Identification and Treatment
Post Dural Puncture Headache

Beth Ann Clayton, CRNA, MS
AmSol Obstetric Anesthesia CRNA Educator
Clinical Coordinator of Obstetric Anesthesia
Mercy Health-Fairfield Hospital
Assistant Professor, University of Cincinnati
PDPH

- Most frequent major complication after spinal anesthesia
- Described over 100 years ago
- Effective treatment for common problem related to regional *undiscovered* for decades
Classification Postpartum Headache

• **Primary**
  – Migraines
  – Tension

• **Secondary** (complications of):
  – Regional anesthesia
  – Obstetrics
  – Neurologic

Goldszmidt E et al. *Obst Pedi Anesth* 2005;52;971-7
Common Causes of Postpartum Headache

- Sleep deprivation
- Caffeine withdrawal
- Need for cigarette
- Dehydration
- Hormonal fluctuations
- Migraine

*Reported incidence PPH/A 11-80%

Serious Causes PP Headache

- Meningitis
- Delayed onset Preeclampsia
- Intracranial pathology
Cause of Postpartum Headache

• 95 women with H/A > 24 hrs (2000-2005 @ UCMC)
  Mean onset H/A~3.4 days

• Cause:
  – Tension –type  n=37  39%
  – Migraine  n=10  11%
  – Preeclampsia/eclampsia  n=23  24%
  – Spinal headache  n=15  16%
  – Cerebral venous thrombosis  n=3  3%
  – Subarachnoid hemorrhage  n=1  1%

Influencing Factors of PDPH

- CSF loss exceeds production
- > Size of hole > CSF lost….the larger the hole, the more CSF lost
- Active labor and “pushing”
- Loss of CSF with sagging of brain and traction of cranial meninges

Turnbull DK, Shepherd DB. *Br J Anaesth.* 2003;91:718-29
Pneumocephalus

- Use of air for LOR technique can be contributory to sudden onset of H/A
  - 66.7% incidence with air
  - 9.8% incidence with saline
- May see more immediate onset of H/A
- Use of saline for LOR recommended

Aida S et al. Anesthesiology 1998;88:76-81
S&S PDPH

- Unremitting frontal/occipital pain radiating to neck and shoulders
  "severe, searing and spreading like hot metal"

- Positional
  - worsening of H/A with standing
  - relieved in horizontal

? Diagnosis if no postural component

Definition of PDPH
International Headache Society

• Bilateral headache
• Develops within 7 days of lumbar puncture
• Worsens within 15 minutes in upright
• Improves within 30 minutes in horizontal
Onset PDPH

- Majority occur 48-72 hrs after puncture
  - 90% occur within 3 days of dural puncture
  - 66% within 1st 48 hrs
- Rarely develops 5-14 days
- Duration usually < 1-2 weeks
- Rare reports of symptoms > months or even years

Duration PDPH

- 72% resolve ~ 7 days
- 87% resolve in 6 months

Rare reports of HA lasting 1-8 yrs with improvement after EBP

VandamLD, Dripps RD. *JAMA* 1956;161:586-91
Pathophysiology

- Initiated by loss of CSF
- Total production of CSF ~ 500 ml/day
  - 0.35 mL/min
  - CSF volume in adult ~ 150 mL
- CSF pressure lumbar region is ~ 5-15 cm H₂O but increases to 40 cm H₂O with erect position
- Loss exceeds production
Pathophysiology

1. Mechanical loss of CSF → loss of cushion effect
   Upright position → sagging of brain → traction of cranial nerves

2. Loss of CSF → Intracranial hypotension
   ↓ CSF volume/pressure

Neural Blockade in Clinical Anesthesia and Management of Pain by Bridenbaugh PO and Greene NM 1988, pp213-251
Alternate Etiology PDPH

- Loss of CSF in upright position → intracranial hypotension and loss of CSF volume
- ↓ CSF pressure causes compensatory vasodilation with ↑ CBF
- ↑ CBF → ↑ intracranial blood volume → ↑ intracranial pressure
- Cerebral vasoconstrictors can be useful in Rx
Incidence PDPH

- Unintentional dural puncture related to epidural 0.9 – 4.4%

- PDPH with “wet tap” after epidural 76-85%

Contributing Factors

- Skill of anesthesia provider
- Age of patient
- Female gender
- Pregnancy

  OB patient who is likely to choose epidural for L&D

- Needle size *neurologists performing LP maintain that 22 ga needle required
- Needle type
- Number of attempts
Pushing after Accidental “wet tap”

- Active “pushing” increases CSF pressure and theoretically may increase loss.

- Study with 33 pts
  - 23 actively pushed (10 for C/S)
  - 17/23 “pushing” developed headache
  - 1/10 “non pushing” developed headache

“Wet Tap” after Epidural

• Inject 10 mL preservative free saline into SA space before removing epidural needle*

• Options:
  1. Reattempt epidural @ another interspace
     • preferably at higher space
  2. Thread catheter and convert to Continuous Spinal Catheter
     • CSA

• Inform patient and Document

• Leave spinal catheter in situ ~ 24 hrs
  – Inject 10 mL preservative free NS @ time of removal of catheter

• Close follow-up for PDPH (>80%)

• ? prophylactic EBP after delivery

Studies re: PDPH and CSA

Decreased PDPH (CSA)
Heesen M et al. IJOA 2013
Ayad S Reg Anesth 2003;28:512-15*
Kuczhowski K Acta Anaesth Scan 2003
Segal S. ASA 1999
Dennehy K Can J Anaesth 1998
Cohen S Acta Anaesth Scan 1994
Denny N. Anesth Anal 1987

No changes PDPH
Liu N Reg Anesth 1983
Norris M Reg Anesth 1990

* Ayad S et al suggest leaving intrathecal catheter in 24 hrs to ↓ need for EBP but caution must be used
Meta-Analysis
Insertion of an intrathecal catheter following accidental dural puncture

• Nine reports were identified investigating placement of intrathecal catheters after accidental dural puncture

• Results
  • Reduced the risk for an epidural blood patch
    • Risk ratio 0.64 (95% CI 0.49-0.84, P=0.001)
  • Incidence of PDPH reduced but not significantly
    • Risk ratio 0.82 (95% CI 0.67-1.01, P=0.06)

Heesen M et al. IJOA 2013
“Wet tap with Touhy”

* Stop the flow!

Options

- Inject 10cc of saline
  - Reattempt epidural

- Put stylet in place
  - Thread epidural catheter
  - (Inject intrathecal medication)
  - 15 mcg F + 5mL NS (early)
  - 15 mcg F + 2.5 mg B (late)

Successful

Unsuccessful

- Intermittent injection or CSA
  - 1-2 mL/hr of 0.0625/0125% B + 2mcg/mL fentanyl

- Leave catheter in 24hrs post puncture
  - (Administer 10cc of sterile NSS before pulling)

Follow for PDPH
Treatment

• Early treatment!!!!!!
  – Patients may sue for inadequate Rx

• Inform patient
  – see patient qd while in hospital
  – explain cause and offer Rx options
  – document plan in patient’s chart
Treatment Modalities

- Enforced recumbency …worthless and only delays Rx
- Forced hydration ??? value
- Abdominal binder
- Caffeine
- Leave spinal catheter in situ ~ 24 hrs
- Epidural saline
- Epidural blood patch (EBP)
Timing of EBP

- Failure rate of 71% if EBP within 24 hrs (Loeser)
- 2\textsuperscript{nd} study showed increased failure if performed within 48 hrs
- More recent (504 pts) * success rate 75-93% if EBP performed within 3 days of dural puncture
  - 75% complete relief
  - 18% incomplete relief
  - 7% no relief
  *Success increased by delaying at least 24 hours

How Does EBP Work?

- Blood spreads cephalad, caudad and anterior (evidenced by MRI)  * mean spread:
  - 6 segments cephalad
  - 3 segments caudad

- Compresses the thecal sac and spreads to intervertebral foramina and paravertebral space
- Increases CSF pressure
- Seals the dural defect
- Causes vasoconstriction of dural vessels

How Much Volume?

- Crawford’s recommendation of 20 mL (unless patient c/o back or leg pain) became common practice.

- After visualization of spread in 1986, recommendation of 12-15 mL volume.

- Volumes > 20 mL may be associated with complications*

- Stop injection if c/o pain or fullness.

Crawford JS. *Anaesthesia* 1980;35:513-15
Diaz JH. *Anesthesiology* 2002;96:1515-17*
Risks

• Same for any epidural needle placement
• Common symptoms
  – transient back pain
  – radiculitis
  > 1/3 patients
• Transient bradycardia
• Slight temperature elevation
• Neckache

Failure EBP

- Inadequate blood volumes
- Early patching (before 24 hours)
- Use of epidural steroids

Prophylactic EBP

• Conflicting evidence
• Generally felt to be ineffective
• Inhibition of clot by local anesthetics
• Higher volumes of blood may be required
• Patch separation may occur due to increased pressure gradient between thecal and epidural space
Summary

• Postpartum headache common complaint

• Determine cause of headache
  – can be benign or life threatening

• PDPH debilitating complication of neuraxial anesthesia

• Dramatic reduction in incidence with use of smaller size and pencil point needles

• EBP “gold standard” for treatment