Sedation After Cardiac Surgery Using Volatile Anesthetics: Evaluator Blinded, Randomized Trial of Efficacy and Safety

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Outline

• Rationale
  • Benefits of Volatile Anesthetics
  • Clinical Question

• Study
  • Methods
  • Results
  • Discussion
  • Future Applications
Clinical Scenario

- Postoperative CV Surgery

- Sedation and Analgesia
  - Propofol
    - Dexmedetomidine/BDZ
  - Opioids
Volatile Anesthetics

- Inhaled Halogenated Ethers
  - Amnesia
  - Sedation/Unconsciousness
  - Immobility

- Greater Action at Cortex
  - Preserved brainstem autoregulation

- Initiation and Maintenance of Anesthesia
- Requires Specialized Equipment

Isoflurane
## Comparative Benefits

<table>
<thead>
<tr>
<th></th>
<th>Propofol</th>
<th>Volatile Anesthetic</th>
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</thead>
<tbody>
<tr>
<td>Ischemic Pre/Post - conditioning</td>
<td>NO</td>
<td>YES</td>
</tr>
<tr>
<td>Organ Independent Metabolism</td>
<td>NO</td>
<td>YES</td>
</tr>
<tr>
<td>Hemodynamic Stability</td>
<td></td>
<td>Better</td>
</tr>
<tr>
<td>Bronchodilation</td>
<td>NO</td>
<td>YES</td>
</tr>
<tr>
<td>Targeted Concentration</td>
<td></td>
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Existing Data

• Volatiles in CV Surgery
  - Limited to Intraoperative use
  - Decreased Troponin release
  - Decreased Wall Motion Abnormalities
  - Decrease ICU LoS

• Volatiles in ICU
  • Smaller Trials
    - Anesthesia ventilator
    - AnaConDa – technological breakthrough
AnaConDa Device
AnaConDa Device

- Ventilator
- Conserving medium
- Gas Monitor Port
- Patient
- Agent Line
- Bacterial Filter
- Miniature vaporizer
Clinical Questions

- VA Pre & Post Conditioning
  - Less Cardiac Morbidity?

- Improved Sedation Profile?

- AnaConDa Device
  - Technically Feasible?
Methods

• 150 Recruited
  • 2 withdrew
  • 7 changed surgical plans
  • 2 non-AmaConDa malfunction
• 139 Randomized
  • Elective ACB. Grade 1-2LV
  • Ventilation <12 hours
  • No Renal/Hepatic
• MD and RN - Unblinded
• Analysis - Blinded
Timeline

- Protocol
  - Induction
  - Vasopressors
  - Inotropes

- Induction
  - P or VA started
  - Hemodynamics

- Maintenance
  - P or VA continued
  - Hemodynamics

- Post CPB
  - Protocol Extubation
  - Hemodynamics
  - Troponin

- CVICU
  - Length of Stay
  - Hemodynamics
  - 1 year F/U

- Ward/DC
  - P or VA continued
• Intraoperative Medication
• Norepinephrine
  • Propofol = 33
  • VA = 17
• $p = 0.001$
Results

- ICU Medication

- Vasopressin
  - Propofol = 17
  - VA = 3

- $p = 0.02$
Results

- Troponin @ 12h
- Median Values
  - Propofol
    - 5.1 ng/ml
  - VA
    - 5.57 ng/ml
- \( p = 0.81 \)
Results

- **Time to Extubation**
  - **Median Values**
    - Propofol: 350 minutes
    - VA: 244 minutes
  - $p < 0.001$
Results

- Volatile Anesthetics
  - No Difference Troponin
  - Less Vasopressor/Inotrope Usage
  - Faster Extubation
  - No Difference ICU LoS
Discussion

• Why No Difference Troponin?
  • Not only study
  • Other markers of benefit
    − Extubation time
    − Vasopressor/Inotrope requirements

• Why No Difference ICU LoS
  • ICU Workflow
    − 'Scheduled' admit/discharge times

• Blinding
  • Difficult to blind MD/RN
Future Applications

• Long Term Sedation
  • Faster Extubation & Less Vasopressors / Inotropes
    - Shorter LoS?
    - Decrease M & M?

• Expand Inclusion Criteria
  - Sicker patients = greater benefit?

• Cost Analysis
  • ICU LoS
  • Equipment / Medication
Take Home

• Volatile Anesthetic Sedation
  • Safe & efficacious post Aorto-Coronary Bypass
  • Vs. propofol control
    - Faster readiness to extubation
    - Less vasopressor/intrope usage

• Future Applications
  • Long term sedation
  • Alternate patient populations
  • Cost analysis
Questions
Safety

- Measured Volatile Leak
  - Acceptable OR standard
  - Zero beyond machine

- Equipment Malfunction
  - Measured End Tidal Conc.
VA Delivery