

# Management of Post-Dural Puncture Headache in Obstetric Surgery

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**Abstract:** Post-Dural Puncture Headache is a complication of dual puncture. Although the incidence of PDPH decreased significantly after attention was paid to it, the incidence of post-partum depression, postpartum chronic headache, and back pain increased, which seriously affected the breastfeeding rate and the choice of epidural analgesia during delivery. Therefore, relevant operators should continue to pay attention to the occurrence of PDPH. The diagnosis of PDPH has been updated and described in the International Headache Classification to identify PDPH promptly. In this paper, the diagnostic criteria, pathogenesis, risk factors, and treatment plan of PDPH were summarized. The treatment plan was described in detail from four approaches: drug therapy, acupuncture, nerve block, and lumen administration. The application of epidural blood patches in patients was described in detail, and the complications were reminded to help users prevent related adverse reactions in the process. Finally, the authors suggest that recumbent rest and active fluid replacement are ineffective in the treatment of PDPH. The use of epidural blood patches is a feasible strategy for severe headaches after a rupture of the dual. It is hoped that through the management of this case, the occurrence of PDPH can be effectively avoided so that its impact on patients is less and less.

**Keywords:** PDPH, Headache, Dural Puncture, Management

## 1. Introduction

An epidural block is an anesthetic method in which a local anesthetic is injected into the epidural space to block the conduction function of part of the spinal nerve, so that sensation and/or motor function of the area it innervates disappear [1]. Post-Dural Puncture Headache (PDPH) is a complication of dual puncture [2]. When PDPH occurs, the treatment duration of bed rest is extended. But whether prolonged bed rest can prevent it remains to be seen [2]. As early as 1898, Dr. August Bier observed postural headaches in patients under spinal anesthesia [3]. Later, more and more researchers gradually found more adverse reactions, and then attracted attention [4, 5].

## 2. Factors Associated with PDPH

### 2.1. Incidence and Clinical Adverse Effects of Post-Dural Puncture Headache

The incidence of PDPH decreased from 50% in the 1900s to

1.7% in modern obstetric anesthesia with the improvement of the understanding of clinical anesthesiologists [6]. Most PDPH symptoms should ease within 7 days, but a recent retrospective study [5], from the point of long-term effects, compared patients without PDPH, PDPH in postpartum depression in patients with chronic headaches and back pain, postpartum incidence, and mother's milk feeding rate, the use of epidural analgesia childbirth in the future will be markedly reduced. As a result, a 2003 review of closed claims by the American Society of Anesthesiologists found that PDPH has become the second most common cause of patient compensation for anesthesia and the third most common reason for obstetrical patients to sue anesthesiologists [7].

### 2.2. Diagnostic Criteria for PDPH

According to the third edition of the International Headache Classification (ICHD) [8], PDPH is defined as follows: (1) The time is within 5 days after dual rupture; (2) the site of occurrence is mainly in the forehead and occipital; (3)

Aggravating factors were headache occurring or aggravating within 15 minutes of upright position; (4) The alleviating factors were headache relieved or disappearing within 15min in decubitus position; (5) accompanying symptoms include neck stiffness, tinnitus, hearing loss, photophobia, and nausea.

### **2.3. Clinical Manifestations and Mechanism of PDPH**

Postural headache was a characteristic clinical manifestation, which appeared or worsened within 15 minutes after orthostatic position and disappeared or relieved within 15 minutes after recumbent position. The main reason is the reduction of cerebrospinal fluid, gravity caused "cerebral ptosis", upright position distribution in the intracranial blood vessels, meninges, and other places of pain fibers, and V, VI, VIII, IX, X, and other cranial nerves are compressed or pulled to produce pain, Compensatory dilation of intracranial venous structures sensitive to pain [9].

It could produce the meningitis stimulation that is the main character with neck stiffening, disgusting, vomit signs. Due to vestibular cochlear nerve involvement, the decreased pressure of the inner ear lymphatic can cause tinnitus and hearing changes. Ischemia of the internal carotid artery system may lead to weakness and numbness in the partial body due to vasospasm, while ischemia of the vertebral artery base system may lead to dizziness and unstable walking. Diplopia may occur when the cranial nerve is compressed or pulled on pair III or/and VI. Pituitary stalk displacement and posterior lobe dysfunction may cause diabetes insipidus.

### **2.4. Risk Factors for PDPH**

Factors associated with PDPH were primarily patient factors, i.e., pregnant women aged 18-50 years with low BMI, especially those with a prior history of chronic headache [10]. On the other hand, the caliber, size, and type of puncture needle are very important risk factors for PDPH. The larger the diameter of the needle, the higher the risk. And "non-cut" needles were associated with a reduced incidence of PDPH compared to "cut" needles of the same size, usually Quincke [11]. In terms of operator experience, the risk of PDPH was higher in the less experienced surgeons than in the more experienced ones.

## **3. Preventive Measures to Reduce the Risk of PDPH After ADP**

### **3.1. Core Replacement**

Currently, there are few clinical studies on the prevention of PDPH by core replacement.

### **3.2. Intrathecal Catheter**

K Rana et al. [10] found in their study in 2018 that the insertion of the intrathecal catheter can reduce the incidence of severe headache after dural puncture, but it is rarely applied in clinical practice, mainly because the maternal anesthesia level needs to be closely monitored throughout the whole process to

prevent the occurrence of high lumbar anesthesia endangering the life of the fetus and the puerpera.

### **3.3. Bedrest**

Evidence-based medical evidence published by Arevalo-Rodriguez I [4] in 2016 shows that bed rest leads to a greater increase in the incidence of PDPH than getting out of bed immediately; Staying in bed longer than 24 hours at the same time also increases the risk of an embolic event. In clinical work, unexpected dural rupture does not require bed rest if there is no headache due to low cranial pressure. If the puerpera has a headache with low cranial pressure, bed rest is required.

### **3.4. Oral and Intravenous Rehydration**

Arevalo-Rodriguez I [4] also found that no RCTs have examined the effect of oral fluid intake on PDPH recovery to date; After a large amount of fluid infusion, the patient increased the frequency of urination, and the headache became worse and the chief complaint became more frequent after getting up. Dehydration may worsen headaches, but excessive fluid intake does not seem to be effective and can be harmful, so normal blood volume should be maintained and excessive fluid replacement discouraged.

### **3.5. Epidural Infusion**

Studies have shown that epidural infusion of crystal-fluid or colloidal fluid has no significant advantage in preventing PDPH after Dural puncture [12-14].

## **4. Treatment for PDPH**

### **4.1. Drug Therapy**

Medications include nonsteroidal anti-inflammatory drugs, opioids, caffeine, aminophylline, gabazine, and hormones. But attention should be paid to contraindications and complications of each drug when using it [15].

### **4.2. Greater Occipital Nerve Block**

A bilateral greater occipital nerve block can be performed with an anatomic marker or ultrasound-guided injection of 3-4ml 0.5% ropivacaine on each side. Side effects include vagal syncope, transient syncope, and occasionally worse headache.

### **4.3. Sphenopalatine Ganglion Block**

The study found that the intensity of headache decreased significantly after a dural puncture at 0.5 and 1h after sphenopalatine ganglion block, and no obvious adverse reactions occurred [16].

### **4.4. Epidural Morphine Injection**

Fence M's study [17] showed that intrathecal morphine administration of 150ug after delivery did not reduce the

incidence or severity of PDPH. This study does not support the clinical efficacy of prophylactic intrathecal morphine after accidental dural puncture.

## 5. Application of Epidural Blood Patch in PDPH Patients

### 5.1. Mechanism of Epidural Blood Patch Therapy for PDPH

The epidural blood patch therapy mechanism for PDPH includes immediate action and delayed action. The immediate effect is to squeeze the subarachnoid space when blood is injected into the epidural, causing cerebrospinal fluid to flow to the head, thereby increasing the intracranial pressure treated to PDPH. Hysteresis is when blood clots and fibroblasts close the epidural hole, thereby reducing cerebrospinal fluid leakage to achieve the therapeutic effect.

### 5.2. Current Research Status of Epidural Blood Patch Therapy for PDPH

Paech MJ et al. [18] found that epidural injection of 20ml autologous blood 48 hours after epidural puncture had the best headache relief effect in PDPH patients. The study of Beards SC suggested that epidural blood patch injection at the same level or one level lower than the original puncture site could cover 3-5 levels centered on the injection site, and blood diffusion was mainly intracranial during the injection.

### 5.3. Operation Procedure of Epidural Blood Patch

Epidural blood patches are performed by establishing intravenous access after obtaining the patient's written informed consent. The patient was placed in a comfortable position with an epidural needle. The operator placed the epidural needle in the epidural space at or below the previous puncture level and collected 20 mL of fresh autogenous blood, which was then immediately injected steadily through the epidural needle until the patient reported full or discomfort in the back, hip, or neck. Pay attention to strict aseptic techniques during operation. Keeping the patient in the recumbent position for a period of 1-2 hours after the procedure may help resolve symptoms. An intravenous infusion of 1 L crystalloid during this period is also usually helpful. The use of over-the-counter analgesics such as acetaminophen or ibuprofen to relieve minor residual discomfort is encouraged when discharge orders are made. If necessary, add stool softeners or cough suppressants, and take care to avoid lifting weights, exertion, or air travel for 24 hours. And provide clear instructions on how to contact anesthetists for relief of inadequate or recurrent symptoms.

### 5.4. Complications of Epidural Blood Patch

Major complications include infection, reduced heart rate, back pain, intracranial venous thrombosis, acute blindness, and accidental injection of blood into the subarachnoid space [19].

### 5.5. Possible Differential Diagnosis

When the nature of the patient's headache changes, neurological signs develop, consciousness level decreases, or multiple epidural blood patches do not resolve, imaging tests are required to identify the following diseases: Cerebral hemorrhage/subdural hematoma, cerebral venous thrombosis, stroke, pituitary ischemia, intracranial tumor, meningitis, migraine, caffeine withdrawal pain, preeclampsia, spontaneous hypotensive pressure headache, hypovolemia, pneumothorax, lactation headache [17].

## 6. Conclusion

The prevalence of PDPH is now about 1 percent, as more and more researchers focus on it. But the severe headache makes the mother lose the ability to take care of the newborn and seriously affects the life of the mother and baby, so it still can not be ignored. However, supine rest and active fluid replacement were ineffective in the treatment of PDPH. Ultimately, the researchers found that epidural blood patches were a viable strategy for treating severe headaches after a rupture of the dura. It is hoped that through the management of this case, the occurrence of PDPH can be effectively avoided so that its impact on patients is less and less. At the same time, it is also hoped that operators will pay more attention to PDPH and jointly explore more patient-friendly methods while using existing technologies to reduce its impact on patients.

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