Neurological Problems in Obstetrics

M.S. Damian, Cambridge University and Ipswich Hospital
Neurologic Complications of Pregnancy and Childbirth

- Central neurological disturbances in pregnancy
- Neuromuscular complications in pregnancy
- Effects of pregnancy on preexisting neurological disease
- Neurologic complications of childbirth and regional anaesthesia and the 3rd NAA
Central Neurologic Complications of Pregnancy

• Pregnancy is associated with an increased risk of cerebrovascular events
• Ischemic stroke (ca. 70% of strokes)
• Venous occlusion (ca. 20% of strokes)
• Intracerebral hemorrhage
• Subarachnoid hemorrhage
• Eclampsia
Seizures peri/post-partum

- Eclampsia
- Cerebral Venous Sinus Thrombosis
- ICH
- Hypertensive encephalopathy
- Space occupying lesions
- Metabolic disease (hypoglycemia, porphyria)
Eclampsia

• Pre-eclampsia: Hypertension, Proteinuria +/- HELLP
• Severe Pre-eclampsia: with Oliguria
• Eclampsia:
  – Preeclampsia with seizures or coma
  – Often with PRES on MRI
  – Mortality 5%
• Mg$^+$ is best for eclamptic seizures (4g loading dose then 2g/h)
Eclampsia as the preeminent neurological emergency in pregnancy is still frequently not recognised in time

• 25 y/o presents with 2 new onset seizures. Pregnancy estimated at 19 weeks. BP documented 150/80, no proteinuria. Discharged home with Neurology outpatients appointment.

• Returns after 2 days with recurrent fits, in status. BP raised, proteinuria, ventilated, ITU, pregnancy terminated.
Posterior Reversible Encephalopathy
Incidence of cerebrovascular problems in pregnancy

- Ischemic stroke: 10/100000 pregnancies (13x the expected rate, more puerperium)
- Cerebral venous thromboses: 20/100000 births in Europe (200000 in India)
- SAH: 10/100000 pregnancies
- ICH: 5/100000 births
- AVMs have no increased rate of bleeding (Horton 1990), but bleeds are more severe
Aetiology of Thunderclap Headaches

Vascular aetiologies:
- Subarachnoid haemorrhage
- Cerebral artery thrombosis
- Reversible cerebral vasoconstriction syndrome
- Cerebral venous sinus thrombosis
- Intracerebral haemorrhage
- Pituitary apoplexy
- Hypertensive crisis

Nonvascular aetiologies:
- Spontaneous intracranial hypotension
- Space occupying lesions obstructing CSF flow
- Primary thunderclap headache
A 36 year old woman with sudden onset right sided headache and one seizure
A 36 year old woman with sudden onset right sided headache and one seizure
Reversible Cerebral Vasoconstriction
An 18 year old woman, previously healthy
08-01-10: develops increasing headache
10-01-10: becomes confused and sleepy
11-01-10 am: admitted to acute medical unit

CT shows low attenuation in central areas of the brain

MR angiogramm shows absent blood flow in internal veins
8pm on same day: patient becomes comatose
11pm specialist radiologist in N… contacted: “needs thrombectomy – cannot do as no beds on Neuro-ICU”
Outcome: persistent coma, severe brain damage, death

Next day: MRI shows bleeding into affected brain tissue

2 days later: bleeding and severe brain swelling
Migraine in pregnancy

- >2/3 improve during pregnancy
- If headaches, emphasize non-pharmacological management first
- Acute medications: opioids, paracetamol, antiemetic (chlorpromazine, prochlorperazine)
- ?Triptans (licensed for breastfeeding if >24h after last dose
- “Stop all preventative medication” (Migraine trust) or Propranolol safe (Goadsby BMJ 2000)
- 34% have postpartum headache (⇒Sumatriptan)
33 y/o with persistent low pressure headache and facial numbness 6 months after childbirth despite blood patch (top row)
Lumbar MRI does not show leak, but resolution of symptoms after 12 months (bottom row).
Headache and Intracranial Hypotension in Epidural Anaesthesia

- Incidence: 0.6% of epidural procedures caused dural puncture; 16% of those had headache [Tanaka K. 1993]

- Clinical characteristics:
  - Headache in upright position relieved by recumbency
  - With time less clear postural association or “second half of the day” and exertional headache
  - Stiff neck and nausea
  - Diplopia, tinnitus, hearing loss, facial numbness and weakness

- Mechanisms: Stretching of meninges and cranial nerve roots, subdural fluid collections, dilatation of epidural venous plexus

- Blood patch most effective treatment
Complications of Local and Regional Anaesthesia - Overview

- Treatment errors: wrong route, wrong substance, wrong indication
- Central nervous system complications
- Spinal cord complications
- Roots and Plexus
- Peripheral nerve complications
Complications of Local and Regional Anaesthesia – Wrong route complications of Epidural block

• Subarachnoid injection of local anaesthetic causing high spinal block, respiratory and cardiac arrest and coma
• Dural puncture in ?0.6%? [Tanaka K 1993]
• Migration of catheter tip possible (esp. in low lying catheters?)
• Particularly in combined general and epidural anaesthesia, as monitoring reduced
• Intravascular injection causes hypotension, nausea, vomiting, seizures
Neurological Complications of Epidural Anaesthesia - Cranial

• Headache and intracranial hypotension
  – Low pressure headache vs. unspecific headache and ?pneumocephalus?
  – Cranial Nerve palsies (esp. CN VI)

• Bacterial meningitis (external contamination or haematogenous spread)

• Horner syndrome and Trigeminal Neuropathy reported as results of anaesthetic toxicity
Meningitis after Regional Anaesthesia

- Very rare; some 200 reported cases
- Commoner after spinal than epidural anesthesia, and in catheters left > 3d
- Estimated risk: 1 in 5000 to 50 000 [Grewal S. 2006]
- Mechanisms: hematogenous spread, local contamination (superficial infection, some medical personnel)
- Symptoms: headache, neck stiffness (like PP headache)
- Course severe if unrecognised: high suspicion index needed
- NAP3: likely full recovery
Neurological Complications in Epidural Anaesthesia – Myelopathy

• Causes:
  – Infarction
  – Anaesthetic toxicity (wrong route, catheter migration
  – Epidural haematoma (patients with coagulopathy)
  – Abscess (multiple passes in sick patients)
  – Fibrosis and spinal arachnoiditis

• Management depends on identification of cause
• MR Imaging with suspicion without delay
Neurological Complications in Epidural Anaesthesia – Epidural hematoma

• Typically occurs in patients with coagulopathy (50 000 platelets safe?); older, sicker, ?thoracic blocks?
• NAP3: 1/100 000
• Unclear when anticoagulants safe
Postoperative care crucial for outcome: monitoring protocol to detect leg weakness!
• Surgical emergency evacuation
• Persisting neurological deficits after epidural need monitoring and early imaging to allow timely surgery
• Myelopathy has poor prognosis
Neurological Complications in Epidural Anaesthesia – Cord infarction

High signal abnormalities in Lower thoracic cord supplied by Adamkiewicz’ artery
Neurological Complications in Epidural Anaesthesia – Cord infarction

- **Anatomy:** Anterior spinal or posterior radicular artery territories
- **Predisposing factors:** Systemic hypotension during procedure and preexisting vascular risk factors (diabetes), and prolonged hyperlordosis in pelvic surgery?
- **Cave:** Masking effect of continuing epidural infusion causes delayed recognition
- **Poor prognosis likely**
Neurological Complications in Epidural Anaesthesia – Cauda equina syndrome

Often severe polyradiculopathy particularly in elderly, not obstetric group

Causes:
- Exacerbation of spinal stenosis by injected fluid volume
- Anaesthetic neurotoxicity with contaminant or subarachnoid injection
- Compression from epidural air
- Chronic toxic effect as arachnoiditis
- Frequently unknown origin
Cauda Equina Syndrome

- Complex anatomy, incomplete lesions difficult to differentiate from lumbar plexus and combined nerve lesions
- Combined electrophysiological and imaging approach
Peripheral Nerve Complications of Delivery and Anaesthesia

• Positioning, particularly in prolonged and difficult labour, is associated with foot drop
• Causes of post partum foot drop: nerve root or lumbosacral plexus injury, or sciatic nerve or peroneal nerve compression
• Mechanisms: disc herniation – pressure or traction of nerves by head or forceps – compression of nerves by positioning
• Clinical pattern may not always differentiate
Radiculopathy (nerve root trauma; anaesthetic neurotoxicity)

Guillain Barre Syndrome - ? Delayed immune reaction?

Post partum nerve injury – associated with regional anaesthesia or not? Indirect factors seem likely
Clinical differentiation is often difficult between partial nerve and partial root lesions. EMG and nerve conduction studies (combined with imaging) are essential.
Postpartum Peripheral Nerve Injuries

- Risk factors were prolonged labour and nulliparity
- Mechanisms: Compression, stretch, vascular injury
- Incidence: 1% lower limb peripheral dysfunction [Wong CA 2003]; 55% had regional anesthesia. Nerves involved were:
  - Lateral femoral cutaneous (24/63 cases)
  - Femoral (sensory or sensorimotor) (22/63)
  - Common peroneal
  - Lumbosacral plexus
  - Sciatic
  - Obturator
  - Radicular
- Noted that regional anesthesia prolongs second stage of labour, and encourages less change of position
- Outcome depends on percentage of axonal loss. If less than 50%: recovery within 1 year
National Audit Project 3: Major Complications of Spinal and Epidural Anaesthesia

• Data collection in prospective 12 month audit estimating 200 cases

Data on:
• Spinal and CNS infections
• Spinal bleeding
• Major nerve damage
• Wrong route errors
• Voluntary participation through anaesthetists
• Coded case data
• Review by panel chaired by Tim Cook, Bath
NAP3 : Major Complications of Spinal and Epidural Anaesthesia

Largest prospective sample to date:
• 700 000 CNB procedures (45% obstetric)
• 84 major complications
• 30 permanent injuries, 13 deaths (20% obstetric)

Results demonstrate:
➢ Risk factors for complications
➢ Typical errors
➢ Possible procedural advice
Complications of CNB Anaesthesia in Obstetrics

- Wide range of potential complications, but low risk of significant complications
- Peripheral nerve injuries are most common but hard to attribute directly to procedure
- Peripheral injuries often transient
- Central complications are rare, but can be catastrophic
- Recognition requires high index of suspicion and multidisciplinary approach
Neurological Complications of Regional Anaesthesia – NAP3

- Complications occur typically in unwell patients with pre-existing risk factors (Diabetes, spinal disease)
- Complications more often in perioperative CNB
- The obstetric populations is relatively low risk

Potential other risk areas are:
- Inexperienced practitioners (multiple passes for catheter insertion)
- Extended catheter in situ
- Postoperative monitoring through juniors
Thank you