POLIO and ANESTHESIA

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TIME IS SHORT!

ASSUMPTIONS:

- Everyone is familiar with the pathologic changes from polio and the clinical issues of survivors
- Will focus only on anesthesia for surgery and procedures needing sedation, not pain
- Everyone is a medical professional
OBJECTIVES

• What do we know about anesthesia and polio?
• Preop evaluation
• Anesthesia planning
• Research needed
ANESTHESIA and POLIO

- There is no significant data!!!
- Case reports: 10/last 10 yrs
- Only one population study
<table>
<thead>
<tr>
<th>Year</th>
<th>Article Type</th>
<th>Title Details</th>
<th>Country</th>
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<tbody>
<tr>
<td>2001</td>
<td>theoretical</td>
<td>dental anes</td>
<td>US</td>
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<td>2005</td>
<td>theoretical</td>
<td>anes in general</td>
<td>Canada</td>
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<tr>
<td>2008</td>
<td>retrospective</td>
<td>123 pts, 162 ops (pts were healthy and young)</td>
<td>Brazil</td>
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<td>1990</td>
<td>research</td>
<td>resp to mm rlxts</td>
<td>US</td>
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WE **DO** KNOW…

- At least twice as sensitive to non-depolarizing relaxants

- Children 6-12 yrs post-polio: N 30, mean age 13 yrs
- Controls: 51 no polio: N 51, mean age 11 yrs
- Standard anesthetic
- Ulnar nerve stimulation
- Curare, pancuronium, gallamine
DOSE (mg/kg) TO ED50
NO POLIO (n=24) POLIO (n=13)
PANCURONIUM
SINGLE TWITCH (0.2 hz) TETANUS (50 hz)
RECOVERY INDEX: Time (mins) elapsed from 50% to 90% twitch depression during recovery

Difference is not significant
NEUROMUSCULAR JUNCTION:

- Functional and structural abnormalities are common, but not always present
- Decreased MEPPs, decreased quantal content, or both
- Evidence of reinnervation
NEUROMUSCULAR JUNCTION:

- Avoid muscle relaxants if possible
- Always use a nerve stimulator if relaxants are used
- Reversal at end of case is prudent, even if NM transmission normal
- Don’t extubate until NM transmission is normal
- Avoid -mycin antibiotics in po period
ISSUES FOR ANESTHESIA

✓ NM junction function
  • CNS changes
  • Respiratory
  • Sleep apnea
  • Physical changes:
    – contractures, muscle wasting, obesity

• Chronic inflammatory reaction
CNS CHANGES

- RAS lesions
- MRIs show HS in grey and white matter
- Hypothalamic lesions, decreased CRH, ACTH, cortisol
- Cranial nerve lesions

EXCESS SEDATION?
ISSUES FOR ANESTHESIA

- NM junctions’ function
- CNS changes
  - Respiratory, including sleep apnea
  - Physical changes:
    – contractures, muscle wasting, obesity
- Chronic inflammatory reaction
RESPIRATORY: Multiple causes in a post-polio patient

Scoliosis
Respiratory muscle loss/weakness
Diaphragm paralysis
Chronic aspiration
Sleep apnea
Respiratory:

- Using ventilation now?
- Current PFTs, ABGs?
- Hx ventilation?
- Hx trach?
- Hx aspiration?
- Voice/swallowing difficulties?
SLEEP APNEA

• We now know a lot about how sleep apnea patients do during anesthesia and surgery

• Danger periods:
  – Induction: obstruction, intubation problems
  – Extubation: obstruction
  – Postop, especially if narcotics are given

Guidelines from the ASA:

Practice guidelines for the perioperative management of patients with obstructive sleep apnea. Anesthesiology 2006; 104:1081-93.
ISSUES FOR ANESTHESIA

- NM junctions’ function
- CNS changes
- Respiratory, including sleep apnea
  - Physical changes:
    - contractures, muscle wasting, obesity
  - Chronic inflammatory reaction
PHYSICAL CHANGES

- Contractures → positioning problems
- Muscle wasting:
  - Exposed peripheral nerves
  - Smaller blood volume (EBV)
  - ?Smaller ECF?
- Obesity
ISSUES FOR ANESTHESIA

- NM junctions’ function
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CHRONIC INFLAMMATION

- Acute inflammatory changes in CSF, spinal cord, muscle, peripheral blood, peripheral nerves and blood
- Proinflammatory cytokines (interferon-γ, TNF) in CSF
- Peptides involved in apoptosis and inflammation are present in CSF of post-polio pts
SHOULD A POST-POLIO PATIENT HAVE A REGIONAL ANESTHETIC?
ISSUES FOR ANESTHESIA

- NM junctions’ function
- CNS changes
- Respiratory, including sleep apnea
- Airway/larynx
- Physical changes:
  - contractures, muscle wasting, obesity
- Chronic inflammatory reaction
ANESTHESIA PLANNING

• What type of anesthesia is best?

• IT DEPENDS!!
  – Patient's diseases
  – The planned operation
  – The anesthesiologist
  – Patient's preference

• Be sure to plan for postop pain AND respiratory needs
RESEARCH NEEDED

- Large group study: how do these pts really do?
- Repeat the muscle relaxant studies with newer drugs: Are they different?
- Measure cytokines in post-polio pts having regional anesthesia pre- and post-RA: What happens?
- Look at local anesthetic blood levels in pts with atrophied muscle
- Effect of local anesthetics on nerves; this could be non-invasive
TAK TIL DANMARK!

- 1952 polio epidemic
- Anesthesiologist Bjorn Ibsen
- Positive pressure ventilation begins
- Blood gas measurements begin: Poul Astrup
- ICUs started and anesthesiologists were (and are) there

Bjorn Ibsen 1915-2007