Post-operative Delirium

Ken Brady, MD
Pediatrics, Anesthesia, Critical Care
Texas Children’s Hospital
Baylor College of Medicine

Disclosures

• IP for monitoring technology licensed to Medtronic

Set up audience participation

1. Take out your silenced phone
2. Open a web browser
3. Go to: PollEv.com/kenbrady584

Delirium Definitions

• DSM
  – Altered level of consciousness
  – Impaired cognition
  – Acute onset, fluctuating course
  – Direct consequence of general medical condition

• CAM
  – Fluctuating course
  – Inattention
  – Disorganized thinking
  – Altered level of consciousness

Incidence of Delirium

• Occurs in 15-55% of hospitalized patients, and in the ICU from 40-80%, depending on patient population (Inouye NEJM 2006)

<table>
<thead>
<tr>
<th>Surgery</th>
<th>Incidence of delirium (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abdominal aortic aneurysm (infrarenal)</td>
<td>33-54</td>
</tr>
<tr>
<td>Abdominal</td>
<td>5-51</td>
</tr>
<tr>
<td>Cataract</td>
<td>4</td>
</tr>
<tr>
<td>Coronary artery bypass graft surgery</td>
<td>37-52</td>
</tr>
<tr>
<td>Elective orthopedic</td>
<td>9-15</td>
</tr>
<tr>
<td>Head and neck (major)</td>
<td>17</td>
</tr>
<tr>
<td>Hip fracture</td>
<td>35-65</td>
</tr>
<tr>
<td>Peripheral vascular</td>
<td>30-48</td>
</tr>
<tr>
<td>Urologic</td>
<td>4-7</td>
</tr>
</tbody>
</table>
Risk of Post-op Delirium

Vulnerability + Insult → Post-op delirium

Patient Vulnerability

Non-Cardiac Risk Factors
- Age
- Baseline cognitive impairment
- Multiple co-morbidities
- Poor functional status
- Alcohol use
- Electrolyte abnormalities

Cardiac Risk Factors
- MMSE
- Depression
- Albumin
- Stroke history

Incidence of Delirium

<table>
<thead>
<tr>
<th>Risk Factors</th>
<th>Incidence of Delirium</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>18%</td>
</tr>
<tr>
<td>1</td>
<td>43%</td>
</tr>
<tr>
<td>2</td>
<td>60%</td>
</tr>
<tr>
<td>3</td>
<td>87%</td>
</tr>
</tbody>
</table>

An 85 year old presents for cataract surgery

- He was previously unable to lie still for a "no anesthesia" cataract excision.
- PMH: 3V CABG; CHF NYHA II; ex-smoker
- Enalapril, metoprolol, ASA, Lasix
- Na 134 Meq/L; glucose 95 mg/dL; Albumin 2.6; Cr 2.8 mg/dL
- HR 64; 143/92; 94%
- Affable; Oriented to person and place; confused about the date; Poor hearing and vision; daughter is holding his glasses, hearing aid and walker.

An 85 year old presents for cataract surgery

- He was previously unable to lie still for a "no anesthesia" cataract excision.
- PMH: 3V CABG; CHF NYHA II; ex-smoker
- Enalapril, metoprolol, ASA, Lasix
- Na 134 Meq/L; glucose 95 mg/dL; Albumin 2.6; Cr 2.8 mg/dL
- HR 64; 143/92; 94%
- Affable; Oriented to person and place; confused about the date; Poor hearing and vision; daughter is holding his glasses, hearing aid and walker.

What risk factors for post-op delirium did you find in this history?

Top
Pathophysiology

- Neurotransmitters
  - Acetylcholine deficiency
  - Dopamine excess
- Neuroinflammation
- Metabolic disorders
- Cerebrovascular
- Drugs
  - Physiologic stressors
    - Cortisol
    - Ischemia/hypoxia
- Baseline vulnerability
  - Genetic
  - Cognitive reserve

Inouye et al Lancet 2013

Delirium Subtypes

- Hyperactive
  - Easy to diagnose
  - Combative/agitated
- Hypoactive
  - Easy to miss
  - Psychomotor slowing
Symptoms Associated with Delirium

1. Change in level of arousal: drowsiness or decreased arousal* or increased arousal with hypervigilance
2. Delayed awakening from anesthesia*
3. Abrupt change in cognitive function (worsening confusion over hours or days), including problems with attention, difficulty concentrating, new memory problems, new disorientation
4. Difficulty tracking conversations and following instructions
5. Thinking and speech that is more disorganized, difficult to follow, slow,* or rapid
6. Quick-changing emotions, easy irritability, tearfulness, uncharacteristic refusal to engage with postoperative care

Postoperative Delirium in Older Adults: Best Practice Statement from the American Geriatrics Society


Octogenarian for Hip Replacement

• An 83 year old woman with daughter for pre-op consultation.
• Mild memory loss
• HTN-HCTZ
• Unable to self care due to hip pain
• Will this surgery cause cognitive decline?

Which is true regarding the risk of cognitive decline

Deliurium and Cognitive Decline

Cognitive decline accelerates after post-operative delirium

Regional Anesthesia

Regional should help:
- Pain control
- Less GA

Regional Anesthesia has not been shown to reduce the risk of post-operative delirium.

Does regional mean less general?

Without monitoring, many “sedated” patients are receiving general anesthesia.
Best Practice Statement from the American Geriatrics Society

“A health care professional trained in regional anesthetic injection may consider providing regional anesthetic at the time of surgery and postoperatively to improve pain control and prevent delirium in older adults.”

Cochrane Database Review

“There is moderate-quality evidence that Bispectral Index (BIS)-guided anesthesia reduces the incidence of delirium compared to BIS-blinded anesthesia or clinical judgement (RR 0.71, 95% CI 0.60 to 0.85; two studies; 2057 participants).”

Prophylactic antipsychotics

<table>
<thead>
<tr>
<th>Negative Studies</th>
<th>Positive Studies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Haldol 0.5mg tid in elderly hip surgery</td>
<td>Haldol in non-cardiac surgery (23 vs. 15%)</td>
</tr>
<tr>
<td>MNOS trial: Haldol or Zyprexa in mixed ICU</td>
<td>Girard et al. Crit Care Med 2010</td>
</tr>
<tr>
<td>Haldol 1mg tid in high risk ICU patients reduced delirium from 75% to 65%</td>
<td>van den Boogard et al. Crit Care 2013</td>
</tr>
<tr>
<td>Risperidone (1mg SL) reduced delirium from 32% to 11%</td>
<td>Prakanrattana et al. Anaesth Int Care 2007</td>
</tr>
</tbody>
</table>

Best Practice Statement from the American Geriatrics Society

“There is insufficient evidence to recommend for or against the use of antipsychotic medications prophylactically in older surgical patients to prevent delirium.”

Depth of Anesthesia

<table>
<thead>
<tr>
<th>RCCT: Light vs. Deep or Routine (BIS-guided)</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>F.E. Seiber, K.J. Zakriya, A. Gottschalk, et al. Sedation depth during spinal anesthesia and the development of postoperative delirium in elderly patients undergoing hip fracture repair</td>
<td>Deeper sedation: more delirium</td>
</tr>
<tr>
<td>M.T. Chan, B.C. Cheng, T.M. Lee, et al. BIS-guided anesthesia decreases postoperative delirium and cognitive decline</td>
<td>BIS guided: less delirium</td>
</tr>
<tr>
<td>FM. Radlie, M. Franski, G. Sandner, et al. Monitoring depth of anesthesia in a randomized trial decreases the rate of postoperative delirium but not postoperative cognitive dysfunction</td>
<td>BIS guided: less delirium</td>
</tr>
</tbody>
</table>

Best Practice Statement from the American Geriatrics Society

“The anesthesia practitioner may use processed electroencephalographic monitors of anesthetic depth during intravenous sedation or general anesthesia of older patients to reduce postoperative delirium.”
Comparing Agents: no difference

<table>
<thead>
<tr>
<th>Study</th>
<th>Surgery</th>
<th>Intervention</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nishikawa 2004</td>
<td>Abdominal</td>
<td>Propofol vs. Sevo (all with epidural)</td>
<td>No difference (delirium)</td>
</tr>
<tr>
<td>Hudetz 2009</td>
<td>Cardiac</td>
<td>Additional ketamine (0.5 mg /kg)</td>
<td>3.4% vs. 31% (delirium)</td>
</tr>
<tr>
<td>Royse 2011</td>
<td>Cardiac</td>
<td>Propofol vs. Des</td>
<td>No difference (POCD)</td>
</tr>
<tr>
<td>Leung 2006</td>
<td>Non-cardiac</td>
<td>Additional nitrous</td>
<td>No difference (delirium &amp; POCD)</td>
</tr>
</tbody>
</table>

Dexmedetomidine

- Dexmedetomidine has been extensively studied as a post-operative sedative to reduce delerium.

Pain and post-op delerium

<table>
<thead>
<tr>
<th>Pain Severity</th>
<th>Risk of Delirium</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moderate</td>
<td>OR 2.2 (1.2–4)</td>
</tr>
<tr>
<td>Severe</td>
<td>OR 3.7 (1.5–9)</td>
</tr>
</tbody>
</table>

Oral opioids vs IVPCA:
(OR, 0.4; 95% CI 0.2 to 0.7)
Geriatrician consult

• Marcantonio et al
  – 126 patients > 65 y/o admitted for emergent surgical repair of a hip fracture
  – Geriatrician vs. usual care

• Result: Improved rates of delirium in the intervention arm (32% vs. 50%; p=0.04)

Most effective prevention: non-pharmacologic

1. Sensory enhancement (glasses, hearing aids)
2. Mobility enhancement (ambulating)
3. Cognitive orientation and therapeutic activities
4. Pain control
5. Cognitive stimulation
6. Communication standards to prevent the escalation of behaviors
7. Nutrition and fluid repletion
8. Sleep enhancement (nonpharmacologic)
9. Medication review
10. Daily rounding by an interdisciplinary team to reinforce the interventions

In the event of acute delirium:

1. First line: Non-pharmacologic interventions
2. When pt is not agitated, medications are not indicated.
3. Agitated self harming pts failing non-pharmacologic interventions
   – Lowest effective dose antipsychotic
   – Lowest effective dose benzo if antipsychotic fails

Take-home

• Delirium: common
• Delirium: harmful
• Delirium: preventable

Thank You!