

# 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. *Obstet Pediatr 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%



Scharff L et al. *Headache* 1997;37::203-10.

# 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%

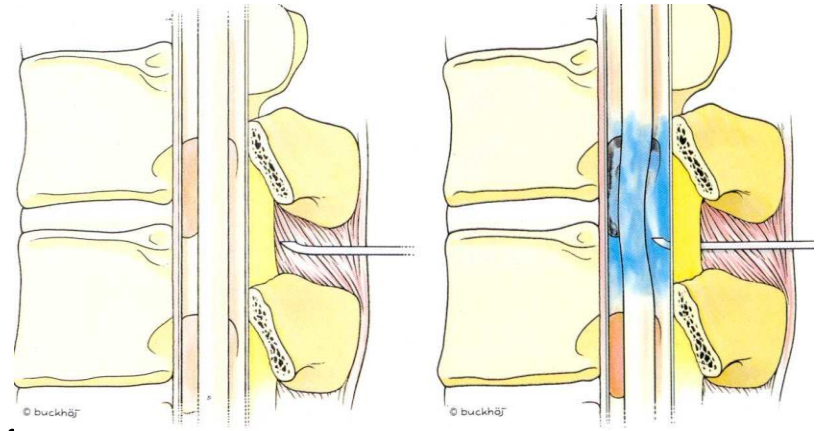
Stella CL et al. *Am J Obstet & Gynecol.* April 2007

# 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***

\*Weir EC. Br Med J 2000;320: 127-8



# 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

Reynolds F. *Br. Med J* 1993;306:874-6

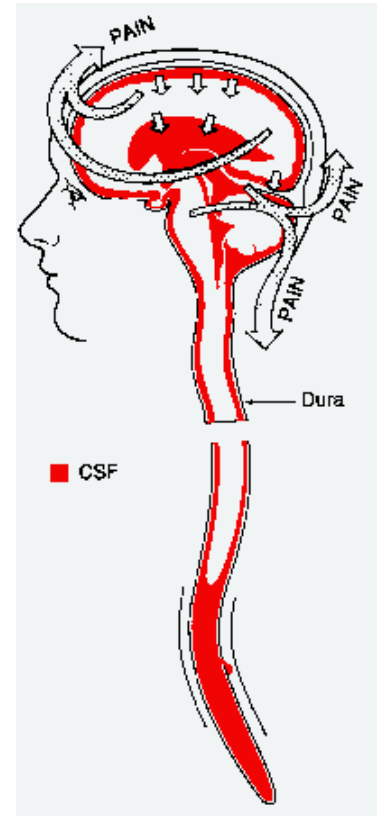
# Duration PDPH

- 72% resolve ~ 7 days
  - 87% resolve in 6 months
- } Largest follow-up
- 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 H<sub>2</sub>O but increases to 40 cm H<sub>2</sub>O 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

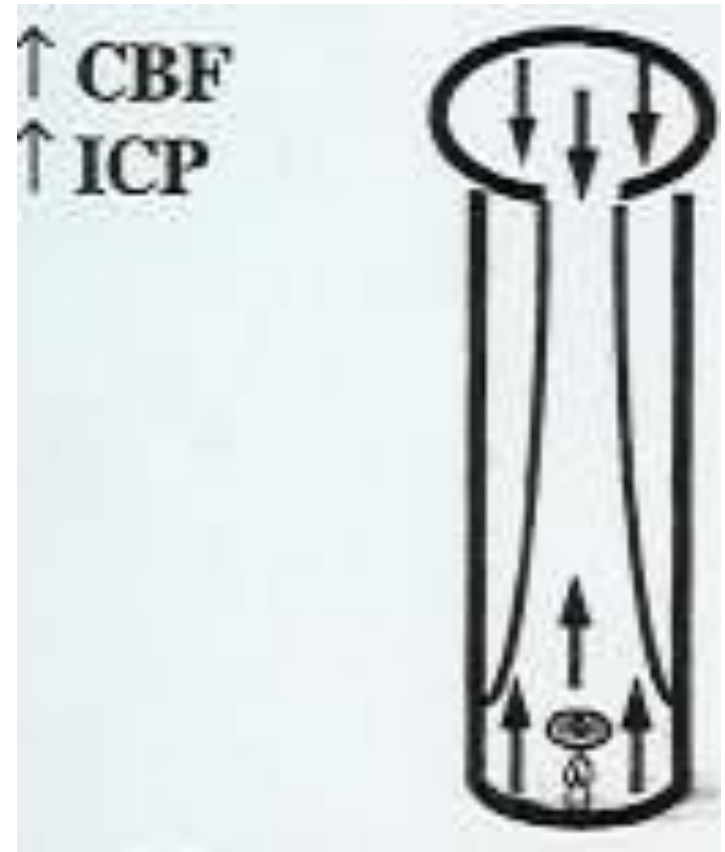
↓ CSF volume/pressure



Neural Blockade in Clinical Anesthesia and Management of Pain by Bridenbaugh PO and Greene NM 1988, pp213-251  
Kuczkowski, K *Rev Col. Anes* 2006; 34:267-272

# 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%

Collier CB. Complications of Regional anesthesia. In Textbook of Obstetric Anesthesia. Churchill Livingstone, NY 2000;504-523

# 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

Angle P et al. *Can J Anesth* 1999;46:861-6

# “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

Ayad S et al. *Regional Anesthesia and Pain Med* 2003;28:512-515

# 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

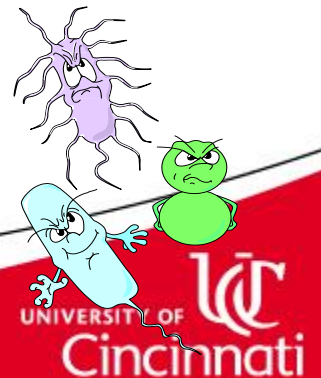
## No changes PDPH

Liu N *Reg Anesth* 1983

Norris M *Reg Anesth* 1990

Rutter S. *Int'l J Obstet Anesth* 2001

\* 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)

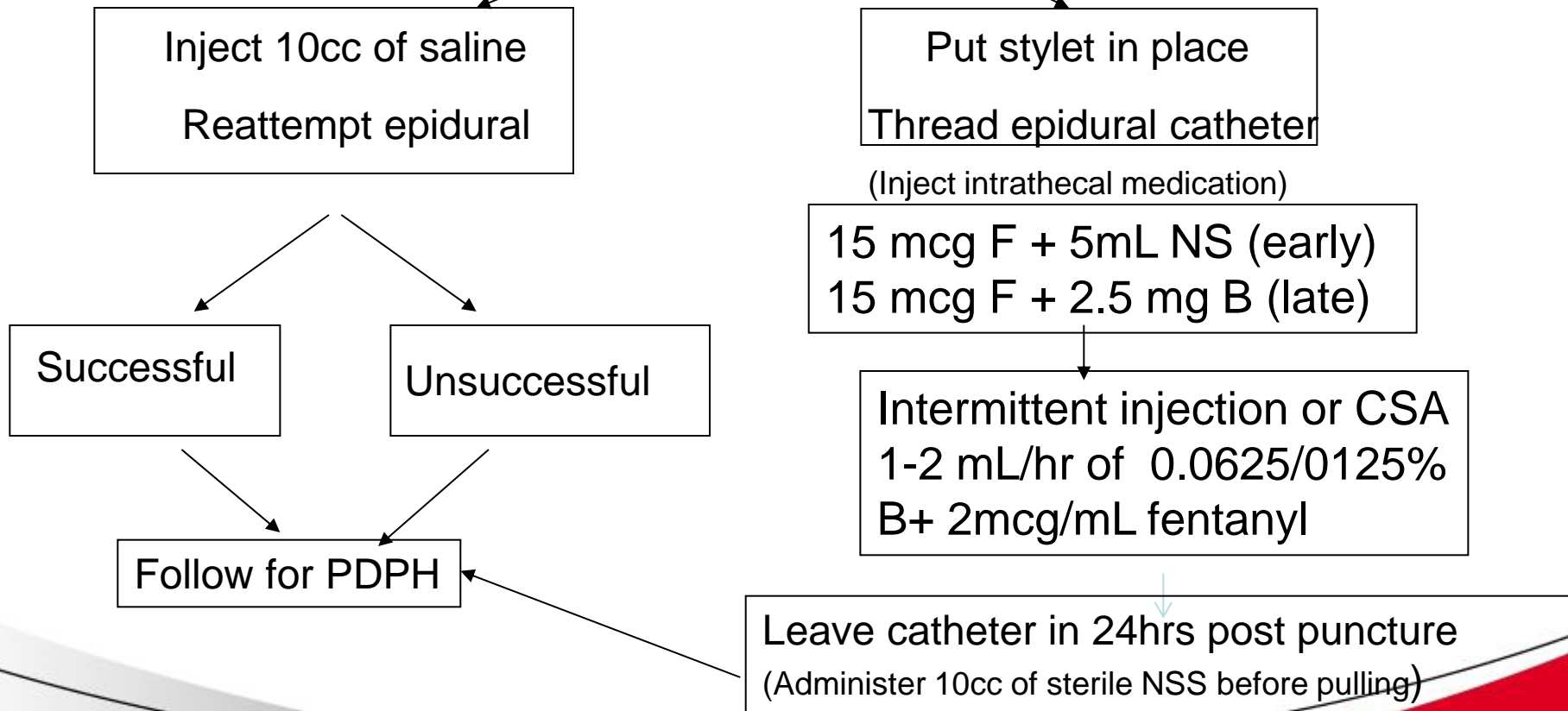
Heesen M et al. IJOA 2013



# “Wet tap with Touhy”

\* Stop the flow!

## Options



# 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<sup>nd</sup> 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

Loeser EA et al. *Anesthesiology* 1978;49:147-8

Banks S et al. *Int' J Obstet Anesth* 2001;95:10;172-6

Safa-Tisseront V et al. *Anesthesiology* 2001;95:334-9.

# How Does EBP Work?

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

[ Beards SC et al. *Br J Anaesth*  
1993;71:182-8 ]
- 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
- Transient bradycardia
- Slight temperature elevation
- Neckache

} > 1/3 patients

Harrington,B. *Regional Anesthesia and Pain Med* 2004;29:136-63

# Failure EBP

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

Fry. RA, Perera A. *Anesthesia* 1989;44:492-3.

# 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