The Effect of Postoperative Position on the Incidence of Postdural Puncture Headache after Cesarean Section

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Abstract
Objective: The purpose of this study was to study the effect of postoperative position on the incidence of the postdural puncture headache.

Study design: An observational study was conducted on 300 patients scheduled to undergo elective cesarean section under spinal anesthesia.

Setting: Departments of Anesthesiology and Obstetric & Gynecology, Assiut University Hospital, Assiut, Egypt.

Subjects: Three hundreds women (ASA I-II) scheduled for elective cesarean section under spinal anesthesia were included in the present work.

Interventions: Patients were classified into two groups (according to the postoperative position in the first postoperative day), group I (n=150) flat position (Recumbent) for 24 h, and group II (n=150) head-up position and allowed to ambulate early (Ambulant). The incidence, severity, and duration of postdural puncture headache were recorded.

Results: There were no significant differences between both groups in the incidence, severity, and duration of postdural puncture headache.

Conclusions: This study concluded that the strict flat position immediately postoperative, may be of no effect on the incidence and characteristics of postdural puncture headache. The prevalence and characteristics of PDPH were not different between the 6 hour-recumbence and early ambulation groups.

Key Words: Spinal anesthesia – Incidence of postdural puncture headache – Cesarean section.

Introduction
SPINAL anesthesia is often the preferred technique of anesthesia for cesarean delivery [1]. Spinal anesthesia developed in the late 1800s. More than 100 years have passed since the initial description of the postdural puncture headache (PDPH). However, this unique clinical entity still continues to fascinate anesthesiologists, and numerous studies on its pathophysiology, prevention, and treatment, have been published. Using himself as subject, Bier demonstrated spinal anesthesia (with subarachnoid injection of cocaine) one day, and spinal headache known today as PDPH the following morning. Bier surmised that the headache was attributed to loss of cerebrospinal fluid (CSF). By the early 1900s, there were numerous reports in the medical literature of the application of spinal anesthesia with large gauge needles, with the average incidence of PDPH exceeding 50% of subjects [2,3]. In 1951 Whitacre developed the pencil-point needle, which led to a significant reduction in the incidence of PDPH [4]. However, PDPH still remains a disabling complication of needle insertion into the subarachnoid space [2].

Consequences of dural puncture: Puncture of the dura has the potential to allow the development of excessive leakage of CSF. Excess loss of CSF leads to intracranial hypotension and a demonstrable reduction in CSF volume [3]. The adult subarachnoid pressure of 5-15cm H2O may be reduced to 4cm H2O or less. The rate of CSF loss through the dural hole is generally greater than the rate of CSF production, particularly with needle sizes greater than 25GA. The sudden decrease in the CSF volume may also activate adenosine receptors, thus producing arterial and venous vasodilatation and subsequently clinical symptoms of PDPH [2]. There is considerable variability in the incidence of PDPH, which is affected by many factors such as age, gender, pregnancy, low body mass index and needle type and size [9]. In 1899, following his experiments with spinal anesthesia, Bier reported the PLPHA of himself and his associate. His
recommendation for prevention, strict bed rest, is still advised by many physicians today [6].

Patients and Methods

After obtaining approval from our Institutional Ethics Committee and informed consent, an observational study was completed on three hundreds female patients (from October 2004 to March 2006), ASA physical status I and II, who underwent elective cesarean section under spinal anesthesia.

Exclusion criteria: Patient refusal, coagulopathy, known hypersensitivity to the used drugs, previous history of recurrent headache or migraine, patients with hypertension, previous history of PDPH, and difficult LP. On arrival in the operating theatre, IV access was secured and standard monitoring, comprising non-invasive blood pressure cycled at 2 min for 15 min, then at 5 min, electrocardiogram and pulse oximetry, was attached. After an IV preload of 20 ml kg⁻¹ of lactated Ringer’s solution, spinal anesthesia was performed by a senior anesthesiologist in the sitting position with a 25-gauge Quincke needle (KBM-SPINAL NEEDLE) at the L2-3 or L3-4 interspace (paramedian approach). The needle was introduced and withdrawn with its bevel facing parallel to the direction of the dural fibers, and 8-12 mg hyperbaric 0.5% bupivacaine plus 25 µg fentanyl were injected intrathecally. Supplemental oxygen given by face mask to all patients. The patient was then turned supine with left lateral tilt of the operating table, and prepared for surgery after checking that the level of the block was adequate. Hypotension (20% decrease in MAP) was treated with IV ephedrine 6 mg increments. All procedures were closely supervised by a staff anesthesiologist. Patients were classified into two groups according to the predominant maintained postoperative position during the first 24 hours, group I, flat position, the patients asked to strictly maintain, as possible as they can, the flat or plain (Recumbent) position for 24 hours, and group II, head-up position, the patients maintained in head-up position and asked to ambulate early (Ambulant). Postoperatively, all patients in the study were followed by residents or staff physicians and were questioned for the presence of a headache and any accompanying symptoms such as nausea, vomiting, blurred vision, and tinnitus. The incidence and severity of post-spinal headache were assessed in each patient at 1 st, 2 nd, and 3 rd postoperative days.

A PDPH was defined as an occipital or frontal headache brought on by the erect posture and relieved when the supine posture was assumed. When a patient complained of an occipital or frontal headache, she was monitored daily until she was discharged from the hospital. All patients received a telephone call 1 wk later (if possible), or followed in the outpatient clinics to evaluate for any signs or symptoms of a delayed-onset headache. Patients with a headache were evaluated for the onset, duration, and severity of the headache and their response to treatment.

The severity of PDPH was categorized as follows: Mild PDPH resulted in a slight restriction of their physical activity. These patients were not confined to bed and had no associated symptoms. Moderate PDPH forced the patient to stay in bed for part of the day, and resulted in restricted physical activity. Associated symptoms were not necessarily present. Severe PDPH Patients were bedridden for the entire day and made no attempt to raise their head or to stand. Associated symptoms were always present. The PDPH was initially treated conservatively with bed rest, hydration, oral analgesics, and oral caffeine.

Data analysis: All statistical analyses were carried out using SPSS statistical package (SPSS 10.0 for Windows); non-parametric data (severity of headache) compared using Chi-Square test, and other data compared using Paired-Sample t-test, using Mean ± Standard deviation (Mean ± SD). p<0.05 was regarded as statistically significant.

Results

There were no statistical differences observed among the two groups regarding preoperative characteristics; maternal age, gestational age, weight, and height (Table 1).

<table>
<thead>
<tr>
<th>Variable</th>
<th>Group I (n=150)</th>
<th>Group II (n=150)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>28.10 ±5.79</td>
<td>27.35 ±5.50</td>
<td>0.109 NS</td>
</tr>
<tr>
<td>Gestational age</td>
<td>38.00 ±1.19</td>
<td>38.12 ±1.21</td>
<td>0.086 NS</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>78.57 ±11.32</td>
<td>77.89 ±10.52</td>
<td>0.21 NS</td>
</tr>
<tr>
<td>Height (cm)</td>
<td>163.19 ±6.95</td>
<td>162.17 ±6.43</td>
<td>0.19 NS</td>
</tr>
</tbody>
</table>

NS = Insignificant.

Postdural puncture headache occurred in 9 cases (6.0%) in group I (Recumbent), while in group II (Ambulant) occurred in 10 cases (6.66%), and there was no statistically significant difference between both groups (p-value = 0.423). The onset of PDPH is shown in Table (2). The duration of PDPH varies in group I between one day to 6 days (1 case for 1 day, 3 cases for 2 days, 3 cases for 3
days, one case for 4 days, and one case for 6 days), while in group II, the duration varies between one day to 7 days (1 case for 1 day, 3 cases for 2 days, 3 cases for 3 days, one case for 4 days, one case for 5 days, and one case for 7 days). Most of the cases of PDPH were mild (4 in group I, and 5 in group II) and moderate (4 in each group), and only one case in each group was severe type of PDPH (Table 3).

Table (2): PDPH incidence & characteristics.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Group I (n=150)</th>
<th>Group II (n=150)</th>
<th>Sign. (p-value)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of PDPH</td>
<td>(3.0±1.73)</td>
<td>(3.33±2.08)</td>
<td>0.423 NS</td>
</tr>
<tr>
<td>Onset:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1st 24 h</td>
<td>2</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>2nd 24 h</td>
<td>5</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>3rd 24 h</td>
<td>2</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Duration</td>
<td>1-6</td>
<td>1-7</td>
<td></td>
</tr>
</tbody>
</table>

NS = Insignificant.

Table (3): Severity of headache.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Group I (n=150)</th>
<th>Group II (n=150)</th>
<th>Chi-square test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Severity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mild</td>
<td>4</td>
<td>5</td>
<td>1.00 NS</td>
</tr>
<tr>
<td>Moderate</td>
<td>4</td>
<td>4</td>
<td>0.50 NS</td>
</tr>
<tr>
<td>Sever</td>
<td>1</td>
<td>1</td>
<td>0.50 NS</td>
</tr>
</tbody>
</table>

NS = Insignificant.

In order to determine the influence of early ambulation on headaches occurring after spinal anesthesia we randomized 300 female patients into two groups. Following cesarean section, we allowed the 150 patients in group A to sit or stand freely, while we confined the 150 patients in group B to bed for 24 hours.

This study shows that, there was no statistically significant difference in incidence and characteristics (onset, duration and severity) of PDPH between the two groups. The overall incidence was 6.33% (19 cases), 9 cases (6.0%) in group I and 10 cases (6.66%) in group II. All the cases of PDPH occurred in the first 3 days, mainly in the second day (66.6% of the cases of PDPH in group I, and 60% in group II). There were 2 cases started in the first day in group I, versus 4 cases in group II. All the cases of PDPH, in this study, resolved by conservative treatment within one week in both groups. Most of the cases were mild to moderate types of headache (89% of the cases). The two patients suffered from the sever form of headache refused epidural blood patch and treated conservatively, and both resolved in the 6th day. The incidence and clinical characteristics of PDPH in the present study were nearly similar to other studies. The actual frequencies in individual series ranged from 0 to 18%, and 6.2% for obstetric spinal anesthesia, in reports in which patients received special measures to prevent PDPHA [9].

In their meta analysis of obstetrical studies, Choi et al., 2003 [8], collected data and provided numerical estimates of PDPH rates for different needle shapes and sizes in the obstetrical population. They also summarized the data on onset and duration of PDPH. They found that, the incidence of PDPH after spinal anesthesia with 25 gauge Quincke spinal needle in cesarean delivery was 6.3%. The incidence of PDPH in the study of Hwang JJ, et al. (1997) in the 25 gauge Quincke group during cesarean delivery was 3.65% [10]. Devvic et al. (1993), compared the incidence of PDPH with two spinal needles of different size and design on patients underwent cesarean delivery, and 7.1% in the 25 gauge Quincke group developed PDPH11. On the other hand, the incidence of PDPH in the study of Buettner J, et al. (1993) which carried out on 400 patients who received spinal anesthesia via 25-gauge Quincke needle for operations of the lower extremities, was 8.5% [12]. In their study on orthopedic and urologic operations, Tarkkila and his colleagues, found that the incidence of PDPH after spinal anesthesia with 25-gauge Quincke needle was 4.5% [13].

Discussion

Postdural puncture headache (PDPH) is an iatrogenic complication of neuraxial anesthesia and results from the puncture of the dura mater. As female sex and young age are purported risk factors, the complication is common in the obstetrical population, who frequently receives epidural or spinal analgesia and anesthesia during labor and delivery [5]. The International Headache Society classified it as one that occurs or worsens less than 15 minutes after assuming the upright position and disappears or improves less than 30 minutes after resuming the recumbent position [6]. It has been suggested that such headaches may be less common if patients routinely have a period of bed rest or receive supplementary fluids after the procedure [7]. Recommendations in medical textbooks concerning bed rest after lumbar puncture to prevent PDPH vary between immediate mobilization and 24 hours bed rest [8].
Our observations on the onset and duration of PDPH are consistent with previous reviews. Although female sex and young age may be risk factors for development of PDPH, they are unlikely to affect the onset or duration of the complication. The size of the needle may also influence the onset and duration of PDPH.

PDPH usually starts within 48 hours after lumbar puncture, and the median duration of the headache is 5 days [14]. In their retrospective study, L’ubusk’y M., et al., found that the onset of symptoms of PDPH occurred after 24 to 65 hours after caesarean sections performed under spinal anesthesia [15]. Fauzia B., et al., compared the frequency and characteristics of PDPH after spinal anesthesia in obstetric patients using 25-gauge Quincke and 25-gauge Whitacre needles, and they found that, most of PDPH developed on 2nd postoperative day, were mild in nature and resolved within 48 hours of their onset [16]. Choi. et al., said that, in general, the onset of PDPH will occur within the first seven days after a DP and lasts up to seven days [8]. Similarly, Turnbull DK, et al., found that, ninety per cent of headaches will occur within 3 days of the procedure, rarely the headache develops between 5 and 14 days after the procedure, and most of the cases resolved within 7 days. In the majority of cases, the problem will resolve spontaneously [3]. Douglas, et al., found that, the PDPH in obstetric anesthesia by 25-gauge Whitacre needle, typically presented on day 2 (range 1-4) [17]. The severity of headache was mild and moderate in 90% cases [18].

In diagnostic lumbar puncture, the onset of PDPH started at 6 hours through the 4th days after LP (mean 1.5 days). The duration of PDPH ranged between 12 hours and 7 days. Mean duration of PDPH was 4 days. The most common peak severity was on the 2nd postoperative day [19].

Headache rarely manifests immediately following dural puncture, but instead presents 15 to 48 hours later. The vast majority of PDPH, especially following small-gauge needle puncture, resolves spontaneously within 2 to 5 days. It is important to recognize the tendency of PDPH to resolve spontaneously, as this affects the interpretation of treatment studies [20].

AS early as 1985, Dieterich M., and Brandt T, suggested that, there is no longer any justification for requiring patients to remain in bed after spinal anesthesia, and PDPH was found to be independent of the post operative posture [21]. The first systematic examination of recumbency following dural puncture in eighty obstetric patients receiving subarachnoid anesthesia, there was a significantly greater incidence of severe PDPH in the “24h bed-rest” group than in the 6h group [22]. There are several practices that traditionally had been thought to reduce the occurrence of PLPH but have been shown to be ineffective. Specifically, prolonged bed rest in the recumbent position following a lumbar puncture has been used to prevent PLPH. However, multiple studies have suggested that there is no benefit from this practice [14].

The duration of recumbence after LP was not related to PDPH pathophysiology (dural tearing and further CSF leakage), so different duration might not influence prevalence and severity of PDPH.

Several previous studies confirmed that duration and posture of recumbence after LP did not influence PDPH. Early ambulation did not increase the prevalence of PDPH, and the duration of recumbence also did not relate to 'severe' PDPH [19]. There is no clinical evidence to support the maintenance of the supine position before or after the onset of the headache as a means of treatment [3].

Thoennissen et al performed a systematic literature review and meta-analysis of randomized controlled trials to assess whether longer bed rest is better than immediate mobilization or short bed rest in preventing headache. They found no evidence that longer bed rest after cervical or lumbar puncture was better than immediate mobilization or short bed rest in reducing the incidence of headache after diagnostic puncture, myelography or spinal anesthesia. At worst, bed rest may even cause headache in particular patient groups. In a trial involving patients who received spinal anesthesia and in another involving patients who underwent puncture for myelography, headache occurred more frequently in those with long bed rest than in those with short or no bed rest [23]. There is no evidence that the duration of recumbency after the LP has a role in preventing PDPH. Class I evidence shows no benefit for prevention of PDPH by bed rest for up to 24 hours in the supine, prone, or head down position. Two studies showed a mildly increased frequency of PDPH in recumbent patients as compared with patients immediately mobilized [6].

On the other hand, Vanzetta, and Mezoon, in their survey to describe the patients’ care after lumbar puncture stated that, Although there is no evidence for the use of increased fluids or bed rest to prevent post dural puncture headache, these and
other non evidence based practices continue to be used. Further research is warranted on strategies to implement an evidence based patients, care [24].

Conclusions:
This study concluded that the strict flat position immediately postoperative, may be of no effect on the incidence and characteristics of post-dural puncture headache. The prevalence and characteristics of PDPH were not different between the 6 hour-recumbence and early ambulation groups.

Despite the respective limitations of this study, on the whole, our findings support the fact that the incidence and characteristics of post-dural puncture headache is not affected by the postoperative position of the patients.

References