COMPARISON OF SIZE OF TWO SPINAL NEEDLES IN POST-DURAL PUNCTURE HEADACHE: A RETROSPECTIVE STUDY

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ABSTRACT

The promotion of epidural and spinal blocks as preferred and safe techniques for Caesarean section and the use of lumbar puncture for diagnostic and therapeutic purposes place patients at risk of developing Post-Dural Puncture Headache (PDPH). A dull and throbbing bilateral headache associated with changes in posture (Worsened by sitting and standing and better lying down), that develops within seven days of a lumbar puncture or an inadvertent dural puncture must raise the suspicion of PDPH. The exact causative mechanism is unclear, but symptoms of PDPH are generally attributed to excessive loss of Cerebrospinal Fluid (CSF). The risk of PDPH is increased with the use of cutting and large-bore needles and with horizontal orientation of the needle bevel.

KEYWORDS

Spinal Headache, Lumbar Puncture, Dural Puncture, Spinal Needle.

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INTRODUCTION

Dural puncture is a commonly performed invasive procedure for various indications like diagnostic lumbar puncture, spinal anaesthesia, myelography and intrathecal chemotherapy. However, in anaesthesia practice apart from intentional dural puncture as in spinal anaesthesia, unintentional dural puncture can also occur while performing epidural anaesthesia or analgesia for various indications including postoperative and labour pain relief. Carrie and Collins.[1] define Post-Dural Puncture Headache (PDPH) as "a headache occurring after dural puncture and has a significant effect on the patients post-operative well being," i.e. headache which is not only postural but also continues for more than 24 hours at any level of intensity or so severe at any time that the patient is unable to maintain upright position. When headache appears in the postoperative or postpartum period after regional anaesthesia, it can be due to many reasons, rather as a complication of dural puncture during regional anaesthesia. However, the most common cause of an anaesthesia-induced headache is PDPH. This study attempts to address several clinical pertinent questions surrounding this topic.

Historical background, historical reference to PDPH was recorded by August Bier.[2] in 1899, when he gave a personal account of his headache, he suffered after spinal anesthesia given to him on his request by his assistant. Dr. Bier described the headache as a feeling of very high pressure in the head, accompanied by light dizziness when raising quickly from the chair. He also described the most important sign of PDPH as follows: "All symptoms disappeared immediately when I laid horizontally, but came back when I got upright."

Dr. Biers suggested that CSF loss caused the symptoms he experienced and his advise is to prevent the loss of CSF as much as possible, as he lost excessive CSF while receiving the experimental spinal block by his assistant who was unable to fit the syringe to the needle during the procedure.

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MATERIAL AND METHODS

Records of patients who underwent various surgical procedures between July 2015 and October 2015 with spinal anesthesia were examined retrospectively. Patients older than 18 were included in the study. Convertion to general anesthesia was the exclusion criteria. Demographic data of patients (Age, weight, height and physical status), comorbid diseases, position of patient while performing spinal anesthesia, the number of spinal puncture attempts, mobility of patients after spinal anesthesia and the incidence of post-dural puncture headache were recorded. In this study, we aimed to compare two different spinal needle designs of the different diameter that is 23-gauge quincke needle with 25-gauge spinal needle regarding their technical handling difficulties and incidence of PDPH.

Patients were randomly divided by a computer generated chart into two groups, Group A and Group B. Women in the Group A (n=55) received spinal anesthesia via 23-gauge (23-G) a traumatic spinal needle and those in the Group B (n=55) via 26-G cutting spinal needle. All the spinal anesthesia procedures were done by experienced anesthesia specialists. Exclusion criteria.[3] were denial of the patient for spinal anesthesia, primary headache disorders (e.g., migraine), hemostatic disorders, infection at the site of puncture and other relative complications for neuraxial anesthesia.

All the patients were preloaded with 1000mL of physiologic saline solution prior to the procedure.[4] Routine intraoperative monitors included continuous electrocardiography, pulse oximetry and non-invasive arterial blood pressure monitoring.[5] Lumbar puncture was performed through the L2-3, L3-4 or L4-5 intervertebral space with the patient in a lateral position. The needles were introduced with the bevels in the parallel direction to the dural fibers with the needle opening facing right. All the patients received standard doses of drugs consisting of 10-12mg hyperbaric bupivacaine.

ASA status, height and weight of the patients were noted as well as the number of puncture attempts and time for the procedure, which were recorded by an anesthesia technician. The duration of spinal puncture procedure was defined as the time from the first puncture attempt to the final removal of the

needle after completion of the subarachnoid injection.[6] Number of puncture attempts was grouped as 1, 2, 3 or more attempts. Time required for the procedure was recorded as <1 min, 1-3 min, 3-5 min and ≥5 min.

Immediate complications such as hypotension were treated with appropriate doses of mephentine (6-12mg) intravenously.[7] Postoperatively, the patients had bed rest for first 6h, as part of the standard protocol of postoperative patient followup. After the 6h, they had intermittent mobilizations. Lying position was suggested rather than sitting during the bed rest to minimize the risk of PDPH. The patients were interviewed by the ward nurse unaware of the needle type used on the first postoperative day and were asked about the presence of headache, its intensity, character and any accompanying symptom which was duly noted in the file.

The patients who were discharged on the postoperative day 1 are advised having bed rest in lying position and drink at least 3L of water a day.[8] Other patients who are are admitted in the ward are accordingly managed. PDPH is defined as a frontal or occipital headache in the erect or sitting posture that was relieved with supine posture. Other types of headaches were assumed as non-PDPH. PDPH was evaluated by Visual Analogue Scale (VAS) and Numerical Rating Scale (NRS) on the first postoperative day and on the 8th day respectively. In the case of headache, the patient was put in one of the three groups that were formed according to VAS and NRS as mild (VAS/NRS 1-3), moderate (VAS/NRS 4-7) and severe (VAS/NRS 8-10). Time of onset and duration of headaches were also noted.[9] Mild PDPH was treated with bed rest and oral hydration at home.

Moderate PDPH was treated with tab. combiflam and I/V fluids, still with bed rest and inj. Butrum 1mg I/M sos. Severe PDPH was treated with oral analgesics and Epidural Blood Patch (EBP) was offered for this group of patients, but none of the patient was ready for this, so narcotics pain killer I/V fluids are continued along with strict bed rest.[10] Data analysis was performed using SPSS 15 (Statistical Package for the Social Sciences, Chicago, Illinois, USA). Continuous variables were presented as mean±standard deviation, whereas categorical variables as frequencies and percentages. Differences between categorical variables were evaluated with Chi-square test.[11] Continuous variables were compared by Student's t-test for two independent groups.

The sample size was indicated by power analysis calculated by PASS software (Power Analysis of Sample Size, http://www.ncss.com/software/pass/). The sample size calculation process considered the power, the size of the Type I (alpha) error, and the actual size of the effect. Our power analysis revealed that a sample size of 100 in each group would have 90% power to detect such a large effect size. A two-sided $P<0.05$ was considered as significant for all analyses.[12]

RESULT

In this study record of 110 patients were examined retrospectively. Patients were divided in two groups. Group A patients received spinal anesthesia with 23-gauge needle and patients in group B received spinal anesthesia with 26-gauge needle. Demographic data of patients are shown in Table 1. No difference was found with regard to age, height, weight and ASA physical status of patients between two groups. Spinal puncture attempts and duration of spinal procedure are shown in Table 2. Spinal block was established in single attempt in 46 patients in group A (92%) and 48(85%) in group B.

The procedure of spinal block was completed within 60 sec in 48 patients in group A and 39 patients in group B. None of the patients in either group required trasition of anesthesia from spinal to general. Table 3 shows severity, onset of time and duration of spinal headache. No. of patients suffering from PDPH in group A were 7 and in group B were 2. The patients were offered epidural blood patch, but none of the patients agreed for that. Conservative treatment as described earlier was given to the patients.

DISCUSSION

The risk factors for PDPH after SA are either patient related or technique related. Patient related factors are young age, female gender, pregnancy and history of headache.[13] The technique dependent factors are the preventable ones and they are the spinal needle size, the shape of the spinal needle tip and the experience of the anesthetist.[14] The most widely accepted precaution to prevent headache is to use a smaller sized spinal needle. Using a larger dimeter spinal needle leads to a larger defect in the dura and consequently to more CSF leakage and more chances of PDPH.[15] However, PDPH can be observed despite using smaller sized spinal needles.

PDPH occurred more often in the patients who lay in supine position during the operation than those who lay in prone position. The higher incidence of PDPH in the supine position has been attributed to gravity and to more CSF leakage caused by increased abdominal pressure. PDPH occurred more often in the patients who lay in supine position during the operation than those who lay in prone position.[16] The higher incidence of PDPH in the supine position has been attributed to gravity and to more CSF leakage caused by increased abdominal pressure. In that study overall incidence of PDPH was 17.5% (21 of 120), but it was 14.1% (21 of 149) in our trial. We think that the reason of lower incidence in our study is due to smaller size of spinal needle, so it is clearly understood that size of the spinal needle is directly proportionate to severity of spinal headache.[17]

CONCLUSION

In conclusion, the results of our study shows that diameter or the size of the needle does matter in post-dural puncture headache along with no. of attempts at providing spinal anesthesia. So it is advocated to use fine spinal needles with single or minimum no. of attempts in giving spinal anesthesia in order to avoid post-dural puncture headache.

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Groups	A Group	B Group	P Value
AGE	22.2±3.7	31.1±5.5	Q.264
HEIGHT	161.8±6.2	159.8±6.2	Q.212
WEIGHT	78.3±9.7	76.3±8.2	Q.836

Table 1: Demographic Data of Patients

GROUPS	GROUP A(55)	GROUP B(55)
NO. OF PUNCTURE		
1	49 (92.8)	48(86.2)
2	05(7.4)	05(11.2)
>3	01(1.1)	02(1.9)
DURATION OF PROCEDURE		
<1 MIN	46(88.3)	45(74.9)
2 MIN	08(12.8)	06(26.4)

Table 2: Spinal Anesthesia Attempts and Duration of Procedure

3-5 MIN 01 (1.8) 04(2.1)

GROUPS	A GROUPS (N 55)	B GROUP (N 55)	P VALUE
PDPH			
ABSENT	52(92.6)	54(97.2)	0.785
PRESENT	03(7.4)	01(2.8)	
SEVERITY OF PDPH			
MILD	04	02	
MODERATE	01	0	
SEVERE	0	0	

Table 3: Incidence and Severity of PDPH