Absite: Anesthesia

http://opensourceurgery.com

• Inhalational agents:
  – MAC: Minimal alveolar concentration is the smallest concentration of agent at which 50% of patients will not move with incision.
  – Small MAC means more potent and reflects solubility
  – Speed of induction inversely proportional to solubility
  – Nitrous has a high MAC and thus is the fastest agent but also the least potent.

• Halothane
  – Halothane Hepatitis: Fever, eosinophilia, jaundice, increased LFTs.
  – Enflurane: Can have seizures as a side effect, don’t use in Epileptics
  – Nitrous: can fill closed air spaces such as in Pneumothorax or bowel obstruction and take longer to wear off.

• IV Induction:
  – Etomidate: Fast, minimal BP effects or cardiac depression.
    • S/E: Adrenal suppression
  – Propofol: Fast on and Off, no analgesic effects
    • S/E: Pain at injection site, hypotension, Don’t use with EGG ALLERGY or SOY ALLERGY
    • Can cause metabolic acidosis and death with prolonged use in children.
  – Ketamine: Dissociative amnesia + Analgesia, no respiratory depression.
    • Hallucinations, Catecholamine release, increased cerebral blood flow(Contraindicated in head patients)

• Rapid sequence intubation
  – Used in emergent situations where patient’s or when patients are high risk of aspiration (recent PO intake, Bowel Obstruction, GERD, Gastroparesis)
  – Steps:
    • 1) Preoxygenate with 100%FiO2
    • 2) Apply Cricoid Pressure prior to loss of consciousness
    • 3) Give Induction Agent
    • 4) Give Paralytic Agent
    • 5) Place Tube
    • 6) Verify Placement
    • 7) Release cricoid pressure and secure tube.
• Best indicator of successful placement:
  – End Tidal CO2
• Significant drop in EtCO2 seen with CO2 embolus. Also seen in PE.
• Increase in EtCO2 can be associated with Malignant hyperthermia

• Malignant Hyperthermia
  – Caused by succinyl choline and the volatile anesthetics
  – Uncontrolled muscle contraction secondary to calcium channel defect in the sarcoplasmic reticulum
  – Symptoms: Increased EtCO2, tachycardia, muscle contraction, acidosis, Hyperkalemia. Elevation of body temps is a late sign.
  – Treatment: Dantrolene 10mg/kg dose. Acts on ryanodine receptor to stop the release of calcium. Also cool patient, and correct acidosis
  – Irreversible

• Paralytics
  – Only one Depolarizing agent in use.
  • Succinyl Choline
    – Fast and Short acting (lasts 5 minutes)
    – Postential Side effects include:
      • Malignant Hyperthermia
      • Hyperkalemia
      • Conversion of Open Angle glaucoma to closed angle
      • Increased ICPs
      • Some People have atypical anticholinesterases that metabolize it slower and thus paralysis lasts longer

• Non-depolarizing agents
  – Act as a competitive inhibitor at the acetyl choline receptor
  – Cisatracurium: degraded by hoffman degeneration (spontaneous degradation in plasma) makes it work well in kidney and liver failure.
    • Can cause a histamine release
  – Vecuronium: intermediate acting
  – Pancuronium: long acting, can cause tachycardia (especially if you don’t sedate)
  – Rocuronium: Intermediate acting with quick onset.
  – Don’ use in burn patients, renal failure, spinal cord injury

• Reversal agents
  – Neostigmine and Edrophonium
  – Blocks acetyl cholinesterases thus increasing acetyl choline.
  – Atropine and glycopyrolate can be given to counter the effects of acetylcholine overdose (hypersecretions).
• Diaphragm: last muscle to go down, first to come back.
• Neck and Face: First down, Last back

• Epidural
  – Sensory blockade, and sympathetics also affected
  – Local Anesthetic bathes spinal nerves as they exit the dura.
  – Reaches several 3-4 levels above insertion site.
• Contraindications:
  – Anything that won’t tolerate afterload reduction:
    • HOCM, Cyanotic heart disease, aortic stenosis
  – Any increased bleeding risk.
• Local Anesthetics
  - Amides and Esters. Amides have I’s in them.
  - Work by raising the action potential threshold
  - Amides:
    - Lidocaine, Bupivacaine, mepivacaine
  - Esters:
    - Tetracaine, procaine, cocaine degrade to a PABA analogue and cause side effects.
  - Lidocaine: w/o 5mg/kg, w/ epi 7mg/kg
  - Bupivacaine: w/o 2mg/kg, w/ epi 3(4)mg/kg
  - Lidocaine toxicity:
    - 1st sign are paraesthesias (perioral) then hallucinations other CNS: Tinnitus, headaches,
    - Cardiac are much later

• Narcotics
  - All narcotics act on the μ-opiod receptor within the Central Nervous System.
  - Narcotics cause analgesia but are also associated with respiratory depression and blunted sympathetic responses.
  - Itching associated with Narcotics is due to histamine release. Common in morphine, less likely with demerol, and fentanyl.
  - Morphine and Demerol not used in renal failure
  - Reversed with Narcan

• Benzodiazepines
  - Versed, Ativan, Xanax, Valium
  - Bind to the Gaba receptor
  - Reversed with Flumezanil, may put patient in acute withdrawal or cause seizure.

ASA Class

<table>
<thead>
<tr>
<th>ASA</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>ASA I</td>
<td>Normal Healthy Patient</td>
</tr>
<tr>
<td>ASA II</td>
<td>Patient with mild systemic disease</td>
</tr>
<tr>
<td>ASA III</td>
<td>Patients with severe systemic disease</td>
</tr>
<tr>
<td>ASA IV</td>
<td>Patients with severe systemic disease that is a constant threat to life</td>
</tr>
<tr>
<td>ASA V</td>
<td>Moribund Patients who are not expected to survive without the operation</td>
</tr>
<tr>
<td>ASA VI</td>
<td>Declared brain dead patient who organs are being removed for donor purposes</td>
</tr>
</tbody>
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Revised Cardiac Risk Index

1. History of ischemic heart disease
2. History of congestive heart failure
3. History of cerebrovascular disease (stroke or transient ischemic attack)
4. History of diabetes requiring preoperative insulin use
5. Chronic kidney disease (creatinine > 2 mg/dL)
6. Undergoing supranormal vascular, intrapleural, or intrathoracic surgery

Risk for cardiac death, nonfatal myocardial infarction, and nonfatal cardiac arrest:
0 predictors = 0.4%, 1 predictor = 1%, 2 predictors = 2.4%, 3 predictors = 5.4%

• Largest risk factor is uncompensated heart failure(S3 Gallop).
• Second largest is recent MI(wait 8 weeks)