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A Comparison of Incidence of the Postdural Puncture Headache and Low Back Pain in the Cesarean Section Patients Undergoing Spinal Anesthesia and General Anesthesia: A Randomized Clinical Trial Study

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Abstract: Post Dural Puncture Headache (PDPHA) and Low Back Pain (LBP) are possible complications in patients undergoing cesarean section by spinal anesthesia, but yet, headache and LBP may occur in patientsundergoing general anesthesia. In this study, 250 patients were randomized into 2 groups to receive either general anesthesia (Group G, n = 125) or spinal anesthesia using 25 G needle (Group S, n = 125). Patients were asked about the incidence of headache or back pain during 24, 48 h and 30 days (by telephone) post of surgery. The incidence of pain was evaluated by a yes or no survey. Bilateral frontal or occipital pain increased on upright position was considered as a PDPHA. Patients characteristics, perioperative fluid administration, 48 h post operative morphine consumption and the duration of surgery was similar in both groups. There were no significant differences, in the incidence of PDPHA or LBP after 24 h, 48 h and 30 days in groups. Spinal anesthesia using 25 G spinal needle and suitable technique was not associated with increasing risk of PDPHA or persistent LBP after cesarean section in comparison with general anesthesia.

Key words: Spinal anesthesia, postdural puncture head ache, low back pain general anesthesia

INTRODUCTION

Post Dural Puncture Headache (PDPHA) and Low Back Pain (LBP) are possible complications of patients undergoing cesarean section in spinal anesthesia (Candido and Stevens, 2003; L'ubuský *et al*., 2004; Movafegh *et al*., 2007). The incidence of PDPHA following spinal anesthesia has been reported to vary from 0.2-24% (Halpern and Preston, 1994). PDPHA is more frequently noted in pregnant women receiving spinal anesthesia. Although, the highest incidence of PDPHA may occur in obstetric patients, as many as 40% of parturients, who has never received any neuroaxial anesthesia whatsoever complain of headache in the peripartum period (Ostman, 1993). On the other hand, LBP is prevalent during pregnancy and also post-partum period. The etiology is poorly understood. Some reports show that spinal anesthesia is not associated with increased risk of LBP (Morgen, 2007).

The aim of present study, is to compare the incidence of PDPHA and LBP after general and spinal anesthesia in women undergoing cesarean section.

MATERIALS AND METHODS

The protocol was approved by the Institutional Ethics Committee and informed written consent was obtained from the patients. Two hundred fifty patients, 18-40 years, classified as ASA physical status I and II who were undergoing elective cesarean section, were enrolled in this randomized, double-blinded and placebo-controlled study. Patients with a history of anxiety disorders, those consuming sedative, analgesic, antidepressant, or antiepileptic drugs, those with any contraindication to spinal anesthesia and patients with history of tension or migraine headache, PDPHA, low back pain or spine surgery were excluded from the study.

At the preoperative visit, the study plan was explained to the patients by a trained investigator. Patients were randomly assigned into 2 groups of either general anesthesia (Group G, n = 125) or spinal anesthesia (Group S, n = 125) using a computer generated randomization list.

On arrival in the operating room, all patients were routinely monitored with an Electrocardiogram (ECG), noninvasive blood pressure and pulse oximetry.

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An 18 gauge cannula was inserted and lactated ringer solution 7 mL kg^{-1} was administered. In group G, anesthesia was induced with thiopental sodium 5 mg kg^{-1}, the trachea intubated after succinylcoline 1 mg kg^{-1}. After tracheal intubation, anesthesia was maintained with Isoflurane (0.6-0.7%), N_2O (50%) and fentanyl (1 μg kg^{-1} q half hour after delivery). Ventilation was adjusted to maintain normocapnia (end-tidal carbon dioxide partial pressure 4.7-5.3 kPa). Patients were actively warmed to keep core temperature (esophageal) normothermic. At the beginning of the skin sutures, drug administration was stopped and neuromuscular block was antagonized by IV administration of 2.5 mg of neostigmine along with 1.0 mg atropine. Patients were considered awake when they opened their eyes on command or after gentle tactile stimulation; they were extubated soon thereafter.

The patients in group S received spinal anesthesia. Using an aseptic technique, a 25 gauge. Quincke needle was inserted intrathecally via a midline approach (directing the needle bevel in the longitudinal axis) into the L 3-L 4 or L 4-L 5 interspace with the patient in the sitting position. Patients received 15 mg 0.5% hyperbaric bupivacaine.

Patients in both groups could request rescue analgesia any time after surgery. Intravenous morphine (0.1 mg kg^{-1}) injection was given as a rescue analgesic at 6 h intervals.

Patients were asked about the headache or back pain during 24, 48 h and 30 days (by telephone) after termination of surgery. The incidence of pain was evaluated by a yes or no survey. Bilateral frontal or occipital pains that increased at upright position were considered as a PDPHA.

It was estimated that a minimum of 125 patients in each group would be required to have an 80% power of detecting a 20% difference at a significance level of 0.05. Statistical analysis was performed using SPSS package (SPSS Inc., Chicago, IL, USA), version 13.5. The distribution of age, weight, post-operative morphine consumption, PDPHA and LBP was checked by the Kolmogorov-Smirnov test. They followed a normal distribution. Age, weight and morphine consumption were compared among 2 groups by independent sample t-test. To compare the ASA physical status, PDPHA and LBP among 2 group's chi-square and Fisher exact tests (when appropriated) were used. Two tailed $p<0.05$ was taken as significant.

RESULTS

Seven patients (3 in G group and 4 in S group), were excluded from the study. Patient characteristics, prioperative fluid administration, 48 h post operative morphine consumption and the duration of surgery was similar in the 2 groups (Table 1).

Table 1: Patient characteristics, surgery time, perioperative fluid administration and postoperative morphine consumption

	Spinal group (n = 121)	General group (n = 122)
Age (year)*	29.6±5.6	28.5±5.08
ASA class (I/II)	97/24	95/27
Weight (kg)*	77.1±11.7	78.0±11.7
Surgery time (min)*	68±25.6	74±23.2
Prioperative fluid (mL)*	3220±960	3390±1050
Morphine consumption (mg)*	42.1±9.7	45.7±101

*Values are expressed as mean±S.D. **There are no significant differences among the groups

Table 2: The incidences of the Post Dural Puncture Headache (PDPHA) and Low Back Pain (LBP)

	Spinal group (n = 121)	General group (n = 122)
PDPH		
After 24 h	11 (8.3)	7 (5.3)
After 48 h	3 (2.3)	0 (0)
One month later	0 (0)	3 (2.3)
LBP		
After 24 h	33 (25)	29 (22)
After 48 h	13 (9.8)	15 (11.4)
One month later	17 (12.9)	16 (12.1)

**There are no significant differences among the groups

There was no significant difference in the incidence of PDPHA at 24 h after surgery 7(5.3%) in G group, 11 (8.3%) in S group (Table 2). After 48 h, the incidence of PDPHA was similar in groups (0 (0%) in G group, 3 (2.3%) in S group) (Table 2). One month later, 3 patients in G group complained of headache, while no one in S group reported such a problem. However, this does not account for any significant statistical difference (Table 2). There was no significant differences in the incidence of LBP in groups first day 29 (22%) in G group versus 33 (25%) in S group, third day 15 (11.4%) in G group versus 13 (9.8%) in S group and one months later 16 (12.1%) in G group versus 17 (12.9%) in S group.

DISCUSSION

The current study, demonstrates that there are no differences in the incidence of PDPHA or LBP between the pregnant patients undergoing spinal anesthesia with 25 G needle and general anesthesia for cesarean section. The incidence of PDPHA and specially LBP were common but decreased considerably over the short term.

During regional or general anesthesia the patients will not perceive signals of adverse positions in the low back and pelvis and therefore these positions cannot be corrected during surgical intervention. Women with advanced LBP during pregnancy commonly suffer from frequent disturbances of sleep during the night caused by episodes of pain and need to correct their position. The artificial immobilization during anesthesia and surgical intervention may result in short or long-term damage of joints, muscles and ligaments, which may worsen the long-term prognosis of LBP during and after pregnancy (Russell *et al*., 1996; Candido and Stevens, 2003; Sadegh *et al*., 2008).

To explain the PDPHA attention should be paid to the relationship between the headache and loss of CSF. One theory states that the loss of CSF through a dural hole results in intracranial tension or traction on nerves and meningeal vessels. Audiometric studies performed on patients, who developed temporary hearing loss and PDPHA after dural puncture support this theory. These studies also, documented improvement in hearing acuity and resolution of the headache following epidural blood patch. The bimodal theory on the pathophysiology of this syndrome was first published by Kunkle. This theory suggests that there is a combination of both low CSF pressure and resultant cerebral vasodilatation in reaction to the stretching of vessels.

The amount of CSF loss depends upon the size and shape of the dural hole and the pressure difference between the subarachnoid and epidural spaces. The shape of the spinal needle tip and direction of a cutting needle bevel are both effective factors in determining the rate of CSF loss. In an *in vitro* study, performed on human postmortem thoracolumbar dura mater, the median loss of CSF volume in 5 min was significantly less through a 22 g Whitacre needle than with a 22 g.

Quincke, there was a 21% reduction in leakage of CSF if the Quincke needle bevel was located parallel to the large axis of the vertebral column. Placing the Quincke needle bevel in the longitudinal axis promotes separation of the dural fibers instead of cutting them. However, this cadaver study, has been disputed by anatomical and in vitro analysis. A classic clinical study by Mihic demonstrated that the incidence of PDPHA is lower when a Quincke needle bevel is placed parallel to the longitudinal fibres.

The size of a dural hole depends on outside diameter of a given spinal needle, as well as to bevel configuration. Cutting fewer fibres of the dura reduces the size of the dural hole (Sadegh *et al*., 2008).

Although, it seems that the highest incidence of PDPHA may occur in obstetric patients, as many as 40% of parturients, who don't receive any neuroaxial anesthesia whatsoever complain of headache in the peripartum period (Ostman, 1993). In our study, because of the small gauge needle used and the bevel placed parallel to the longitudinal fibers, the incidence of the PDPHA was similar to the general anesthesia. This finding shows that by applying the correct technique and choosing smaller needles, the incidence of PDPHA and LBP can be as low as general anesthesia.

CONCLUSION

Spinal anesthesia using 25 G spinal needle and applying suitable technique was not associated with increased risk of PDPHA or persistent LBP after cesarean section in comparison to general anesthesia. However, the study population was relatively small and the results must therefore, be interpreted with caution. Future studies, should address this question with a larger sample size.

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