

# POST-DURAL PUNCTURE HEADACHE IN OBSTETRIC ANESTHESIA

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Postdural puncture headache (PDPH) is an iatrogenic complication of a neuraxial blockade. In obstetric patients it occurs mainly after an accidental dural puncture when attempting an epidural block to treat labor pain. PDPH can be incapacitating and it is especially troublesome in obstetric patients, impairing ambulation and the mother's ability to take care of her newborn. In addition it prolongs hospital stay, increases emergency department visits and represents a common cause for litigation.

## Incidence of accidental dural puncture

The reported incidence of unintentional dural puncture during labor epidural is 0.4–6% (1). The risk of accidentally puncturing the dura is increased by operator inexperience and fatigue, multiple attempts to locate the epidural space and increased depth of the epidural space (2–4).

## Incidence of PDPH after accidental dural puncture

The risk of PDPH following an inadvertent dural puncture is higher in pregnant patients due to sex, young age, active bearing down during the second stage of labor (5), and is estimated to be 50–88% (6–7).

## Signs and Symptoms

The most common symptom is postural headache, exacerbated by sitting or upright position and diminishing /disappearing in supine position. Immediate relieve of the headache when assuming decubitus is a pathognomonic sign for PDPH.

The headache is severe, non-throbbing, bilateral, typically fronto-occipi-

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tal, irradiating to the neck and shoulders. Other symptoms associated with PDPH are: nausea, vomiting, dizziness, visual and hearing disturbances, vertigo, neck stiffness, scalp paresthesia.

Most frequently the PDPH occurs within 48 hrs after the dural puncture and it has a self-limiting course. Untreated, the majority of cases will resolve spontaneously after a week, however there are reports of long-lasting PDPH (8). The course of the PDPH is not always benign, chronic headache can occur. Also, rare but severe complications such as cranial nerve palsies, (especially abducens cranial nerve palsy), subdural hematoma, cortical venous thrombosis, meningitis have been reported (9-12).

### Differential diagnosis

Even though the diagnostic of a PDPH is usually straightforward based on a known dural puncture and orthostatic headache, differential diagnosis should be considered to exclude:

pre-eclampsia, cerebral venous thrombosis, venous sinus thrombosis, non-specific headache, migraine, sinusitis etc (13,14).

Pneumoencephalus should be suspected if the headache appears in a few hours after the procedure and the epidural space was identified using the loss of resistance technique with air (15).

### Pathophysiology

The mechanism of PDPH is not fully elucidated. Dural puncture with a large gauge Tuohy epidural needle can result in a persistent cerebro-spinal fluid (CSF) leak, leading to intracranial hypotension and traction on pain-sensitive meningeal structures in vertical position (13).

Another mechanism responsible for PDPH is compensatory intracranial venodilation. Intracranial hypotension may result in MRI confirmed dural meningeal and dural venous sinus dilation (16). According to the Monro-Kellie hypothesis (17) because the cranial compartment is incompressible, the sum of intracranial volumes (brain, CSF and blood) is constant. Therefore a compensatory increase in blood volume can result as a consequence of a decrease in CSF volume. Subdural hematoma after dural puncture can be explained by the rupture of the sagittal bridging subdural veins (9).

### Treatment

Close follow up of the patient with an inadvertent dural puncture is mandatory. Psychological support should be offered, and all therapeutic options fully and frankly discussed with the patient.

## Conservative treatment

### 1. Bed rest.

Bed rest alleviates the headache; however it is definitely not therapeutic.

### 2. Intravenous fluids

Intravenous fluids, regardless of type of fluid infused are ineffective.

### 3. Pharmacotherapy

Caffeine, Sumatriptan, Gabapentin, Theophylline, Desmopresin acetate, Adrenocorticotrophic hormone and analogues have modest results in the treating PDPH (13,18).

## Invasive treatment

### 1. Epidural injection of saline

Epidural injection of saline, especially as continuous infusion can improve symptoms by increasing the CSF pressure; however the headache relief is transitory (13).

### 2. Blood patch

Blood patch is the most effective treatment for PDPH. Recently the success rate was reported to be 93% after first and 97% after the second blood patch (19). Approximately 15% of patients necessitate a second blood patch (20).

Blood patch consists of injecting autologous blood (drawn simultaneously from the arm by an assistant) into the epidural space, using full aseptic precautions. Blood patch acts both by creating a blood clot which seals the dura, explaining the long-lasting effect and by increasing the CSF pressure explaining the immediate headache relief (13). To obtain a mass effect it is recommended to inject 20 ml of autologous blood (19). As evidenced by MRI, the blood spreads mostly in a cephalad direction (21), and therefore the blood patch should be performed at an intervertebral level below the original dural puncture.

Much controversy exists regarding the right timing to perform a blood patch. Paech et al (19) recently reported good results when the blood patch was delayed for 48 hrs after the dural puncture.

The most common side effect associated with blood patch is a transitory back pain probably because of significant leakage of the blood into subcutaneous tissue. Exacerbation of the headache is a potential side effect, should the dura be punctured again.

Blood patch has a long record of safety, however rare and severe complications such as arachnoiditis, subdural hematoma, cauda equina syndrome, infection have been reported (22-24).

To decrease the risk of PDPH recurrence, decubitus position is recommen-

ded for 1–2 hrs after the blood patch (25). The patient should be instructed to avoid Valsalva maneuvers and strenuous physical activity.

## Prevention

### Epidural morphine

Repeated epidural injection of Morphine was reported in one study (3 mg each time at 24 hrs interval) to significantly decrease the PDPH. Side effects were increased incidence of pruritus and nausea (26).

### Prophylactic epidural blood patch

Prophylactic injection of blood through the epidural catheter has the benefit of reducing the severity of the pain and duration of symptoms. However, prophylactic epidural blood patch is not significantly reducing the incidence of PDPH (27,28).

### Intrathecal catheter

An option that becomes increasingly popular among clinicians is the intrathecal placement of the epidural catheter after an accidental dural puncture (29). An inflammatory reaction caused by the presence of the catheter may seal the dural tear and stop the CSF leakage, especially if kept in situ for more than 20 hrs (30). However, a recent prospective study by Russell (31) compared continuous spinal analgesia versus repeat epidural analgesia after accidental dural puncture in 115 women in labor. Converting to spinal analgesia after an accidental dural puncture provided better labor analgesia but did not reduce the incidence of PDPH.

Complications of a continuous spinal catheter are: potential for a total spinal if bolus as an epidural catheter, infection, CSF leak and cauda equina syndrome.

### Cosytropin

Adrenocorticotrophic hormone (ACTH) and analogues have been used to treat refractory PDPH. Cosytropin, a synthetic subunit of ACTH, was recently used successfully as a single intravenous dose to reduce the incidence PDPH after accidental dural puncture (32).

## Summary

- PDPH after an accidental dural puncture during an attempted labor epidural has a very high incidence.
- Prophylactic measures to reduce PDPH incidence are controversial.
- Bed rest and intravenous hydration are ineffective.
- Pharmacotherapy has very modest results .
- Blood patch is the most effective treatment; 20 ml of blood should be injected epidurally.

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