loop.

BIS

Results: Compared with manual control, closed-loop systems under bispectral index anesthesia depth monitoring reduced the dose of propofol (MD: -0.62, 95% CI: -1.08--0.16, P = .008), with heterogeneity (I2 = 80%). Closed-loop systems significantly reduced the incidence of abnormal blood pressure (MD: -0.02, 95%CI: -0.05-0.01, P = .15, I2 = 74%) and postoperative cognitive dysfunction (MD: -0.08, 95% CI: -0.14 -0.01, P = .02, I2 = 94%).

Conclusion: Bispectral index monitoring of propofol closed-loop target-controlled infusion system can reduce the amount of propofol, reduce the incidence of adverse reactions such as hypertensive or hypotension and postoperative cognitive dysfunction.

Levels of sedation

Table 1
Effects of ASA Levels of Sedation

Level of Sedation	Responses to Stimuli	Airway	Spontaneous Ventilation	Cardiovascular Function
Minimal	Normal response to verbal stimulation	Unaffected	Unaffected	Unaffected
Moderate	Purposeful response to verbal or tactile stimulation	No intervention required	Adequate	Usually maintained
Deep	Purposeful response after repeated or painful stimulation	Intervention may be required	May be inadequate	Usually maintained
General anesthesia	Unarousable, even with painful stimulus	Intervention often required	Frequently inadequate	May be impaired

Source.—Reference 4.

Levels of sedation

- Not all patients need deep sedation during procedure.

- Female, 62 year old
- Diagnosis : acute cholangitis
- Underlying disease : HTN
- Planned procedure : PTBD
- Deep iv sedation with propofol, fentanyl
- uneventful

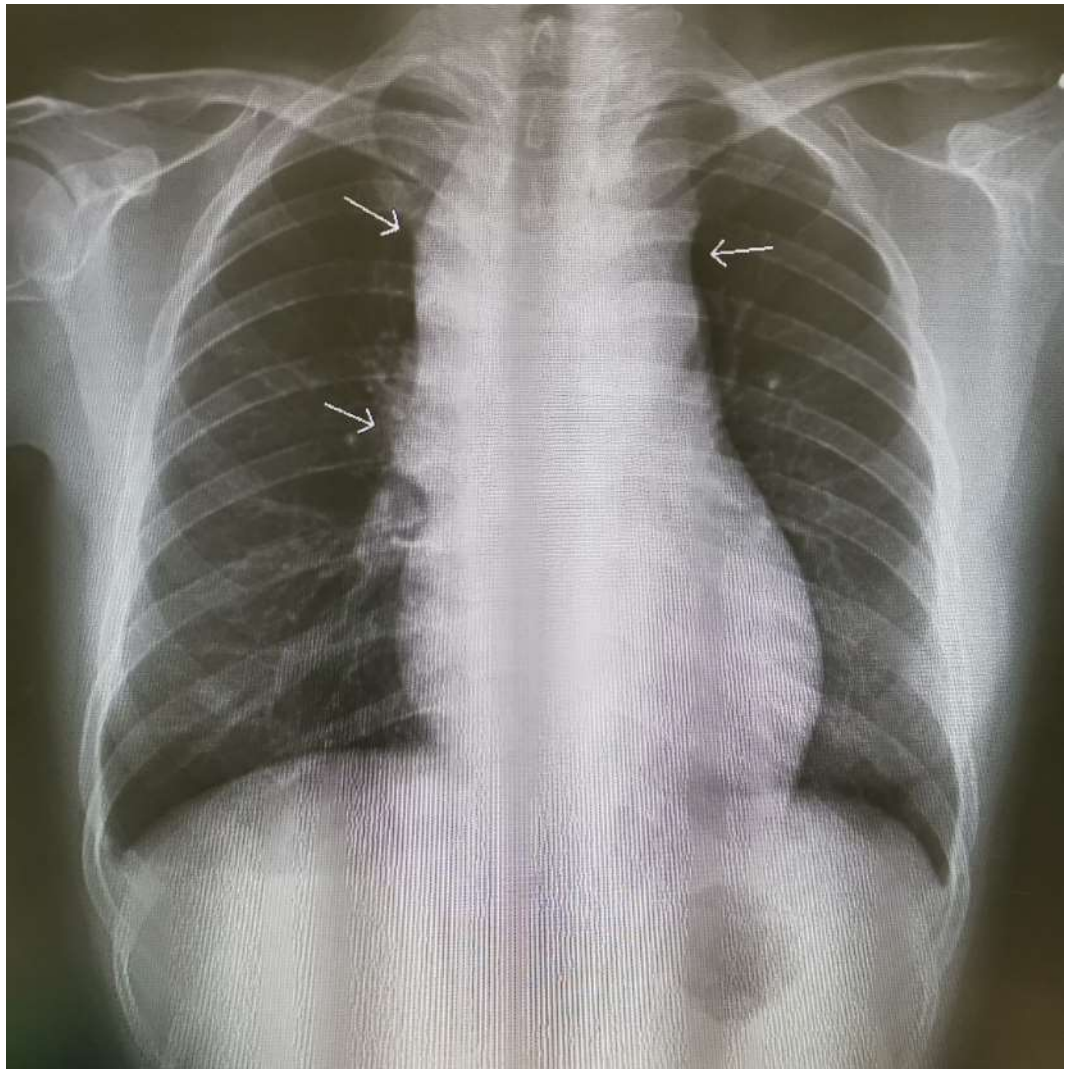
- Female, 60 year old
- Diagnosis : CA head of pancrease with obstructive jaundice
- Underlying diseases
  - VSD S/P surgery 20 years ago
  - DVT with chronic PE with pulmonary hypertension
  - CTA pulmonary : no significant change in size and appearance of the residual eccentric intraluminal filling defects along distal right main pulmonary artery, right lower lobar pulmonary artery and proximal segmental branches.

- Consult with GI endoscopist → high risk given large PE and DVT
- Risk of sedation during ERCP with stent
- Alternative option being PTBD

- Mild sedation with fentanyl and dexmedetomidine during procedure
- uneventful

- Female 30 year old
- CC: cough 1 month, no fever, no underlying disease
- CXR : widening mediastinum
- CT chest : anterior mediastinal mass
- Planned procedure : ultrasound/CT guided biopsy mediastinal mass

- Patient has no dyspnea, can lying with supine position, no signs of SVC obstruction.



- Sedation with midazolam 1 mg, fentanyl 75 mcg and propofol 50 mg
- Patient develop desaturation during procedure.
- assissted ventilation with mask to rescue desaturation.
- Successful procedure

- Final diagnosis : lymphoma

Levels of sedation

- No need deep sedation all time during procedure

Need patient cooperation during the procedure.

Tips

- Procedure : painful or painless
- Communications with surgeon and patient
- Titration of sedative medication
- 3 ways was not far from patient.