Paraplegia Following Intracord Injection
During Attempted Epidural Anesthesia
Under General Anesthesia

Philip R. Bromage, M.B.B.S., F.F.A.R.C.S., F.R.C.P(C) *
and Jonathan L. Benumof, M.D. †
“This case reinforces the admonition against attempting epidural puncture above the termination of the cord in unconscious, areflexic patients, and the opinion that risk of such gravity is only justified as a life-saving measure under exceptional circumstances. There has been expert opposition to such cautious teaching, but adept technique and concern for preoperative patient comfort are no license to risk infliction of neurologic catastrophe and are unlikely to prevail as a defense in any subsequent allegation of malpractice.”
Editorial
The Safety of Epidurals Placed During General Anesthesia

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“The standard of care in medicine is ultimately determined by the common practice of physicians and by common sense—an element that seems to be lacking in the case report by Bromage and Benumof... The conclusions of Bromage and Benumof as expressed in this journal should not slow this progress or discourage the performance of regional anesthetic techniques, including thoracic epidural catheter placement, in children after the induction of anesthesia.
Asleep Versus Awake: Does It Matter?
Pediatric Regional Block Complications by Patient State: A Report From the Pediatric Regional Anesthesia Network

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Christie Wolf, MBS,# and Elliot J. Krane, MD**

(Reg Anesth Pain Med 2014;39: 279–283)
Study Objectives

“The objective of this report was to define the incidence of postoperative neurologic symptoms (PONSs) and local anesthetic systemic toxicity (LAST), and other adverse events related to regional anesthesia depending in the patient’s conscious state: awake, sedated, anesthetized or anesthetized with neuromuscular blockade (NMB) at the time of block placement.”
Outcomes Analyzed

- Postoperative neurologic symptoms (PONSs)
- Postoperative neurologic symptoms lasting more than 6 months (PONS-L)
- Local anesthetic systemic toxicity (LAST)-Extended hospital stay due to block complications
Results

- 53,564 regional nerve blocks were analyzed.
- Younger children tended to receive neuraxial blocks more often, while older children had peripheral nerve blocks.
- GA was used at a lower rate in children <1 month of age, with the exception of children >10 years of age.
Results

- The overall complication and adverse event rate was 11.9/1000; PONSs rate was 1.3/1000 and LAST was 0.09/1000.
- PONSs rate was 0.93/1000 under GA, and 6.82/1000 in sedated and awake patients.
- 1 case of PONSs-L.
Results

- The overall incidence of LAST was 0.9/1000
- 3 cardiovascular complications; 2 seizures
- 18 extended hospital stays
- 17/18 extended stay <5 days
Study Limitations

- Diversity of practices
- Uneven distribution of blocks and patient states across ages
- Binary distribution of patients
- All academic institutions reporting (no community hospital data)
- Non-verbal children less likely to be detected to have PONSs
Conclusions

- Major complications from regional anesthesia in children are rare
- LAST complications more common in younger children, PONSs more common in older children
- The rate of PONSs in awake and sedated patients was more than 7 times higher than in patients under GA
- Performing blocks under general anesthesia is safe in children and should remain the prevailing standard of care
Comparison of Three Techniques for Ultrasound-guided Femoral Nerve Catheter Insertion

A Randomized, Blinded Trial

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Continuous Femoral Nerve Catheter Placement

- Documented failure rate 7-15%
- Ultrasound guidance improves success rate
- Nerve stimulation in addition to ultrasound is used for most femoral perineural catheters
- Does ultrasound (US) + nerve stimulation (NS) improve success over US alone? How does using both impact efficiency and cost?
Superior vs. Non-Inferior

Joint Hypothesis Testing Methodology
(Mascha et al. Anesth and Analg 2012)
Methods

- Prospective study on adult patients having knee arthroplasty, 453 enrolled, 437 analyzed
- Randomized into 3 groups: US alone, US +SN, and US+SC
- Standardized procedure techniques
- Once catheter was positioned, 20ml 1% ropivacaine injected, followed by an 8ml/hr infusion for the next 48 hours
Methods

- Patients received either a GA or neuraxial block for the procedure, 2/3 were neuraxial blocks
- Supplemental treatments given with suboptimal blocks
- VRS pain scores used (0-10)
Results

- **Primary outcome criteria:** pain scores and opioid requirements within the first 48 hours post op

- **Secondary outcome criteria:** block performance time, cost minimization analysis
Results

• US+SN non-inferior to US or US+SC

• Mean block time for US group was significantly lower than for other groups (177s US+SC, 150s US+SN, 110s US)

• Costs: SN/SC kit $50-$80 each; institutions performing high volume regional anesthesia could realize significant savings not using nerve stimulation
Study Limitations

- Individual physician variation
- NS without US was not evaluated and compared in the analysis
- Motor block was not evaluated
- Most but not all patients were given spinal anesthesia, which may have affected immediate postoperative pain
Conclusions

- Femoral nerve catheter placement techniques were equivalent when considering analgesic effectiveness.
- Ultrasound guidance without nerve stimulation was both more efficient and cheaper than techniques using nerve stimulation.