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## CONTROVERSY

# All patients with a postdural puncture headache should receive an epidural blood patch

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### ABSTRACT

Postdural puncture headache (PDPH) is an important complication of obstetric epidural anaesthesia and analgesia. Though often self-limiting, PDPH is unpleasant, at times incapacitating, and associated with complications, some of which are serious. Despite this, treatment options are few and of limited efficacy. The epidural blood patch (EBP) has been used for PDPH treatment for over 50 years.<sup>1</sup> It is probably the most efficacious of therapies, although this is unproven, and plays an important part in the management of this condition.<sup>2</sup> However, PDPH is often complex, of variable severity and duration, and merits a cautious and individualized approach to its diagnosis and treatment. An EBP may be part of that treatment but administering it to all women with PDPH is not the optimal management approach.

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### Evidence supporting epidural blood patch

The scientific literature regarding PDPH and EBP is limited.<sup>2</sup> The few randomized controlled trials that do exist are underpowered for some important outcomes and largely unblinded. Consequently, evidence supporting the efficacy of EBP for PDPH is scarce, and the optimal techniques for performing an EBP remain largely unknown.

Our knowledge and beliefs are also influenced by our own practice because most obstetric anaesthetists perform EBPs from time to time. We may think we perform many, but our own individual experience is likely to be less than we think. To illustrate this, within the author's own institution in which over 4000 women deliver each year, only 50 EBPs have been performed (by several obstetric anaesthetists) over the last 20 years as part of the management of 144 PDPHs. Undoubtedly, many units will have greater numbers (and some fewer) but even in maternity units that perform double or triple this number of EBPs, individuals' experience of the technique is unlikely to be great.

A compelling reason why all women with PDPH should *not* receive an EBP relates to the natural history

of the condition. Many will be familiar with Dr August Bier's experiments at the end of the 19th century in which he and his assistant, as part of their investigation into the effects of spinal anaesthesia, performed some of the experiments on themselves.<sup>3</sup> Bier's fascinating account of these early experiments in spinal anaesthesia includes a first-hand description of a PDPH.

*"I went to bed at 11p.m., slept the whole night, awoke the next morning hale and hearty and went for an hour's walk. Towards the end of the walk I developed a slight headache which gradually got worse as I went about my daily business. In addition, I had a feeling of very strong pressure on my skull and became rather dizzy when I stood up rapidly from my chair. All these symptoms vanished at once when I lay down flat, but returned when I stood up. Towards the end of the evening I was forced to take to bed and remained there for nine days because all the manifestations recurred as soon as I got up. The symptoms finally resolved nine days after the lumbar puncture."<sup>3,4</sup>*

In this brief account, Bier concisely describes what many would consider classic manifestations of a PDPH; the headache presented some time after the dural puncture, it was both severe and positional but resolved with time. PDPH is unpleasant, at times incapacitating and in the obstetric population tends to occur at the most inconvenient of times. However in the majority of cases, just as in the case of Bier over 100 years ago, it resolves without intervention.

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## Complications of dural puncture headache

But is there a risk of more serious harm if the headache is not treated with an EBP? Adverse outcomes have been reported in women with PDPH, including cranial nerve palsies, chronic headache, back pain and subdural haematoma.<sup>5-7</sup> Of these, it is the latter that deserves the closest attention. It has been postulated that leakage of fluid from a punctured dura reduces cerebrospinal fluid volume leading to a fall in intracranial pressure. As a consequence, downward traction of the brain may rupture cerebral bridging veins and a subdural haematoma may form.<sup>7</sup> The true incidence of subdural haematoma following dural puncture is unknown. A review of the literature in 2006 described 47 patients with a PDPH complicated by a subdural haematoma following spinal (26 cases) and epidural (21 cases, 19 of which were obstetric) anaesthesia.<sup>6</sup> It is clear from this and other case reports, that PDPH associated subdural haematoma may cause significant morbidity and in some cases may be fatal.<sup>6,8</sup>

This begs an important question – is the risk of subdural haematoma increased if a PDPH is *not* treated with an EBP? Some have suggested this to be so but there are no studies that answer this question.<sup>9,10</sup> However, it is clear from case reports that presentation and diagnosis of PDPH associated subdural haematoma is variable (from hours to several weeks after dural puncture) and symptoms not typically associated with PDPH, including persistent non-postural headache and vomiting, are often present.<sup>6</sup> In some cases, subdural haematoma may present in women already treated with an EBP,<sup>11,12</sup> but whether an EBP reduces the risk of subdural haematoma in PDPH is unknown. Clearly, awareness that dural puncture may be complicated by subdural haematoma is essential and those managing women with a PDPH should be vigilant and suspicious of atypical symptoms and signs that may indicate this damaging complication.

It has been known for some time that PDPH may be complicated by chronic headache.<sup>13</sup> However, the magnitude of this complication has only recently been established.<sup>5</sup> In a case control study design, Webb et al. investigated 40 women who sustained unintentional dural puncture with a 17-gauge Tuohy needle and 40 controls.<sup>5</sup> Twelve to 24 months after delivery, the incidence of chronic headache in the study group (28%) was significantly higher than in matched controls (5%), but there was no significant reduction in chronic headache incidence in those who received an EBP as part of their PDPH treatment. These findings provide further evidence that PDPH is associated with important adverse outcomes, but whether the incidence of these can be reduced by an EBP is unknown.

## Efficacy of epidural blood patch

The reported efficacy of an EBP in terms of permanent PDPH cure has varied over time with emergence of a somewhat disappointing downward trend. In the first report by Gormley, a general surgeon from Pennsylvania, EBP treatment of seven cases of post-spinal headache, “promptly and permanently cured” each patient – a success rate of 100%.<sup>1</sup> DiGiovanni developed the EBP technique using larger volumes of autologous blood and reported a success rate in excess of 95% in over 200 patients with PDPH treated with an EBP.<sup>14</sup> Ostheimer et al. published a prospective study of the effectiveness and safety of EBP for PDPH in the obstetric population in 1974 and found PDPH was “completely and permanently relieved” in 98% of 185 patients.<sup>15</sup> Move forward 30 years and permanent rates of PDPH cure with an EBP are noticeably less enthusiastic. In a prospective audit of unintentional dural puncture in 100 obstetric patients, the incidence of complete headache relief with one EBP or more was 50%.<sup>16</sup> More recently, a multinational, randomised blinded trial of different volumes of autologous blood for EBP treatment of PDPH secondary to unintentional dural puncture, reported an even lower incidence of permanent success.<sup>17</sup> In this study of 121 EBPs, permanent headache relief occurred in 4 (10%), 13 (32%) and 10 (26%) women treated with a 15 mL, 20 mL or 30 mL EBP respectively. Overall, permanent cure across the three groups was just 22%.<sup>17</sup>

So why the dramatic fall in reported efficacy of an EBP over time? A number of biases and confounding factors are no doubt at play in older studies of PDPH. Many of these studies investigated PDPH that occurred following dural puncture with needles of different gauge and tip design, in a variety of patient groups, both obstetric and non-obstetric, undergoing a range of procedures. Furthermore, exaggerated positive outcomes were no doubt a consequence of observer bias, limited patient assessment and inadequate follow-up. More recent studies that have focused purely on PDPH following unintentional dural puncture in the obstetric population appear to demonstrate a hidden truth. While initial resolution of a PDPH is common following EBP, permanent cure is less so because the headache commonly recurs.<sup>16,17</sup>

The efficacy of an EBP is influenced by its timing in relation to the initial dural puncture. Several studies demonstrate improved outcomes (primarily reduced headache recurrence) if the EBP is delayed.<sup>16-19</sup> In delaying treatment, some patients with PDPH will avoid undergoing an EBP at all since the headache will resolve spontaneously. In an observational study, the incidence of EBP failure was significantly greater if performed within 48 h of dural puncture.<sup>16</sup> Performing an EBP within four days of dural puncture has been shown to

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