Avoiding postoperative delirium in older patients

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POCD - Decline in a variety of neuropsychological domains (memory, executive functioning, speed of processing)
Postoperative delirium – acute confusional state with alterations in attention and consciousness
Dementia – chronic, insidious decline in cognitive function. Alzheimer’s disease – most common form of dementia
POCD ≠ postoperative delirium?

DEFINITIONS

Delirium is a disease (ICD-9 293.0; ICD-10 F05)
POCD is NOT a disease

Distinction between delirium & POCD

Delirium & POCD
Incidence of Delirium

<table>
<thead>
<tr>
<th>Population</th>
<th>Incidence</th>
<th>Author(s)</th>
<th>Sample size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hip fracture</td>
<td>44%</td>
<td>Berggren</td>
<td>37</td>
</tr>
<tr>
<td></td>
<td>19%</td>
<td>Edlund</td>
<td>71</td>
</tr>
<tr>
<td></td>
<td>16%</td>
<td>Morrison</td>
<td>541</td>
</tr>
<tr>
<td></td>
<td>20%</td>
<td>Schuurman</td>
<td>92</td>
</tr>
<tr>
<td>Elective orthopedic</td>
<td>28%</td>
<td>Fisher</td>
<td>40</td>
</tr>
<tr>
<td></td>
<td>28%</td>
<td>Rogers</td>
<td>43</td>
</tr>
<tr>
<td>Major elective</td>
<td>9% (46% aortic)</td>
<td>Marcantonio</td>
<td>876</td>
</tr>
<tr>
<td>surgery</td>
<td>45%</td>
<td>Vaurio</td>
<td>333</td>
</tr>
<tr>
<td></td>
<td>11.4%</td>
<td>Litake</td>
<td>500</td>
</tr>
<tr>
<td>Elective vascular</td>
<td>25% (32% aortic)</td>
<td>Schneider</td>
<td>47</td>
</tr>
</tbody>
</table>


Why is Delirium Important?

- Prolonged hospitalization ($$$)
- Decreased functional status upon discharge
- Cognitive decline post discharge
- Increased institutionalization
- Increased mortality

Case discussion

- Patient is an 80 year old man with mild dementia, hearing loss, a history of depression, and a prior stroke. He is on HCTZ, donepezil, and sertraline. He presents for a total hip replacement. He comes in for preoperative assessment.

Delirium Risk Factors

- Delirium is a multifactorial syndrome influenced by:
  - Baseline patient risk factors (vulnerability)
  - Precipitating factors
- Patients with more baseline risk factors and exposed to more precipitating factors are much more likely to develop delirium
Delirium Risk Model

Patient Factors + Extrinsic Factors

Baseline Risks: Vision, MMSE < 24, Apache > 16, Bun/CR > 18

Precipitating Factors: restraints, 3+ new meds, poor nutrition, bladder catheter, iatrogenic event

Inouye JAMA 1998

Delirium Baseline Risk Factors

- Age
- Sensory impairment
- Cognitive impairment
- Depression
- Alcoholism
- Severe illness
- Fever or hypothermia
- Metabolic disorder

Delirium Precipitating Risk Factors

- Use of Restraints
- Psychoactive Medication
  - Anticholinergics
  - Sedative/hypnotics
  - Benzodiazepine
  - Opioids
  - Meperidine
- Polypharmacy
  - >3 meds added
- Malnutrition
- Bladder Catheter
- Urinary Retention
- Pain

Potential surgical risk factors

- Surgical Factors
  - Type of surgery (Cardiac, orthopedic)
What are his risk factors for delirium?

Patient is an 80 year old man with mild dementia, hearing impairment, a history of depression and a prior stroke. He is on HCTZ, donepezil, and sertraline. He comes in for pre-operative assessment for his total hip replacement.

What is your anesthetic plan?

Potential anesthetic factors

<table>
<thead>
<tr>
<th>Anesthetic factors</th>
<th>Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Types (general vs. regional)</td>
<td>- Williams-Russo, JAMA 1995</td>
</tr>
<tr>
<td></td>
<td>- Rasmussen, Acta Anaesthesiol Scand 2003</td>
</tr>
<tr>
<td>Management (intra- &amp;/or post-op)</td>
<td>- Williams-Russo, Anesthesiology 1999</td>
</tr>
<tr>
<td>Specific anesthetic agent/drug(s)</td>
<td>- Leung et al, Br J Anaesth, 2006</td>
</tr>
</tbody>
</table>

Potential Etiologic Causes

Anesthetic factors - Type

- General versus regional
- "Cognitive effects after epidural vs general anesthetic in older adults"
- 262 pts ≥ 40 yrs undergoing elective primary total knee replacement
- Neuropsychological assessment preop. & postop (1 week & 6 month)

*Williams-Russo, JAMA 1995*
Potential etiologic causes

Anesthetic factors

- Cognitive outcome
  - A generalized decline at 1 wk post-op
  - Return to or improvement over baseline at 6 months
- Delirium
  - 11% overall
  - 12% epidural vs. 9.4% GA, P=0.5
  - Calculated power 0.03

(Ramaswamy, JAMA 1995)

Potential etiologic causes

Anesthetic factors

- Multi-center trial of patients ≥ 60 years of age undergoing non-cardiac surgery
- Outcomes - POCD at one week and 4 months postop

(Ramaswamy, Acta Anaesthesiol Scand 2003)

Potential etiologic causes

Anesthetic factors

MANAGEMENT

- Randomized trial of hypotensive epidural anesthesia in 235 older adults (MAP 45-55 vs. 55-70 mm Hg)
- General decline in cognitive function at 1 wk postop, no difference between groups
- Postoperative delirium 9% vs. 4% (power 25%)

(Williams-Russo, Anesthesiology 1999)

Potential etiologic causes

Anesthetic factors

MANAGEMENT

- Hemodynamically significant aortic valve or mitral valve stenosis (documented by Doppler echocardiography or cardiac catheterization) and severe carotid artery stenosis (>70% occlusion) were exclusion criteria
How should we control postoperative pain?

- Age > 70 years
- Moderate to severe preop rest pain
- Worsened postop pain
- PCA (vs. oral narcotics)

Vaurio et al., Anesth & Analg 2006; 102:1267-73

Clinical trials in postoperative delirium

- Clinical trial of gabapentin vs. placebo
  - Postop delirium 5/12 in placebo vs. 0/9 in gabapentin treated patients

Neurology 2006; 67:1-3

Pain & postoperative delirium

- Age > 70 years
- Moderate to severe preop rest pain
- Worsened postop pain
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Clinical trial of gabapentin vs. placebo

- Postop delirium 5/12 in placebo vs. 0/9 in gabapentin treated patients

Neurology 2006; 67:1-3

Are there certain drugs we should avoid?
Potential etiologic causes

Anesthetic factors

TYPE OF ANESTHETIC AGENT

- Nitrous oxide (Early postoperative delirium 41.9% vs. 43.8% in the oxygen group)  
  (Leung et al, Br J Anaesth, 2006)

DRUGS

- Anticholinergics (atropine, scopolamine)
- Meperidine (Marcantonio 1994)
- Lorazepam (Pandharipande 2006)

Clinical trials in postoperative delirium

- Rivastigmine in elective cardiac surgery (Gamberini 2009)
  - postop delirium 30% (placebo) vs. 32% (rivastigmine), n=120

- Dexmedetomidine (Maldonado 2009)
  - Postop delirium 3% in dexmedetomidine, vs. 50% each in propofol or midazolam groups, n=36

Clinical trials in postoperative delirium

- Emergency hip fracture
  - "proactive geriatric consultation" vs. standard care – postop delirium 32% vs. 50%
  - Sedation depth during spinal anesthesia for hip fracture
  - Postop delirium 19% in light sedation vs. 40% in deep sedation

Crit Care Med. 2000;27:1762-8  
Psychosomatics. 2009;50:306-17

JAGS 2001;49:516-22  
Mayo Clin Proc 2010;85:18-26
Summary

- Postoperative delirium and POCD - etiology likely multi-factorial
- Anesthetic protocol to reduce delirium - needs further studies
- Drugs to avoid - meperidine, postoperative lorazepam
- Clinical trial of postoperative pain management

How Do We Recognize Delirium?

- Many screening tools exist
  - Setting
  - Who is doing the assessment?
  - Training needs
  - Time for assessments
- Diagnosed per DSM-IV criteria

Diagnostic Tools

<table>
<thead>
<tr>
<th>Diagnostic Tool</th>
<th>Sensitivity</th>
<th>Specificity</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAM*</td>
<td>.46-.92</td>
<td>.90-.92</td>
</tr>
<tr>
<td>Delirium Rating Scale*</td>
<td>.32-.94</td>
<td>.82-.94</td>
</tr>
<tr>
<td>Clock Draw</td>
<td>.87</td>
<td>.93</td>
</tr>
<tr>
<td>MMSE (23/24 cutoff)</td>
<td>.52-.87</td>
<td>.76-.82</td>
</tr>
<tr>
<td>CAM- ICU*</td>
<td>.93</td>
<td>.98</td>
</tr>
<tr>
<td>Neecham</td>
<td>.95</td>
<td>.78</td>
</tr>
<tr>
<td>Mini-Cog</td>
<td>.81</td>
<td>.74</td>
</tr>
<tr>
<td>NuDesc</td>
<td>.96</td>
<td>.69</td>
</tr>
</tbody>
</table>


Confusion Assessment Method CAM

- Acute onset mental status changes or a fluctuating course
- Inattention
- Disorganized thinking
- Alternating level of consciousness

Diagnosis of delirium requires presence of features 1 and 2 and either 3 or 4.
Clock Drawing Test

MMSE & Clock Draw in Delirium

Useful at separating “normal” from “abnormal”
Not specific for distinguishing delirium from dementia
May be useful as change from baseline
May be useful in experienced hands
Mini-Cog - clock draw plus 3 words recall

Scoring of Mini-Cog

Score clock drawing as Normal (the patient places the correct time and the clock appears grossly normal) or Abnormal
Score for the three word recall
0 Positive for cognitive impairment
1-2 Abnormal CDT then positive for cognitive impairment
1-2 Normal CDT then negative for cognitive impairment
3 Negative screen for dementia (no need to score CDT)

6 Item Cognitive Impairment Test

1. What yr is it now (1X4)
2. What month is it now (1X3)
   Memory phrase: repeat after me: John/Brown/42/West Street/Bedford
3. About what time is it now (within 1hr) (1X3)
4. Count backwards 20 to 1 (2X2)
5. Say month in reverse order (2X2)
6. Repeat the memory phrase (5X2)
(score 1 for each incorrect response)
Can Interventions Prevent Delirium?

- 852 patients aged 70+
- Prospective matching of patients on intervention unit with patients on 2 usual care units
- Risk factor reduction strategy targeting:
  - cognitive impairment
  - sleep deprivation
  - immobility
  - visual impairment
  - dehydration


Intervention Protocol

<table>
<thead>
<tr>
<th>Risk Factor</th>
<th>Strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cognition</td>
<td>Orientation, activities</td>
</tr>
<tr>
<td>Sleep</td>
<td>Bedtime drink, massage, music, noise reduction</td>
</tr>
<tr>
<td>Immobility</td>
<td>Ambulation, exercises</td>
</tr>
<tr>
<td>Vision</td>
<td>Visual aids and adaptive equipment</td>
</tr>
<tr>
<td>Hearing</td>
<td>Portable amplifiers, cerumen disimpaction</td>
</tr>
<tr>
<td>Dehydration</td>
<td>BUN, volume repletion</td>
</tr>
</tbody>
</table>

Protocols For:
Hospital Elder Life Program (HELP)

- Fluid/electrolytes
- Pain treatment
- Eliminating unnecessary medications
- Bowel/bladder function
- Nutrition
- Mobilization
- CNS oxygenation
- Prevention of complications (MI, PE, UTI, pneumonia)
- Environmental stimuli
- Treatment of agitated delirium

Case discussion

- Anticipate that he is at risk for delirium
- Discuss with patient/family
- Communicate risk/screen each shift
- Glasses on; identify his vision problems and strategies to overcome such as announcing self, assist with food and fluids
- Address pain issues, narcotic adjuvants rather than PCA?
- Foley out; anticipatory toileting protocol
Nursing…

- Diversion, safety attendant, bed check, low bed, HL IV, vs. restraint
- Reorient to his tolerance; family stay at night
- Ensure nutrition and hydration
- Mobilize: partner with PT/OT
- Encourage activity during the day with natural light; short rest periods early afternoon only

Case Continued

Patient is now on post-op day #1. He seems agitated and moans in response to questions. He keeps pulling at his IV lines and is trying to leave. Which medication if any is most likely to result in improved outcomes?

Etiology of Postoperative Delirium

- 54 of 571 (9.5%) hip fracture patients developed delirium in one study:
  - Only 7% were assigned definite cause: drugs, infection, fluid-electrolyte disorder
  - Majority of cases had no single clear etiology
  - Contributing factors: drugs, underlying dementia, sensory deprivation, infection, and fluid-electrolyte disorder


How much medical work-up is needed?

- A directed medical workup:
  * Laboratory tests and brain imaging rarely helpful
- Detailed review of medications is crucial:
  * Opioids, Anticholinergics, benzodiazepines, antiemetics, antispasmodics
Drug therapy

- Info based on limited case reports and expert opinion
- All drug therapy has side effects
- Rx only if delirium interferes with therapy, or risks safety and welfare
- Generally poor quality RCTs
- Almost no studies with placebo control