Complications and controversies in the practice of neuraxial anaesthesia

S. Gligorijevic
Clinic Hirslanden Zürich
Zürich, Switzerland

SARA
Spring meeting
Fribourg, 2015
Perioperative regional anaesthesia

Initially
• Main goal was good pain control

Today
• Afferent neural blockade limits organ dysfunction caused by inflammatory and metabolic changes during the perioperative period
• Beneficial effect would facilitate recovery process and contribute to better outcome
Benefits of Combining RA & GA

• Intraoperative deafferentiation of surgical field and sympatolysis
  • Abolition of stress response
  • Haemodynamic stability
  • Decreased use of volatile anaesthetics & opioids

• Excellent postoperative analgesia
Neuraxial Analgesia in the 1980s

Large number of RCTs confirm

Good analgesic efficacy
Reduced thromboembolism
Reduced respiratory morbidity
Favorable effects on bowel motility
Efficacy of Postoperative Patient-controlled and Continuous Infusion Epidural Analgesia versus Intravenous Patient-controlled Analgesia with Opioids

Christopher L. Wu, M.D.,* Seth R. Cohen, B.S.,† Jéffrey M. Richman, M.D.,‡ Andrew J. Rowlingson, B.A.,§ Genevieve E. Courpas, B.A.,§ Kristin Cheung, M.D.,|| Elaina E. Lin, B.A.,# Spencer S. Liu, M.D.**

299 RCT’s

Epidural analgesia in every combination superior to i.v. PCA up to 3-days (exception epidural morphine alone)

Continuous epidural infusion superior to PCEA for pain at rest and activity (but more PONV and motor block, less pruritus)

Epidural LA + opioid better than epidural opioid alone

Almost without exception, epidural analgesia, regardless of analgesic agent, epidural regimen, and type and time of pain assessment, provided superior postoperative analgesia compared with intravenous patient-controlled analgesia
Early 2000s - bad years for epidurals

Series of case-reports of permanent neurological injuries including paraplegia

Vertebral canal haematoma
Epidural abscess

Rare but serious complications

Christie IW, Mc Cabe S. Major complications of epidural analgesia after surgery Anaesthesia 2007;17:520-33
Early 2000s - bad years for epidurals

Studies on postoperative epidural analgesia fail to show difference in perioperative outcome

- Park WY et al. Ann Surg 2001
- Rigg JR et al. Lancet 2002

Is it possible that a difference no longer exist?
Does the evidence support the use of spinal and epidural anaesthesia for surgery?

“How can an unproven effect on major morbidity be weighed against catastrophic anaesthetic events like spinal canal haematoma or abscesses?”

Are neuraxial blocks safe or dangerous?

If so are they acceptably risky?
How to rate the complications of neuraxial blockades?

Transient benign, avoidable, manageable

- Failed block
- Hypotension/vaso-vagal reaction
- Self-limiting neurologic injury (backache, TNS, tourniquet, cast, positioning)
- Superficial infections/haematoma
- PDPH
Neuraxial Blocks - Serious Neurologic Complications

- Major nerve damage (cord damage, infarction, major neuropathy, paraplegia)
- Bleeding (cord compression) vertebral canal haematoma
- Serious infection (spinal abscess, meningitis)
- Death (where the procedure is implicated)
- Wrong route error

Data sources: case reports, clinical reports, observational studies, closed claim studies, large prospective studies
Are Complications After CNB's Rare?

Old, frequently cited studies have shown very low incidence of serious neurologic complications:

- Vandam LD, JAMA 1954 (11,000 cases)
- Dripps RD, JAMA 1960 (10,098 cases)
- Lund PC, Acta Anaesthesiol Scand 1962 (10,000 cases)
- Phillips OC, Anesthesiology 1969 (10,440 cases)
- Moore DC, Anesth Analg 1978 (11,080 cases)
### Neurologic complications presented within 48 h of surgery

<table>
<thead>
<tr>
<th></th>
<th>Spinal</th>
<th>Epidural</th>
<th>Unrelated to RA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardiac arrest</td>
<td>26/6.4*</td>
<td>3 (1.0)</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>(3.9-8.9)</td>
<td>0.2-2.9</td>
<td></td>
</tr>
<tr>
<td>Neurological injury Radiculopathy</td>
<td>24 (5.9)</td>
<td>6 (1.3)</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>19 (4.7)</td>
<td>5 (4)</td>
<td></td>
</tr>
<tr>
<td>Seizures</td>
<td>0</td>
<td>4 (7.5)</td>
<td>0</td>
</tr>
<tr>
<td>Cauda equina syndrome</td>
<td>6 (1.2)</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>0.1-2.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Paraplegia</td>
<td>0</td>
<td>1 (0.3)</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0-1.8</td>
<td></td>
</tr>
<tr>
<td>Death</td>
<td>6 (1.5) **</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

* The incidence/10,000, ( ) The 95% confidence interval
* * Three pats died after cement insertion (THA)
### Major Complications of Regional Anaesthesia in France

<table>
<thead>
<tr>
<th>Technique</th>
<th>Cardiac Arrest (N=41,251)</th>
<th>Respiratory Failure (N=41,251)</th>
<th>Death (N=41,251)</th>
<th>Seizure (N=41,251)</th>
<th>Neurologic Injury (N=41,251)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spinal</td>
<td>10 (2.4)</td>
<td>2 (0.5)</td>
<td>3 (0.7)</td>
<td>1 (0.2)</td>
<td>14 (3.4)</td>
</tr>
<tr>
<td>Epidural (N=35,379)</td>
<td>0 (0.8)</td>
<td>3 (0.8)</td>
<td>0</td>
<td>3 (0.8)</td>
<td>0</td>
</tr>
<tr>
<td>Peripheral Blocks</td>
<td>1 (0.2)</td>
<td>2 (0.4)</td>
<td>1 (0.2)</td>
<td>6 (1.2)</td>
<td>12 (2.4)</td>
</tr>
<tr>
<td>(N=50,223)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IV Regional</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>(N=4,448)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peribulbar Blocks</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>(N=17,071)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Regional</td>
<td>11 (0.7)</td>
<td>7 (0.4)</td>
<td>4 (0.3)</td>
<td>10 (0.6)</td>
<td>26 (1.6)</td>
</tr>
<tr>
<td>Blocks (N=158,083)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Data presented are number and the estimated (n/10,000) where applicable.*

epidurals in obstetric pats. n = 29,732
Incidence of Severe Neurologic Complications after Neuraxial Blockades

<table>
<thead>
<tr>
<th>Study</th>
<th>Country</th>
<th>Year</th>
<th>Spinal</th>
<th>Epidural</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dahlgren &amp; Törnebrand</td>
<td>Sweden</td>
<td>1995</td>
<td>1:2834</td>
<td>1:923</td>
</tr>
<tr>
<td>Auroy et al</td>
<td>France</td>
<td>1997</td>
<td>6:10,000</td>
<td>2:10,000</td>
</tr>
<tr>
<td>Aromaa et al</td>
<td>Finland</td>
<td>1997</td>
<td>0,45:10,000</td>
<td>0,52:10,000</td>
</tr>
<tr>
<td>Moen et al</td>
<td>Sweden</td>
<td>2004</td>
<td>1:20-30,000</td>
<td>1:3,600</td>
</tr>
</tbody>
</table>

Considerably different ratios among studies (countries?)
Neurologic Complications of Neuraxial Anaesthesia

Why Are the Ratios so Different?

• Lack of standardised procedures
• Different levels of providers expertise
• Recognition of preexisting neurological diseases
• Retrospective studies, voluntary reporting, missing of “small injuries”
• Uncertainty of the actual cause of injury
• Transient or permanent damage?
Patient Injuries in Response to Anaesthetic Procedures: Cases Evaluated by the Danish Patient Insurance Association

- PIA Database 1996 - 2002

- 18,917 claims - 916 anaesthesia related (4.8%)

- 374 financial compensations, 132 for complications followed spinal, epidural or peripheral nerve blocks

- Among 13 patients with disabling injury and compensation of >150,000 Euro were 8 cases of neuraxial alone or combined with general anaesthesia
Etiology of 8 severe neurologic complications related to CNB

- 3 pats with hypotension during major part of EA/GA
- 1 pat. EA placed during GA (no LOR)
- 1 pat. epidural abscess 4 w postop after 11 days of EA
- 1 pat. EA for 15 days and leg paralysis 5 days after EA stop
- 1 pat. leg paresis after 1 day EA/GA (normal MRI)
- 1 pat. SA with postop leg weakness, cauda equina and hearing loss
Analysis of Deaths Related to Anaesthesia from Closed Claims Registered by the Danish PIA, 1996-2004

Hove LD et al Anesthesiology 2007;106:675-80

27,971 claims, 1,256 (4.5%) related to anaesthesia

Causes of 24 deaths considered to result from anaesthetic procedure

4 airway management
2 ventilation management
4 side effects of drugs
4 infusions pump problems
4 CV-catheters problems
1 severe haemorrhage
1 uncertain (amniotic embolism?)

4 deaths related to regional anaesthesia
<table>
<thead>
<tr>
<th>Procedure</th>
<th>Causes of Death</th>
</tr>
</thead>
<tbody>
<tr>
<td>75 y old patient, 24 days after SA for TURP (uncomplicated)</td>
<td>Sepsis, multiple spinal abscesses</td>
</tr>
<tr>
<td>1 y old child, 2 months after EA/GA (Down syndrome, M.Hirschprung)</td>
<td>Tetraplegia, medular injury (needle)</td>
</tr>
<tr>
<td>47 y old patient, EA placement in RR after laparotomy</td>
<td>Cardiac arrest after spinal injection</td>
</tr>
<tr>
<td>79 y old patient, 3 months after EA for rib fracture</td>
<td>Epidural abscess with paraplegia</td>
</tr>
</tbody>
</table>
Severe Neurological Complications after Central Neuraxial Blockades in Sweden 1990–1999

Vibeke Moen, M.D.,* Nils Dahlgren, M.D., Ph.D.,† Lars Irestedt, M.D., Ph.D.‡

1,260,000 spinal
450,000 epidurals (200,000 obstetrics)
127 serious complications

Incidence of vertebral canal haematoma in obstetric patients: 1: 200,000,
in orthopaedic female patients up to 1:3.600

<table>
<thead>
<tr>
<th>Category</th>
<th>Spinal Hematoma</th>
<th>Cauda Equina Syndrome</th>
<th>Purulent Meningitis</th>
<th>Epidural Abscess</th>
<th>Miscellaneous</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Orthopaedic surgery</td>
<td>13 (1/12)</td>
<td>21 (12/9)</td>
<td>9 (3/6)</td>
<td>1 (0/1)</td>
<td>3 (2/1)</td>
<td>47 (18/29)</td>
</tr>
<tr>
<td>Obstetrics</td>
<td>2 (0/2)</td>
<td></td>
<td>1 (0/1)</td>
<td>7 (0/7)</td>
<td></td>
<td>10 (0/10)</td>
</tr>
<tr>
<td>Gynaecology</td>
<td>1 (0/1)</td>
<td></td>
<td>1 (0/1)</td>
<td></td>
<td></td>
<td>3 (0/3)</td>
</tr>
<tr>
<td>General surgery</td>
<td>8 (3/5)</td>
<td>6 (2/4)</td>
<td>8 (7/1)</td>
<td>8 (4/4)</td>
<td>6 (2/4)</td>
<td>36 (18/18)</td>
</tr>
<tr>
<td>Vascular surgery</td>
<td>8 (4/4)</td>
<td>1 (0/1)</td>
<td></td>
<td>1 (1/0)</td>
<td>2 (2/0)</td>
<td>12 (7/5)</td>
</tr>
<tr>
<td>Urology</td>
<td>3 (3/0)</td>
<td></td>
<td>7 (6/1)</td>
<td></td>
<td>2 (2/0)</td>
<td>12 (11/1)</td>
</tr>
<tr>
<td>Thoracic surgery</td>
<td>1 (1/0)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1 (1/0)</td>
</tr>
<tr>
<td>Pain clinic</td>
<td></td>
<td></td>
<td>3 (1/2)</td>
<td>1 (0/1)</td>
<td></td>
<td>4 (1/3)</td>
</tr>
<tr>
<td>Other</td>
<td>1 (1/0)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2 (1/1)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>33 (9/24)</strong></td>
<td><strong>32 (18/14)</strong></td>
<td><strong>29 (17/12)</strong></td>
<td><strong>13 (5/8)</strong></td>
<td><strong>20 (8/12)</strong></td>
<td><strong>127 (57/70)</strong></td>
</tr>
</tbody>
</table>

The number of males/females is in parentheses.
33 haematoma (intravertebral, subdural)
25 after epidural (24 catheters) 8 after spinal

Possible concomitant factors:
♦ In 11 pats haemostatic irregularities and to short time distance to tromboprophylaxis
♦ Known spine pathology in 6 cases (2 ankylosing spondylitis)
♦ Difficult puncture in 10 cases
Table 8. Cases and Incidences of Spinal Hematoma

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Epidural Blockade Including CSE</th>
<th>Spinal Blockade</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Patients (x 1000)</td>
<td>Cases and Incidence</td>
</tr>
<tr>
<td>Hip arthroplasty</td>
<td>M: 14, F: 29</td>
<td>1 [0-6] 1:29000</td>
</tr>
<tr>
<td>Hip fracture</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Obstetric pain relief during labor</td>
<td>-</td>
<td>1 [0-6] 1:200000</td>
</tr>
<tr>
<td>Cesarean sections</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Subtotal (M/F)</td>
<td>M: 275, F: 400</td>
<td>M: 303, F: 6</td>
</tr>
<tr>
<td>General population (M/F)</td>
<td>M: 175, F: 20</td>
<td>M: 957, F: 2</td>
</tr>
<tr>
<td></td>
<td>10-27</td>
<td>[0-7] 1:480000</td>
</tr>
<tr>
<td>Total (M/F)</td>
<td>M: 450, F: 25</td>
<td>1,260, F: 8 (1/7)</td>
</tr>
</tbody>
</table>

Moen V et al. Anesthesiology 2004;101:950-59
Severe Neurological Complications after Central Neuraxial Blockades in Sweden 1990-1999

Moen V et al. Anesthesiology 2004; 101:950-59

Table 5. Spinal Hematoma, Spinal Stenosis, and Cauda Equina Syndrome Related to Age

<table>
<thead>
<tr>
<th></th>
<th>≤50</th>
<th>50-59</th>
<th>60-69</th>
<th>70-79</th>
<th>≥80</th>
<th>All</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spinal hematoma</td>
<td>4 (1/3)*</td>
<td>4 (3/1)</td>
<td>4 (2/2)</td>
<td>11 (3/8)</td>
<td>10 (0/10)</td>
<td>33 (9/24)</td>
</tr>
<tr>
<td>Paraparesis and spinal stenosis</td>
<td>1 (0/1)†</td>
<td>1 (0/1)‡</td>
<td>-</td>
<td>1 (1/0)</td>
<td>1 (1/0)</td>
<td>4 (2/2)</td>
</tr>
<tr>
<td>Cauda equina syndrome, all cases</td>
<td>8 (4/4)</td>
<td>8 (7/1)</td>
<td>3 (2/1)</td>
<td>7 (2/5)</td>
<td>6 (3/3)</td>
<td>32 (18/14)</td>
</tr>
<tr>
<td>Pre-existing spinal stenosis</td>
<td>-</td>
<td>-</td>
<td>2 (1/1)</td>
<td>5 (0/5)</td>
<td>2 (1/1)</td>
<td>9 (2/7)</td>
</tr>
<tr>
<td>Local anesthetic neuronal toxicity</td>
<td>8 (4/4)</td>
<td>8 (7/1)</td>
<td>1 (1/0)</td>
<td>2 (2/0)</td>
<td>4 (2/2)</td>
<td>23 (16/7)</td>
</tr>
</tbody>
</table>

The number of males/females is in parentheses. The number of spinal hematoma and cauda equina syndrome in patients with coexisting spinal stenosis increase with age. When local anesthetic neuronal toxicity is considered the cause of damage, the cauda equina syndrome does not show the same increase with age.

* Including two obstetric patients with the syndrome of hemolysis, elevated liver enzymes, and low platelets. † Patient with corrected heart disease, fiberoptic intubation warranted by severe neck disorder. Epidural blockade placed under general anesthesia. ‡ Patient with severe rheumatism, previously operated for spinal stenosis, epidural blockade performed under general anesthesia.
Age-Related Anatomical Changes of the Spine

- The prevalence of degenerative processes (scoliosis, hyperlordosis) osteoporosis) increased with the age

- Spondylosis calcifications, sclerotic deformations of the intervertebral foramina, osteophyts

- Osteoporotic vertebra is enlarged causing spinal stenosis

- Possible reduction of CSF volume
Severe Neurological Complications after Central Neuraxial Blockades in Sweden 1990–1999

Conclusions:

• Complications significantly more often after EA than after SA
• Obstetric patients with significantly lower incidence of complications
• High incidence of complications in the elderly

Osteoporosis – previously neglected risk factor
More common in women (increased prevalence of hip fractures, vertebral deformities, narrow spinal canal)
An Analysis of the Safety of Epidural and Spinal Neuraxial Anesthesia in More Than 100,000 Consecutive Major Lower Extremity Joint Replacements

Matthias Pumberger, MD, * Stavros G. Memtsoudis, MD, PhD, † Ottokar Stundner, MD, ‡ Richard Herzog, MD, § Friedrich Boettiner, MD, ¶ and Alexander P. Hughes, MD∥

2000-2010

100,027 TKR and THR under neuraxial blocks

97 patients with neurologic deficit
8 patients with epidural gas/blod colection

No patient with persistent nerve damage
No patients recieving only spinal anesthesia were affected
Neuraxial anaesthesia in patients with preexisting CNS disorders?

Retrospective study, 139 patients

<table>
<thead>
<tr>
<th>Type of anaesthesia</th>
<th>Worsening</th>
<th>54%</th>
<th>no</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spinal</td>
<td>42%</td>
<td></td>
<td>no</td>
</tr>
<tr>
<td>Continuous spinal</td>
<td>3%</td>
<td></td>
<td>no</td>
</tr>
<tr>
<td>Continuous spinal/epidural</td>
<td>2%</td>
<td></td>
<td>no</td>
</tr>
</tbody>
</table>

Neurological complications in patients with preexisting sensorimotor neuropathy or diabetic polyneuropathy?

Retrospective study, 567 patients

<table>
<thead>
<tr>
<th>Anaesthesia</th>
<th>Worsening</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spinal</td>
<td>57%</td>
</tr>
<tr>
<td>Epidural</td>
<td>38%</td>
</tr>
<tr>
<td>Continuous spinal</td>
<td>4%</td>
</tr>
<tr>
<td>CSEA</td>
<td>1%</td>
</tr>
</tbody>
</table>

> incidence 0.4 %

Patients with preoperative compressive radiculopathy or multiple neurologic diagnosis are at significantly increased risk of neurologic complications postoperatively – 1.1%

Previous spine surgery did not affect the frequency

Etiology?
Neurological complications in obstetrics

Without epidural: 1 on 2000-3000 deliveries

- **Foot drop**: pressure on peroneal n. by faulty lithotomy position
- **Numbness lateral part of upper leg**: by faulty lithotomy position
- **Sciatica**: compression of sciatic nerve by head of the baby or caused by forceps delivery
- **Epidural hematoma**: anticoagulants or patient with vertebral hemangioma
- **Bladder dysfunction**: failed control of bladder volume ➔ over distention

Back pain: Predisposing factors: history of back pain during pregnancy, younger age, heavy weight, shorter statue

Breen T, Anesthesiology 1994
Obstetric problems? Blame the epidural!

1. Forceps delivery ↑
2. Caesarean section ↑
3. Post partum backache ↑
4. Neonatal problems, breast feeding, etc.
5. Obstetric palsies

“What will EA be blamed for next? Who knows?”


Postpartum nerve injuries occur 5-10 times more often as the direct consequence of vaginal delivery than as a result of regional anaesthesia.
Safety & Risks of Neuraxial Blockades

Infection

• Incidence of serious infection problems after neuroaxial blockades (spinal-epidural abscess or meningitis) is very low
  Kane RE 1981, Dalghren & Tornebrandt 1995

• Incidence is higher in newer prospective but, smaller studies
  1:675 Christie W Anaesthesia 2007;62:335-341

♦ Predictive factors: Longer mean catheterisation time, immunocompromised patient and perioperative anticoagulant therapy
Infection - epidural abscess


21(50%) with no documented risk factors (diabetes, corticosteroids, preoperative infection, cancer etc)


Nasal saprophytic flora from the anaesthetists is the most common exogenous cause of epidural abscess

North JB N Engl J Med 1975
Can we reduce the incidence of complications?

Yes, we could
Any consideration of complications associated with CNB should be balanced by:

- **The benefits**: proven and potential of the technique
- **The known and potential complications** (and benefits) of alternative analgesics (opioids, paracetamol, NSAID)
- **Consequences of avoiding CNB** and of less good anaesthesia and/or analgesia
Safety & Risks of Neuraxial Blockades

Predictive Factors?

Paraesthesia (common occurrence, no large scale studies)

Incidence of persistent paraesthesia after SA:

1:75  1.3% with paraesthesia or pain on injection
1:2.200 (0.05%) without

Horlocker TT, Anaesth Analg 1997;84:578-584

• 105 nerve root injuries - often accompanied by paraesthesia
  Chaney FW, Anesthesiology 1999;90:1062-69

• 19 radiculopathies, 12 after paraesthesia
  Auroy Y, Anesthesiology 1997;87:479-476
Neuraxial Blocks- Level of Needle Insertion?

Spinal cord ends at L1 level - MRI study in 136 adults

Boon JM. Clin Anat 2004

Accuracy of predicting the level of needle insertion is about 50% at best


The Tuffier's line may cross spinous process from L3 – S1

Edwards E 1952, MacGibbon B 1979, Quinell RC 1983

Conus medullaris and Tuffier’s line become closer with the age and in obese patients (MRI study in 690 patients)

Kim JT, Anesthesiology 2003; 99:1359-63
An Analysis of Postoperative Epidural Analgesia Failure by Computed Tomography Epidurography

Prospective study, n = 125, major abdominal surgery, successful vs. failed epidural catheters

Thoracic epidural, subcutaneous tunneling, bupivacaine 0.125 % (10 mL/h) and morphine 0.25 mg/h for 48 h

CT scan with contrast media (all patients)

Incidence of failure 24.8 %

45 % failures due to catheters outside epidural space
Second cause: dosing of medication
• Decreased mobility of neural structures caused by inflammation, adhesion or scarring can lead to higher incidence of paresthesia in patients with previous spine pathology (20 % vs 9 %)

Safety & Risks of Neuraxial Blockades - Predictive Factors?

• Nerve injury: epidural vs spinal
  
  Epidural 0,1%  10:9232  
  Spinal 0,03%  3:8501

• Epidural blockades (catheter) with clear greater potential for complications

Dalgren and Tornebrand  

Moen V Anesthesiology 2004  
Brull R Anesthesiology 2007
Safety & Risks of Neuraxial Blockades - Predictive Factors?

- Haemostatic abnormalities → spinal haematoma?
- Difficult puncture → spinal haematoma?

- 61 cases of spinal haematoma after CNB: Coagulation problems in 68%, Difficult puncture in 15 cases (25%), Coagulation disorders & difficult puncture in 87%

Vandermeulen EP
Anesth Analg 1994;79:1165-1177
Specific considerations regarding trombolytic medications

- Elderly and/or patients in renal failure have prolonged action of LMWH: The traditional “safety time” is not valid but also frequently not mentioned in the guidelines
Systemic LA toxicity: risk or protection?

Increased risk (Role of ultrasound?)

Risk of nerve injury increased?

Paresthesias – specific indicator?

Yes, (in selected cases) but not as a routine
Ultrasound for Neuraxial Blocks?

Reduced incidence of difficult punctures
Regional anaesthesia: preoperative assessment and disclosure

• Neurologic deficits should be documented

• Patients should be informed about:
  – Technical difficulties
  – Possible relapses and/or progression associated with stress, surgery and anaesthesia
  – Material risks
Can we do it without complications?

Permanent peripheral nerve injury is not completely preventable - even in healthy patient receiving competent, standard care

ASRA Practice Advisory on Neurologic Complications
Reg Anesth Pain Med 2008
Neurological Injury After Neuraxial Block

Suspected compressive lesion ➤ rapid diagnosis and treatment

• Brief neurological examination

• Patient information

• Magnetic resonance imaging (Computed tomography)

• Neurosurgical consultation
Good record – good defence

Bad record - bad defence

No record - no defence
Safety of Neuroaxial Blockades
Considerations From the Literature

- Appropriate strategy for coagulation problems—stick to the guidelines
  ▷ Consider single-shot spinal or peripheral nerve block

- Meticulous technique and sterility—stick to the guidelines

- Avoidance of traumatic puncture and paraesthesia

- Recognition of underlying neurologic and/or severe skeletal diseases as well as their potential for complications

- Regular postoperative assessment of neurological and cardiovascular function

- Properly performed and monitored anaesthesia by neuroaxial blocks is a safe practice

- Serious complications are very rare occurrences
Serious complications associated with spinal and epidural anaesthesia in Finland from 2000 to 2009

M. T. Pitkänen¹, U. Aromaa², D. A. Cozanitis² and J. G. Förster¹
¹Department of Anaesthesia, Orthopaedic Hospital Orion, Invalid Foundation, Helsinki, Finland, ²Helsinki University, Helsinki, Finland

Closed claim analysis, PIC, no fault system, n= 1,4 million
41 serious complications incl. 6 deaths (4 avoidable)
13 haematoma (11 related to antithrombotic medication)

Haematoma after
SA 1: 775.000
EA 1: 26.400
CSA 1: 17.800
Incidence of serious complications 1,9 :100.000

Elderly with comorbidities at higher risk
Lowest risk in obstetric patients

Round numbers indicate a decrease of serious complications during in the last 25 years
(4,5-5,2:100.000 in previous studies to 2.0:1000.000 in RCA/UK study-2009)

Good practice guidelines appear to reduce risks of serious complications
Complications of neuraxial blocks?

No simple answers
“It is all about good performance”
and.... good fortune

Complications yes  →  Claims none
since start of regional anaesthesia in 1981: more luck than skill.....?
Thank you very much for your attention