

## The incidence and management of ADP and PDPH post epidural insertion

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### Abstract

#### *Background*

Accidental Dural Puncture (ADP) is the unintentional rupture of the dura mater during an epidural catheter placement. Post dural puncture headache (PDPH) can cause considerable morbidity in the obstetric population. Depending on the severity of the headaches, the new mothers are unable to care for their newborn and may affect the activities of their daily living.

#### *Aim*

The aim of this retrospective study was to identify the incidence of ADP and PDPH post epidural placement in labouring women that eventually required an EBP (Epidural Blood Patch) at CUMH (Cork University Maternity Hospital). The study period was 6 months (between 1st July to 31st December 2023).

#### *Methods*

Cases of ADP and PDPH were identified retrospectively from a register used to record these cases. The obstetric data was retrieved using the patient's medical records on MN-CMS (The Maternal and Newborn Clinical Management System). The total number of women who received an epidural during the study period and the demographic data was gathered from the patients' medical records on MN-CMS. Analysis of this data was carried out using Microsoft Excel.

#### *Results*

1262 women received an epidural at Cork University Maternity Hospital between 1st July and 31st December 2023. There were 5 cases of ADP during epidural insertion, and this makes it

0.4% of the total epidurals performed in this period. Only two of these ADPs (40%) subsequently developed PDPH.

In total, we identified 11 cases of PDPH, 8 after epidural catheter insertion and 3 after spinal anaesthesia. Only patients post epidural catheter insertion were included in the study. Therefore, PDPH incidence post epidural insertion was 0.63% (8/1262). All PDPH cases received the first-line conservative management. Six patients out of these 8 (75%) women required an epidural blood patch and one (12.5%) required a repeat blood patch.

### *Discussion*

The incidence of ADP at CUMH is 0.4% and is within the quoted range in the literature (0.1 - 1.5%). The incidence of PDPH after observed ADP was 40%. 75% of patients required an EBP to treat the PDPH and 12.5% subsequently required a repeat EBP.

### **Introduction**

Accidental Dural Puncture (ADP) is the unintentional rupture of the dura mater during an epidural catheter placement. ADP complicates between 0.5% and 2.5% of epidurals.<sup>1</sup> Overall, the incidence of Post Dural Puncture Headache (PDPH) post ADP is 81%. During pregnancy, the rate of ADP is between 0.0 and 2.6%.<sup>2</sup> Once there is an ADP, the likelihood of developing PDPH is more than 50%.<sup>3</sup> However, as many as 26% of ADPs are unrecognised at the time of the epidural procedure and first present as PDPH in the early post-partum period.<sup>1</sup>

PDPH can cause considerable morbidity in the obstetric population. Depending on the severity of the headaches, the new mothers are unable to care for their newborn and may affect the activities of their daily living. Apart from the postural headaches, there are other symptoms that the new mothers can experience which include neck stiffness, tinnitus, hypoacusia, photophobia, dizziness, nausea and vomiting.

If PDPH is suspected in a patient, the patient should be actively followed-up and immediately the conservative treatment should be commenced. The patient should be followed-up until the symptoms are resolved. Delaying treatment is the strongest risk factor associated with a cranial subdural hematoma (SDH).<sup>4</sup> Conservative management of PDPH includes bed rest, adequate hydration, caffeine and analgesia such as paracetamol, NSAIDs and oxycodone. The conservative management is used to treat PDPH with the idea that the symptoms will be treated until the dural defect heals on its own.<sup>5</sup>

The objective of this study was to recognise the number of ADP and PDPH post epidural placement in labouring women that eventually required an EBP at CUMH (Cork University Maternity Hospital). This retrospective study was carried out between 1st July to 31st December 2023.

## Methods

This was a retrospective audit to identify the prevalence of ADP and PDPH post epidural catheter insertion that required an epidural blood patch (EBP) in Cork University Maternity Hospital, a tertiary hospital in Cork, Ireland.

The cases of accidental dural puncture and post-dural puncture headache at CUMH are recorded in an anaesthetic register once identified. ADP is diagnosed by observing free flow of CSF from the epidural needle or catheter or on aspiration of CSF. The patients who complain of a headache post-delivery are referred to the anaesthetic team and are followed up by an anaesthetist. These patients are followed up until the symptoms have resolved.

Diagnosis of PDPH is based on the International Headache Society criteria: headache occurring within 5 days of the epidural procedure. The headache is usually positional (worse when upright, better when lying flat) and is often accompanied by neck stiffness, photophobia, nausea, or subjective hearing symptoms.<sup>6</sup>

All cases of ADP and PDPH were identified in the 6-month (July 1<sup>st</sup> to December 31<sup>st</sup>, 2023) study period. Information about the ADP or PDPH was collected from the CUMH anaesthetic register. The total number of women who received an epidural during the study period and the demographic data was gathered from the patients' medical records on MN-CMS. The analysis of the collected data was performed on MicroSoft Excel.

## Results

As per the data in the MN-CMS, 1262 women received a labour epidural analgesia at Cork University Maternity Hospital between 1<sup>st</sup> July and 31<sup>st</sup> December 2023.

There were 5 cases of observed ADP during epidural catheter insertion, which makes it 0.4% of the total epidurals performed in this period. In 4 out of 5 ADPs, the catheter was intentionally placed in the intrathecal space. Only two of these five ADPs (40%) subsequently developed PDPH. The rest of the 3 patients were followed-up but did not develop PDPH or associated symptoms.

In total, there were 11 cases of PDPH that were identified, 8 were post epidural catheter insertion and three of these were after spinal anaesthesia. In this study, only the patients that had PDPH post epidural insertion were included. Therefore, PDPH incidence post epidural insertion of the total number of epidurals performed was 0.63% (8/1262). Six (75%) out of 8 PDPH patients developed PDPH without an observed ADP, while the overall incidence of unobserved ADP was 0.47% (6/1262). At our hospital, we routinely use Braun 18G Tuohy needle for all our epidurals.

Median age of the ADP/PDPH patients was 32 and 72.7 % of them were nulliparous. Most common mode of delivery for these patients was assisted vaginal delivery (63.6%), followed by caesarean section (27.3%) and spontaneous vaginal delivery was the least common (9%).

All PDPH cases post-epidural received the first-line conservative management – bed rest, fluids, caffeine, paracetamol, diclofenac and oxycodone. Six patients out of these 8 (75%) required an epidural blood patch (EBP) and 12.5% (1/8) required a repeat epidural blood patch.

At CUMH, the interval between the placement of the epidural catheter and the presentation of PDPH varied between less than one day up to a maximum of 5 days. The time between PDPH presentation and carrying out epidural blood patch ranged between 1 to 3 days. The one patient that required a repeat blood patch received the repeat EBP 3 days after the original EBP.

## Discussion

In this retrospective audit of obstetric anaesthesia in a tertiary hospital, the incidence of accidental dural puncture complicating epidural anaesthesia was 0.4%, which is within the quoted range in the literature.<sup>1,3,9</sup> The incidence of post-dural puncture headache after an observed ADP was 40%, which is below the quoted value in the literature.<sup>3</sup> PDPH following an unidentified ADP is 75%. Three out of 5 women (60%) who had had an observed ADP, displayed no signs of having acquired PDPH.

There continues to be a lack of consensus among anaesthesiologists regarding the management of a recognised accidental dural puncture. At CUMH, currently there are no guidelines in the event of an ADP. Some anaesthesiologists thread the catheter intrathecally once they recognise that they have punctured the dura (CSF in the needle or the epidural catheter) and provide analgesia intrathecally. Other anaesthesiologists, however, re-site another epidural in an adjacent lumbar space.

The most recent prospective, international, observational, cohort study called EPiMAP (European Practices in the Management of Accidental dural Puncture in Obstetrics) study where 158 centres from 27 countries participated. They identified that factors significantly related to physician choice for EBP included increasing intensity of PDPH after initial diagnosis (Numerical Rating Scale >7), use of a larger gauge epidural needle (<18G), headache presenting dominantly in the frontotemporal or neck region, multiparity, and the presence of auditory symptoms.<sup>7</sup>

There are certain risk factors that increase the likelihood of ADP: low BMI, multiple attempts at placing the epidural, patient movement, young maternal age, using air as a LOR technique, previous history of headaches and clinical experience of the operator.<sup>4,8</sup> PDPH is diagnosed when the patient meets the described diagnostic criteria. The headache itself is usually distributed in the frontal or occipital region which can radiate to the neck and shoulders. As the headache is of a postural character, it tends to get worse on standing or sitting but is relieved on lying down. The headaches are generally associated with other symptoms such as nausea & vomiting, dizziness, tinnitus, photophobia and hypoacusia.<sup>5</sup>

Severe post-dural puncture headaches which affect day to day living of the new mothers where conservative management has not been effective, epidural blood patch (EBP) is considered. EBP is considered the gold standard treatment for PDPH. EBP causes an immediate relief from headache from increased epidural pressure and CSF redistribution. A clot is formed at the puncture site which prevents the leaking of CSF.<sup>4</sup> There is no ideal volume of blood to be used for the EBP for individual patients. Blood is injected until the patient feels pressure or the volume of 20ml is reached. Six out of 8 patients had required an EBP at our institution. 5 of these patients found complete relief after the EBP, however, one of them required a repeat EBP.

There are some limitations to our study, because it was a retrospective study we could not identify the intensity of the level of the headache in all the patients. As there isn't a proforma within our institute to document the findings for a PDPH diagnosis, the intensity of the headache was not always documented.

There is a potential to re-audit with additional variables such as BMI, time of the epidural (working hours/out of hours), headache intensity prior to and after EBP and number of attempts by the operator. The aim would be to find out if any of these variables affect the incidence of ADP and PDPH.

**Declarations of Conflicts of Interest:**

None declared.

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