Diagnosis and Treatment of Post-Dural Puncture Headache (PDPH):
Improving Patient Outcomes Using an Algorithm

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Dural puncture occasionally results in Post-Dural Puncture Headache (PDPH).

- May occur purposefully as a function of a therapeutic or diagnostic procedure (Diagnostic Lumbar Puncture)

- Sub-Arachnoid Block, (single or multiple attempts)

- May not be intentional, such as inadvertent Dural puncture during epidural catheter placement.
"Can you describe your symptoms."
Signs and Symptoms of PDPH

- Headache increases/returns in upright position, minimized or resolves supine.
- Neck stiffness, rigidity of shoulders (Nuchal Rigidity).
- N/V, dizziness.
- Sensitivity to light (Photophobia).
- Inability to focus (Nystagmus).
- Ringing in the ears (Tinnitus).
- Auditory disturbances
Risk Factors

1. Age/younger patients = higher incidence of PDPH!

2. Gender? Females (parturients) included in many studies, skews results in favor of female => risk.


4. # of attempts.
Post-Dural Puncture Headache
Step One: Diagnostic Algorithm

Dural Puncture Performed
Diagnostic/Spinal, inadvertent or unknown

YES

A. Headache which worsens within 15 minutes of assuming a sitting or standing position, and improves within 15 minutes after laying down flat and includes 1 or more of the following:
   1. Nuchal rigidity (neck stiffness).
   2. Tinnitus (ringing in the ears).
   3. Hypacusis (partial deafness related to neural conductivity).
   4. Photophobia (sensitivity to light).
   5. Nausea

B. Headache develops within 5 days of dural puncture. (Note: evidence shows a small percentage of headaches may occur up to 2 weeks post-dural puncture).

NO

See Conservative (Non-Invasive Treatments)

See Treatment Algorithm, Conservative (Non-Invasive) or Aggressive (Invasive) Treatment

Close Follow-up
Complications associated with PDPH

- In the parturient, can lead to reduced ability to perform normal activities of daily living (ADL).
- Leads to decreased *bonding time* between mother and new born.
- Decreased ability to nurse/feed infant.
Some *History Behind PDPH*

- 1898 August Bier reported s/s of PDPH. (15mg IT Cocaine)

- Theorized CSF leakage through puncture site was the cause. CSF loss may be > CSF produced

- Symptoms slow to resolve (2-3 weeks).

- Many researchers agree with this theory still today.

- Newer theories regarding vasodilation/increase in cerebral blood flow increases severity of symptoms. (Similarity to migraine symptomology)
• While symptoms may vary between patients, so do diagnostics.
• Some practitioners will use the postural component as their deciding criteria.
• These patients must also be considered for venous thrombosis, pneumoencephaly, or possible sub-dural hematoma.
• Some practitioners prefer to treat conservatively, while others go directly to epidural blood patch (EBP).
Diagnostics

• Rapid, accurate differential diagnosis is critical.
• Accurate diagnosis and treatment of PDPH performed in a rapid and uniform manner by anesthesia providers may alleviate, or at least decrease, pain and suffering caused by this severe type of headache.
Needle Type and Size

• Puncture of the dura mater by needles of varying size is often performed as part of diagnostic studies to measure CSF pressures and to obtain fluid samples for examination.

• (PDPH) is often an unavoidable consequence of these procedures.

• Needle type and size may be the most important aspect when determining the risk for PDPH.
Needle Type and Size

- The incidence of PDPH following subarachnoid block using a Quinke cutting needle is 36% with a 22 gauge,
- 25% with 25 gauge, and 2-12% with 26 gauge.\(^9\)
- The assumption is larger bore needles leave a larger puncture in the dura making it more difficult to close and more often require treatment.\(^7,8,9\)
- Many of these studies were done using cadaver tissue…? (would cadaver tissue have the ability to re-seal itself after puncture?)
When the dura is punctured, subsequent CSF leakage will occur.

These perforations must close or be closed as quickly as possible to prevent PDPH.

Blood clots in the area of dural puncture or tear that occur during surgery may be responsible for the decreased frequency of PDPH.
It is postulated that these blood clots seal the puncture and create a fibrin plug allowing CSF pressure to be maintained and decreasing the likelihood of CSF leak and PDPH. This also may explain why “bloody-taps” often do not result in PDPH.⁷
Spinal needles fall into **two main categories:**

(i) those that **cut the dura**:
- *Quincke- Babcock needle*, the traditional disposable spinal needle
(ii) those with a conical tip (Pencil tip): *Whitacre and Sprotte needles*

If a continuous spinal technique is chosen, use of a *Tuohy* or *Hustead* needle can facilitate passage of the catheter.

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Provider Experience

• The experience level of the clinician plays a major role in the prevention of PDPH.\textsuperscript{9, 10, 12}

• Many teaching institutions staff obstetric units with anesthesia Residents, or SRNAs, who in some cases have very little experience in the placement of epidural catheters, or the varying techniques used in spinal anesthesia for the prevention of PDPH.\textsuperscript{7}
Provider Experience

• Many anesthesia providers in training, whether they be Physician anesthesia Residents, or Student Registered Nurse Anesthetists (SRNA)s are supervised while performing such procedures, but need to react to an inadvertent dural puncture immediately.
• Some will quickly remove the needle and go to another interspace.
• Some do not even inform the patient of the “tap”.

Provider Experience

• Recent studies have shown advantages to the injection of 10ml preservative-free normal saline before withdrawal of the epidural needle.\textsuperscript{11}

• The injection of saline through the epidural needle has been shown to reduce the risk of PDPH, when the dura is punctured inadvertently with a large bore (18g. Toughy needle) from 62% to 32%.\textsuperscript{11}
The significant reduction in the rates of PDPH when following this simple practice make it an obviously beneficial intervention (however it is inconsistently practiced).
Prevention

• Identifying and decreasing the risk factors.
• Needle type and size are important factors.
• Bevel orientation of the needle as well as type of stylet used may be important factors.

[7]
• Whitacre and Sprotte (pencil point) puncture the dura in such a way that after the needle is withdrawn, the fibers tend to return to their original orientation decreasing the leakage of CSF.
• Perforation closes more quickly and reduces the risk of PDPH.
When I get a headache I take two aspirin and keep away from children, just like the bottle says.
Many anesthesia providers, whether they are an Anesthesiologist or a Certified Registered Nurse Anesthetist (CRNA) advocate on the side of the conservative treatment regimens in the beginning.

Bed-rest has been used by many in the initial phases of treatment for PDPH however more recent evidence has actually shown a higher incidence and prolongation of symptoms for patients on bed-rest.

Immediate mobilization combined other modalities is beneficial to treatment of headache.
Treatment Methods

• Conservative pharmacotherapies have shown to be effective

• Vigorous oral hydration as well as ingestion of caffeinated fluids (Tea, Coffee, Mt. Dew).

• Frequently however, a return of symptoms occurs after approximately 48 hours of cessation of the treatment, making this regimen less than permanently efficacious.
Treatment Methods

• More aggressive therapies involve intravenous administration of caffeine and have shown to be successful;

• 500mg of caffeine are diluted into 1 liter of normal saline, and are administered over a period of approximately 90 minutes with the patient in the supine position in a darkened room with decreased or little stimulation (visitors, television, etc.).
Treatment Methods

• Upon instillation of the full liter of fluid, the patient may elevate the head of bed (HOB) $15^\circ$ each 15 minutes until in a sitting position. If symptoms are not relieved, this may be repeated or the provider may decide to move on to more aggressive therapy.
Cosyntropin has shown promise in the treatment of PDPH as well.\textsuperscript{7, 8}

Intravenous administration of 0.75mg of cosyntropin, a synthetic analog of adrenocorticotropic hormone (ACTH), has been shown in studies to stimulate the adrenal gland to increase CSF production by increasing the output of beta-endorphins.\textsuperscript{7}
Treatment Methods

• Other treatment methods may be beneficial:
  • Abdominal Binder
  • IV Corticosteroids
  • IV Opioids
  • Antiemetics
Treatment Methods

• Injections of autologous blood into the epidural space have shown the most promise as an effective treatment of PDPH and are recognized as the “gold-standard”.

• Not “Risk-Free”

• Free of infection

• No coagulopathies

• What is the risk of a 2nd “Wet-Tap”?
Autologous Epidural Blood Patch (AEBP)

- Introduced in the mid-1960s for treatment of PDPH.
- Blood injected into the epidural space by means of an epidural needle forms a fibrinous clot in the space which seals the dural puncture and remains intact while healing of the dura takes place.
Questions?
References


