Neurological Complications of the Parturient

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Most Common Neurological Issues

- Antepartum
  - Headache
  - Seizures
  - Pre-existing neuropathies
- Postpartum
  - Headache
  - Seizures
  - Lower back pain
  - Lower extremity numbness
Physiological Changes

**Increased estrogen** (stimulates clotting factors)

**Increased blood volume 40-50%** (HTN)

**Increased progesterone**
(enhances venous distensibility/vessel leakage)

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**Neurological changes**

Arterial Continium Posterior Continium Posterior Continen Inception

Cerebral vascular resistance

Cerebral blood flow (22% 3rd trimester)
Pre-eclampsia (2-8% all pregnancies)

Defined: new onset HTN and proteinuria after 20 weeks in a previously normotensive woman
Mild: BP > 140/90 and proteinuria > 3g/24h
Severe: BP >160/110 ( 2 times > 6h apart) and proteinuria > 5g/24h

Edlow, et al. (2013). Lancet 12, 175-185

Pre-eclampsia & Seizures

Mild  0.6%
Severe  2-3%

Mortality for eclampsia is brain ischemia or hemorrhage

Edlow, et al. (2013). Lancet 12, 175-185

Pre-eclampsia (Questions???)

How is BP?
Laboratory values
Proteinuria
End-organ issues (renal, CV, pulmonary)
Labor progress (discussion with OB)
Other conditions with acute neurological symptoms

Acute ischemic stroke (AIS)
Cerebral venous sinus thrombosis (CVT)
Reversible cerebral vasoconstriction (RCVS)
Posterior reversible encephalopathy syndrome (PRES)

Edlow, et al. (2013). Lancet 12, 175-185
Cerebral venous sinus thrombosis

Rare
Third trimester/postpartum
Underlying thrombophilia?
Thunderclap headache

Reversible Cerebral Vascular Syndrome

First reported in 1988
Also, known as postpartum angiopathy
Call-Fleming syndrome
8-39% also have PRES
Thunderclap headache

Posterior reversible encephalopathy syndrome

Postpartum
Headache, seizures, visual disturbances
Vasogenic edema
Accompanies eclampsia, HTN, renal disease, sepsis
Headaches

20% women as a primary disorder
Obesity (pseudotumor cerebri) primary idiopathic intracranial hypertension

Headaches and Preeclampsia connection

80% complain of headache
“shining forth” flashing lights

Post-dural puncture headache

At risk population: larger needles, cutting needle, youth, pregnant
Symptoms: frontal occipital headache that worsens with standing/sitting and gets better when lying
Post-dural Puncture Headache

Conservative treatment first: caffeine, sumatriptan, ACTH, theophylline, abd binder
Definitive treatment: epidural blood patch
< 24 hours after epidural 75% failure
> 24 hours after epidural 70%-97% success

Headache

Postpartum Neurological deficits
Contributing factors

Instrumental delivery
Short stature
Prolonged labor
Primiparity
Persistent transverse/posterior fetal position
Prolonged lithotomy during labor


Anesthetic Neurological Injury

0 - 12 per million women
Direct trauma failure to determine the lower end of the spinal cord

Direct trauma

Catheter
Needle
to the cord, nerve roots or conus medullaris
Intraneural injection

Postpartum Neurological Deficits

Neuraxial causes

- Direct trauma to cord
  - low conus medullaris
  - traumatic catheterization
  - high needle placement
- Indirect trauma
  - hematoma
  - abscess

- Meningitis
- Spinal cord ischemia
- Cauda equina syndrome
- Others
  - Dural puncture/CSF leak
  - Total spinal block
  - Back pain
  - Seizures (systemic toxicity)
  - Pneumocephalus
Conus medullaris injuries

Pain with needle insertion

80% population cord ends at L1
20% population cord ends at L2


Neuraxial complications

Damage to conus medullaris

Pain on injection

Reynolds F. Damage to the conus medullaris following spinal anaesthesia. Anaesthesia 2001; 56: 235–47
Intrathecal anesthesia

**Type of needle**

- Non-cutting
- Smaller size
- Cutting with perpendicular orientation
- Replacing stylette before removal


Limiting peripheral nerve injury

- No superior technique
- Avoid high injection pressures
- Be aware of comorbid conditions increasing nerve injury risk:
  - Diabetes
  - Severe peripheral vascular disease
  - Chemotherapy
  - Multiple sclerosis
  - Paresthesia elicited

Back Pain

- SAB 15%
- Epidural 30%
- Pain is self-limiting
- Early symptom of epidural hematoma/abscess
- Causes: multiple attempts/ligamentous injury, periosteal trauma, local inflammation
Epidural hematoma

1: 150,000 to 1: 200,000

Suspect if:

- Longer lasting epidural
- Unusual back pain/tenderness
- Persistent numbness
- Motor weakness
- Sphincter dysfunction


Epidural abscess

1:500,000

Meningitis

1: 39,000

Cauda equina syndrome

More prevalent when lidocaine was used for SAB

L2-S5 nerve root dysfunction

- Burning, low back pain, sphincter dysfunction, paraplegia and sensory dysfunction in the perineum (saddle anesthesia)
Total spinal

- Obesity
- Pregnancy
- Fluid or local placed into epidural space

Pneumocephalus

- Air LOR
- Acts as a space-occupying lesion
- Headache, sore/stiff neck, nausea/vomiting, blurred vision, tinnitus, dizziness, seizures, depressed LOC

Seizures

- Eclampsia
- Local anesthetic toxicity
- Undiagnosed seizure disorder
- Cerebral bleed
Postpartum Neuropathy

10-27 per 10,000 deliveries
Nulliparity
Type and length of labor
Obesity

Birth Trauma (Obstetric Palsies)

<table>
<thead>
<tr>
<th>Palsy</th>
<th>Manifestations</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lumbosacral trunk (L4-S5)</td>
<td>Quadriceps and hip adductor weakness, foot drop</td>
<td>Fetus head against posterior rim of pelvic bone, forceps delivery</td>
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<tr>
<td>Lateral femoral cutaneous (L2-L3)</td>
<td>Anterolateral thigh numbness</td>
<td>Prolonged pushing in lithotomy</td>
</tr>
<tr>
<td>Common peroneal (K6-S2)</td>
<td>Lateral calf numbness, foot drop</td>
<td>Prolonged pushing in lithotomy</td>
</tr>
<tr>
<td>Femoral (L2-L4)</td>
<td>Thigh calf numbness, weak hip flexion, and weak quadriceps</td>
<td>Prolonged pushing with hips excessively flexed</td>
</tr>
<tr>
<td>Obturator (L2-L4)</td>
<td>Inner thigh numbness, hip adductor</td>
<td>Fetal head compression on lateral pelvic wall; forceps delivery</td>
</tr>
</tbody>
</table>

Lateral Femoral Cutaneous

Meralgia Paresthetica
Lateral aspect of thigh
Burning, uncomfortable pain, tingling numbness
No motor involvement
Femoral

Peroneal Neuropathy

Obturator

Numbness/pain over groin
Adductor weakness
Months to resolve
Brachial plexus injury
C5-C6 (Erb-Duchenne palsy)
C8-T1 (Klumpke)

Bell's palsy
0.017% pregnancy and puerperium
50% recovers within weeks - months

Carpal Tunnel Syndrome
Numbness/tingling over hand/thumb
Pain increased at night
Not always relieved after pregnancy
Metabolic Neuropathies

B12 deficiency post-bariatric surgery
Thyroid disorders
Diabetes

Lower extremity limb weakness (calves)

Birth Trauma
Post-Delivery Assessment

Timing/onset of symptoms?
Location/severity of symptoms?
Are the symptoms progressing/regressing?
Do they radiate?
Did the patient receive neuraxial anesthesia?
Was there any paresthesia with neuraxial placement?
Was there full recovery from neuraxial anesthesia?
What was the duration of labor?
How long was the patient pushing in lithotomy?
Was any instrumentation used?

Just placed an epidural. Smooth. Dosed up effectively. An hour later the OB nurse calls you because the patient has facial droop