Postdural Puncture Headaches
A Contemporary Update

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Why should we care?

- Mother want to feel well and look after their baby

ASA's Closed Claims Analysis Project

- PDPH: Third most common reason for litigation in obstetric anesthesia
International Headaches Society: Definition of PDPH

- Bilateral headache that develops within 7 days after lumbar puncture and disappears within 14 days after the lumbar puncture
- The headache worsens within 15 min of assuming the upright position and disappears or improves within 30 min of resuming the recumbent position

Accompanying Symptoms

- Nausea, vomiting, tinnitus, vertigo, dizziness
- Visual disturbances
  - 14% of patients with PDPH
  - Diplopia, cortical blindness
  - Dysfunction of the extraocular muscles from transient paralysis of the motor nerves of the eye (cranial nerves III, IV, and VI)
    - The abducens nerve most frequently affected
    - Can be unilateral or bilateral
    - Usually occurs 4 to 14 days after dural puncture
    - Resolves completely after 4 weeks to 4 months
- Hearing alteration
- Paresthesia of the scalp
- Limb pain

Incidence of PDPH

• Accidental dural puncture incidence for epidurals
  – 0.5% and 2.5%
  – 80% of patient develop PDPH

• PDPH for spinals:
  – 2–5% with use of small gauge pencil point needle
  – Higher with short beveled Quincke needles

• 26% unrecognized

• Anaesthesia. 2008 Jan;63(1):36-43.
Incidence of Blood Patching at JLR Pain Physicians

- Observation period:
  - 03/2009 to 08/2009 i.e. 6 months
- Number of epidural and spinal OB procedures performed
  - N = 2607
- Epidural blood patches performed
  - N = 15
- Incidence for blood patching: 0.57%
Contributing Factors for PDPH

• Needle size and shape
  – Lower incidence with pencil point and smaller gauge
  – Bevel orientation
    • Lower incidence with needle bevel parallel to longitudinal dural fibers
• Loss of resistant to air for epidural catheter placement
  – Increases ADP versus loss of resistance to saline
• History of previous PDPH
• Operator experience
• Patient’s age
  – Decrease incidence with higher age
• Patient gender has no impact
  – Gender biased studies

*Anaesthesia. 2008 Jan;63(1):36-43.*
*Anesth Analg 1990; 70:389-394*
*Norris MC, Leighton BL, DeSimone CA. Needle bevel direction and headache after inadvertent dural puncture. Anesthesiology 1989; 70: 729–3*
Table 1 Relationship between needle size and incidence of post-dural puncture headache

<table>
<thead>
<tr>
<th>Needle tip design</th>
<th>Needle gauge</th>
<th>Incidence of post-dural puncture headache (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quincke</td>
<td>22</td>
<td>36&lt;sup&gt;128&lt;/sup&gt;</td>
</tr>
<tr>
<td>Quincke</td>
<td>25</td>
<td>3–25&lt;sup&gt;47&lt;/sup&gt;</td>
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<tr>
<td>Quincke</td>
<td>26</td>
<td>0.3–20&lt;sup&gt;45 107&lt;/sup&gt;</td>
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<tr>
<td>Quincke</td>
<td>27</td>
<td>1.5–5.6&lt;sup&gt;25 69&lt;/sup&gt;</td>
</tr>
<tr>
<td>Quincke</td>
<td>29</td>
<td>0–2&lt;sup&gt;45 47 69&lt;/sup&gt;</td>
</tr>
<tr>
<td>Quincke</td>
<td>32</td>
<td>0.4&lt;sup&gt;46&lt;/sup&gt;</td>
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<td>Sprotte</td>
<td>24</td>
<td>0–9.6&lt;sup&gt;13 107&lt;/sup&gt;</td>
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<tr>
<td>Whitacre</td>
<td>20</td>
<td>2–5&lt;sup&gt;17&lt;/sup&gt;</td>
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<tr>
<td>Whitacre</td>
<td>22</td>
<td>0.63–4&lt;sup&gt;17 112&lt;/sup&gt;</td>
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<tr>
<td>Whitacre</td>
<td>25</td>
<td>0–14.5&lt;sup&gt;13 98&lt;/sup&gt;</td>
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<tr>
<td>Whitacre</td>
<td>27</td>
<td>0&lt;sup&gt;25&lt;/sup&gt;</td>
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<tr>
<td>Atraucan</td>
<td>26</td>
<td>2.5–4&lt;sup&gt;115 131&lt;/sup&gt;</td>
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<tr>
<td>Tuohy</td>
<td>16</td>
<td>70&lt;sup&gt;26&lt;/sup&gt;</td>
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</table>
Prevention of PDPH following ADP

- Avoid pushing in second stage of labor
  - Evidence inconclusive
  - Angers patient -> AVOID
- Bed rest
  - No difference between ambulatory patients and bed rest
- Fluid supplementation
  - Uncertain: Too few pertinent trials
- Subarachnoid catheter placement
  - Decreases PDPH after recognized ADP from 91% to 51% when catheter was removed immediately after delivery and 6.2% when catheter was removed after 24 hours
  - Safety issue
    - Inexperience support staff
    - Risk of infection,
    - Inadvertent injections
      - Cochrane Database of Systematic Reviews 2001, Issue 2
Natural Course of PDPH

- Self-limiting
- If left untreated
  - 72% of PDPHA resolved within 7 days
  - 85% of PDPH resolve within 6 weeks
  - May persist > 6 months

Table 3 Estimated rate of spontaneous recovery from post-dural puncture headache

<table>
<thead>
<tr>
<th>Duration (days)</th>
<th>Percentage recovery</th>
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<tbody>
<tr>
<td>1–2</td>
<td>24</td>
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<tr>
<td>3–4</td>
<td>29</td>
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<tr>
<td>5–7</td>
<td>19</td>
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<tr>
<td>8–14</td>
<td>8</td>
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<tr>
<td>3–6 weeks</td>
<td>5</td>
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<tr>
<td>3–6 months</td>
<td>2</td>
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<tr>
<td>7–12 months</td>
<td>4</td>
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</table>
Etiology of PDPH

• Loss of CSF through the dural tear into the epidural space
• Decrease in CSF pressure
  – ? Traction on pain-sensitive structures within the cranial cavity
  – ? Cerebral venous dilation
• Loss-of resistance to air technique
  – ? Intrathecal air may contribute

Differential Diagnosis of Persistent Headaches in the Puerperium

- Non-specific coincidental headache
  - None
- Pregnancy-induced hypertension, (pre-) eclampsia
  - Throbbing headache, often hypertension and proteinuria developing during pregnancy, transient focal disturbances such as amaurosis, aphasia, hemiplegia.
  - Can progress to convulsions
- Meningitis
  - Acute occipital headache, neck stiffness, fever, photophobia
- Cerebral tumor
  - Dull, deep intermittent headache, elevated intracranial pressure, drowsiness, unequal pupils, papilloedema, convulsions
Differential Diagnosis of Persistent Headaches in the Puerperium

- Cerebral vein thrombosis
  - Generalized or focal neurological symptoms and signs. Headache in 80% of cases, nausea, vomiting.
  - Psychiatric symptoms
  - Alteration of consciousness or cerebellar ataxia
  - Other neurological signs include:
    - Papilloedema, and transient visual abnormalities
    - Focal deficits (most deficits are motor and sensory, usually unilateral, and involve mostly the lower extremities)
    - Seizures (focal or generalized)

- Migraine
  - Generalized or unilateral paroxysmal throbbing headache, nausea, vomiting, dizziness, visual disturbances, aura and prodromas
  - Changes in mood, anorexia, scintillating scotomas
Differential Diagnosis of Persistent Headaches in the Puerperium ctd.3

- Intracranial hemorrhage
  - Intracerebral
    - Sudden severe headache (‘the worst in my life’)
    - Weakness and or numbness of one side of the body
    - Slurred speech or language difficulties
    - Loss of vision in one or both eyes; double vision
    - Incoordination, unsteadiness, giddiness
    - Drowsiness, coma
  - Subdural
    - Headache from mild to severe, localized or generalized. Intermittent with slow onset,
    - Often a history of trauma
    - Fluctuating changes in consciousness
  - Subarachnoid
    - Occipital headache with sudden onset, severe, constant.
    - Prodromal pain in one eye, ptosis, blunting of consciousness, vomiting, stiff neck

Conservative Management of PDPH

• Bed rest
  – No difference between the 6 hour- recumbence and early ambulation
  – Common sense approach: If it hurts when you get up, then don’t and allow patient’s to ambulate if they can tolerate the pain
  – Consider VTE prophylaxis if prolonged bed rest is necessary

• Posture
  – Prone position possible helpful, but ?? - > AVOID

• Abdominal binder
  – Cumbersome, uncomfortable, unproven value -> AVOID

Conservative Management of PDPH

• Maintain normovolemia
  – Encourage oral fluid intake including caffeinated beverages
  – Intravenous fluids reserved for patients unable to maintain hydration
  – No evidence that overhydration will increase the rate of CSF production any further

• Advise patients to avoid straining
  – Add stool softener
“Standard” Drug Treatment of PDPH

- NSAID
  - Limited value, reduces inflammatory response necessary for perforation to heal?
- Caffeine
  - Oral
    - 300 mg po, multiple doses,
    - Temporary relief, high recurrence, impractical
  - Intravenous caffeine sodium benzoate
    - 500 mg caffeine in one liter of fluid infused over one hour
    - Inconsistent results
  - Current recommendation
    - 300 to 500 mg po or iv caffeine once or twice a day
- Review article of caffeine:
  - “The clinical trials are few in number, small in sample size, methodologically weak or flawed, and either demonstrate no effectiveness, contradictory and conflicting results, or invalid answers"

British Journal of Anaesthesia, 2003, Vol. 91, No. 5 718-729
Neurologist. 13(5):323-7, 2007 Sep  Caffeine for the prevention and treatment of postdural puncture headache: debunking the myth
Exotic Drug Treatment of PDPH

• Theophyllin
  – Time-release preparation may work better
  – IV infusion effective in one small case study
• Sumatriptan
  – 6 mg subcutaneously
  – Effective, but small scale studies
• Epidural morphine
  – Two epidural injections, 24 h apart, of 3 mg morphine in 10 ml saline
  – Effective, but small scale study (n=25)
• OTHER
  – Intravenous hydrocortisone, gabapentin, DDAVP, ACTH
    LACK of STATISTICAL DATA

Epidural Blood Patch

- High success rate
  - 70–98% if carried out more than 24 h after the dural puncture
- Low complication rate
  - Immediate exacerbation of symptoms and radicular pain

- Prophylactic patching has generally been dismissed as ineffective, but the evidence is conflicting
Legal Aspects

• Usual principles prevail
  – Full disclosure
  – Empathy and reassurance
  – Frank discussion of treatment options
  – Appropriate review and timely follow up

• Explanation of the reason for the headache, the expected time course, and the therapeutic options available

Recommendation for Prevention

- Discuss the possibility of headache before a procedure is undertaken
- Use 25 g pencil point needles
- If Quincke needles ought to be used:
  - Choose smallest diameter possible
- Orientate (epidural or spinal needle) bevel parallel to dural fibers
- Loss of resistance to saline
Action Plan for ADP 1

– For CRNA:
  • Notification of supervising OB anesthesiologist
  • Full disclosure, reassurance
  • Documentation of above in patients charts

– For OB anesthesiologist
  • Timely personal patient visit
  • Full disclosure, reassurance
  • Document in patients charts
  • Communicate with OB attending and LD nurses

– Hand-over to succeeding OB anesthesiologist
– Daily follow-up with chart entry by on-call OB anesthesiologist
Action Plan for ADP 2 of 2

– Referral to Pain Clinic if evolving headaches are refractory to conservative management
– Placement of subarachnoid catheter currently not encouraged because of safety concerns
Power Plan for PDPH

- Full disclosure, reassurance, empathy
- Documentation in patients charts
- Immediate notification of OB Anesthesia MD
- Daily follow-up
- Hand out “Patient Information Leaflet” and document this in chart
- Encourage oral fluid intake with caffeinated beverages
- Advise patient to avoid straining
Power Plan for PDPH

- Prescribe supportive therapy
  - IV fluids for rehydration and maintenance
  - Stool softener
  - Acetaminophen with codeine or oxycodone
- Advise patient of drug safety and breast feeding
- Refer to Pain Team if symptoms remain severe and refractory after 24 hours
LABOUR WARD

PUSH

PUSH HARDER