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Original Research Article

Randomized Controlled Trial Examining the Impact of Intrathecal Fentanyl on Postdural Puncture Headache in Parturients Following Caesarean Section

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Abstract:

Background and Aim: The precise cause of postpartum haemorrhage (PDPH) is still unknown, although other potential causes include unintentional intradural puncture and CSF leak, dehydration during labour, and abrupt changes in blood volume after delivery. Patients undergoing CS under SA may have a decrease in the frequency, severity, and/or duration of post-disposition haemorrhage (PDPH) if intrathecal (IT) fentanyl is added to the local anesthetic.

Material and Methods: For the study, 500 individuals with ASA grade I or II who had elective or emergency caesarean sections between the ages of 18 and 40 were chosen. Using a random number table, the chosen participants were split into two groups at random (n = 250 in each group). Those in Group B received bupivacaine 2ml only, while those in Group A received bupivacaine 2ml + fentanyl 0.5 ml (25 µg). Following surgery, all parturients were monitored in the ward for three days, and on the fourteenth day, they were called to inquire about any headaches or other concerns. When a patient reported having a headache, the following details were noted: the time of start, characteristics, length, intensity, aggravating and relieving factors, and any other symptoms like vertigo, backache, nausea, vomiting, or pruritis. The intensity of the headache was measured using a visual analogue scale score (VAS).

Results: Compared to the B group, the A group's surgical anaesthesia significantly improved ($P < 0.01$). Group A experienced effective analgesia for a longer period of time than group B ($P < 0.001$). In groups B and A, PDPH developed in 19.8% and 12.8% of parturients, respectively. The difference was not significant in terms of statistics.

Conclusion: Addition of IT fentanyl to bupivacaine for SA in obstetric patients reduced the severity and duration of headache in the affected mothers, and they were satisfied with their postpartum recovery.

Key Words: Bupivacaine, Caesarean Section, Intrathecal Fentanyl, Postdural Puncture Headache

Introduction

For Caeserean sections (CS), spinal anaesthesia (SA) is the recommended anaesthetic method since it has advantages over epidural or general anaesthesia (GA). It results in a quick onset of anaesthesia, total muscle relaxation, and is inexpensive and easy to perform. But unintended consequences might result from it. A common issue that arises in parturients after sutures is post-dural puncture headache (PDPH). The symptoms of PDPH might severely limit everyday activities, yet they are not life-threatening. [1,2]

The most upsetting consequence, PDPH, is clinically characterized by frontal and occipital headache. The obstetric population is the one who has PDPH the most frequently; this could be because pregnancy raises intraabdominal pressure, which changes CSF pressure. The precise cause of postpartum haemorrhage (PDPH) is still unknown, although other potential causes include unintentional intradural puncture and CSF leak, dehydration during labour, and abrupt changes in blood volume after delivery. [3,4]

A major side effect of neuraxial blockade that can occur following spinal anaesthesia or epidural analgesia following an unintentional dural puncture is post-dural puncture headache (PDPH). In 1899,

PDPH was initially described. Prior research revealed that the incidence of PDPH varied widely, from 1.5% to 36% following spinal anaesthesia. A recent meta-analysis found that among 175,652 parturients who had spinal anaesthesia during a Caesarean procedure, the incidence of postpartum haemorrhage (PDPH) was 23.47%. [5-7]

According to Martlew's 9-year prospective audit, spinal opioids may be able to prevent post-stroke haemorrhage. Given this context, we postulated that patients undergoing CS under SA may have a decrease in the frequency, severity, and/or duration of post-disposition haemorrhage (PDPH) if intrathecal (IT) fentanyl is added to the local anaesthetic. [8] Therefore, in situations where resources are scarce, it may be a more affordable option than the pricey pencil-point needles. The incidence of PDPH was designated as the primary outcome, and the two groups' respective PDPH duration and severity were designated as the secondary outcomes.

Materials and Methods

The current investigation was carried out at the Medical College's and its affiliated hospital's department of anesthesiology and pain management. The Institutional Scientific and Ethics Committee approved the study after being notified and the trial was completed. The current investigation was a double-blind, randomised trial.

For the study, 500 individuals with ASA grades I or II who had elective or emergency caesarean sections between the ages of 18 and 40 were chosen. Using a random number table, the chosen participants were split into two groups at random (n = 250 in each group). Those in Group B received bupivacaine 2ml only, while those in Group A received bupivacaine 2ml + fentanyl 0.5 ml (25 µg).

Patients with a history of pregnancy-induced hypertension, eclampsia, neurological deficit, migraine or other headaches, altered spine anatomy (scoliosis, lordosis), BMI greater than 35, or requiring more than one attempt at SAB were not allowed to participate in the study. The study comprised patients who had completed a comprehensive pre-anesthetic examination and those who gave written informed consent.

SpO2 and hemodynamics were tracked during the process. All of the patients received IV metoclopramide (10 mg) as premedication and were hydrated with 10 ml/kg RL after an 18G cannula was used to secure the IV line. SAB was carried out at the L3-L4 interspace using a midline approach while the patient was seated. After administering the medication, a 25 gauge Quincke spinal needle was used for SAB, with the needle bevel placed laterally, and the stylet withdrawn in situ.

Following surgery, all parturients were monitored in the ward for three days, and on the fourteenth day, they were called to inquire about any headaches or other concerns. When a patient reported having a headache, the following details were noted: the time of start, characteristics, length, intensity, aggravating and relieving factors, and any other symptoms like vertigo, backache, nausea, vomiting, or pruritis. The intensity of the headache was measured using a visual analogue scale score (VAS). PDPH was treated with 500 mg of paracetamol, coffee, and adequate hydration.

The level of surgical anaesthesia was rated as "excellent" if patients had no complaints, "good" if complaints of pain were present but could be resolved with modest IV opioid doses, and "poor" if multiple doses of opioids, other medications, or rescue general anaesthesia (GA) were required.

An anesthetist who was not aware of the anesthetic drugs used called each patient on the seventh postoperative day to inquire about headache occurrences. After a week, they were called to assess if they had any delayed-onset headache symptoms. Within five days following LP, a postural headache was characterized as PDPH if it was accompanied by at least one accompanying symptom, such as nausea, photophobia, hypoacusis, tinnitus, or stiff neck, and it was worse while in an upright position and better when in a supine position. Statistical Package for the Social Sciences (SPSS) software version 25 was used to code, tabulate, and statistically analyse the obtained data.

Results

A total of 500 pregnant individuals were included in the current study so that data could be analysed. In both groups, the number of participants was equal. Age, weight, height, body mass index (BMI), ASA grade, and technique for SA (midline vs. paramedian) were similar for both groups. The number of tries required for successful LP did not significantly differ between the two groups.

The groups' baseline values for the three hemodynamic parameters—HR, SBP, and DBP—were similar. After five minutes of anesthetic induction, HR values in both groups considerably increased in comparison to baseline values. At three minutes after induction, SBP and DBP in both groups dramatically dropped from baseline levels. At no time during the procedure were there any appreciable variations in SpO2 across the groups or within the same group. In neither group did any individual experience respiratory depression.

Compared to the B group, the A group's surgical anaesthesia significantly improved ($P < 0.01$). Group A experienced effective analgesia for a longer period of time than group B ($P < 0.001$).

In group B, postoperative nausea and vomiting was the most frequent maternal side event (19.8%).

Pruritus was group A's most common adverse effect, occurring 36.7% of the time. In both groups, there were comparable adverse occurrences. At one and five minutes after delivery, there was no discernible difference in the infant Apgar score between the two groups.

In groups B and A, PDPH developed in 19.8% and 12.8% of parturients, respectively. The difference was not significant in terms of statistics. Pregabalin pills, bed rest, water, and basic analgesics were the conservative methods used to treat the parturients who reported PDPH. There were notable differences in the two groups' PDPH duration and severity. When compared to group BF, the B group experienced a longer-lasting and more severe case of PDPH, as evidenced by a higher VRS. Both groups experienced comparable related symptoms, such as nausea, vomiting, and stiff neck.

Table 1: Demographic analysis of the patients

Variable	Group A	Group B
Age	23.04 ± 1.60	23.08 ± 2.02
Height	150.05 ± 1.74	150.57 ± 3.40
Weight	50.07 ± 4.30	50.30 ± 3.02

Table 2: Post Dural Puncture Headache

PDPH	Group A	Group B
Mild (VAS < 3)	2	6
Moderate (VAS 4 – 7)	0	4
Severe (VAS > 7)	0	0
Frontal	2	6
Generalized	0	4
Dull aching	2	10
Throbbing	0	0

Discussion

General anaesthesia and regional anaesthesia are the two main types of anaesthesia used for caesarean sections. Regional anaesthesia is currently far more popular than general anaesthesia because of its ability to lower the dangers of aspiration pneumonia and foetal suppression brought on by the systemic administration of anaesthetics. [8,9] Out of the regional anaesthesia techniques, spinal block is used in clinical practise more often than epidural block because it uses a small dosage of local anaesthetics, is faster to induce anaesthesia, works well for intra-operative analgesia, and excels in muscle relaxation. However, spinal block also has drawbacks, including the inability to precisely manage the depth of anaesthesia and the prevalence of hypotension and post-dural puncture headaches (PDPH). [10]

One of the most excruciating side effects of neuraxial anaesthesia is post-stroke pain. A greater chance of postpartum haemorrhage (PDPH) is associated with the extensive use of neuraxial anaesthesia. Furthermore, it is thought that pregnancy, young age, and female sex are unchangeable risk factors for post-spinal headache. [11]

After SAB, neuraxial opioid use has been shown to lower the risk of post-stroke PDPH. Intrathecal morphine has been the most often utilised method of PDPH prophylaxis during caesarean sections. Because morphine was not readily available, intrathecal fentanyl was administered at our institute. Even yet, there aren't many research in the literature that show how intrathecal fentanyl works to prevent postpartum haemorrhage during caesarean sections. When used with local anaesthetics, opioids enhance the block's quality and lessen the postoperative requirement for systemic opioids.

In our investigation, the incidence of PDPH was statistically not significant lower in the fentanyl group than in the control group. Previous studies have shown comparable outcomes, with the addition of opioids to local anaesthetics reducing the length and intensity of post-traumatic pressure headaches (PDPH) but not the incidence of the condition.

Conclusion

We concluded that the addition of IT fentanyl to bupivacaine for SA in obstetric patients reduced the severity and duration of headache in the affected mothers, and they were satisfied with their postpartum recovery. Although an overall protective effect of opioids was not observed in this study, its role as prophylaxis of PDPH remains to be investigated.

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