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RESEARCH ARTICLE

A COMPARATIVE STUDY TO KNOW THE EFFECT OF POSITION DURING SPINAL ANESTHESIA ON POSTDURAL PUNCTURE HEADACHE IN LOWER ABDOMINAL SURGERIES

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Abstract

Background: Pain is pathologic entity, noxious stimulus and a most common problem challenging the anaesthetists. Spinal anaesthesia is a commonly used technique for providing surgical anaesthesia to patients undergoing urological, gynecological, abdominal and lower limb surgeries [(1)]. PDPH was first described by August Bier in 1898. The incidence of PDPH after spinal anaesthesia in obstetric anaesthesia is 1% - 6%. The risk factors of PDPH after spinal anaesthesia are needle size, direction of bevel, needle design, number of lumbar puncture attempts, age, sex, pregnancy, and previous history of PDPH[(4)].

Objectives: To evaluate the effect of position during spinal anaesthesia on PDPH in patients undergoing lower abdominal surgeries and to study complications associated with spinal anaesthesia.

Methods: After approval from the ethical committee and informed written consent from the patient. A prospective randomised study was conducted with hundred ASA grade I and II patients aged between 18-60 years undergoing lower abdominal surgeries and were divided into two groups of 50 each .Group A and Group B, where first group were given spinal in lateral position and latter group in sitting position. The intensity of PDPH was assessed postoperatively using a Numeric Rating Scale immediately on either postoperative day (POD) one, two, or three as described to the patient during the preoperative visit.

Results: There was a significant decrease in incidence and severity of PDPH when the subarachnoid block was given in the lateral recumbent position as compared to that given in the sitting position.

Conclusion: Hence, lateral position is preferred for spinal anaesthesia for patients undergoing lower abdominal surgeries.

1. Introduction:-

Spinal anaesthesia is a commonly used technique for providing surgical anaesthesia to patients undergoing urological, gynecological, abdominal and lower limb surgeries [(1)]. Spinal anaesthesia is known to be more

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technically easier, less riskier in systemic drug toxicity, and more reliable than epidural anaesthesia in providing anaesthesia from the midthoracic level to the sacrum [(2)]. Spinal anaesthesia is usually conducted in the sitting or in the lateral position and rarely in the prone position. The lateral decubitus position is more convenient and more appropriate than other positions in ill or frail patients.

Spinal anaesthesia in the sitting position is not managed appropriately in a heavily sedated patient, and vasovagal syncope can occur. Therefore, the lateral decubitus position is more comfortable and more suitable for sedated patient.

According to the International Classification of Headache Disorders criteria, PDPH is a headache that develops within 5 days after dural puncture which worsens in an upright position and improves with lying down and accompanied by neck stiffness, tinnitus, photophobia, and nausea. It may disappear spontaneously within 1 week or up to 48 h after an epidural blood patch as a definitive treatment. Conservative therapies such as bed rest, hydration, and caffeine are commonly used for management[(3)].PDPH usually presents as a severe expanding pain over the frontal and occipital regions that extends to the neck and shoulders commonly.

Several theories have been postulated regarding the pathophysiology of PDPH. The most accepted theory is reduction of cerebrospinal fluid (CSF) pressure, following leak of CSF and resultant downwards movement of brain structures, resulting in stretching of meninges and vasodilatation of cerebral vessels.

PDPH was first described by August Bier in 1898. The incidence of PDPH after spinal anaesthesia in obstetric anaesthesia is 1% - 6%. The risk factors of PDPH after spinal anaesthesia are needle size, direction of bevel, needle design, number of lumbar puncture attempts, age, sex, pregnancy, position and previous history of PDPH[(4)].

Treatment of PDPH has been a focus of several reviews. Fluid intake, immobilization and drug therapy have been good approaches for the treatment of PDPH[(5)].

Hence this study is undertaken to compare the position that has less incidence of post dural puncture headache .Thus, reducing the duration of hospital stay.

Materials and Methods:-

After obtaining approval from the institutional ethical committee and written informed consent from each patient ,the study was conducted which included 100 ASA I & ASA II patients of either sexes. Patients aged between 18 years to 60 years undergoing elective lower abdominal surgeries were enrolled in this prospective randomized controlled study. Those who had hyper coagulopathies, allergic to local anaesthetics ,contraindications for spinal anesthesia and patients with previous history of epilepsy , headache were excluded from the study.

The patients were explained prior to surgery about the spinal technique as well as Numeric Rating Scale (NRS).

100 patients were divided into two groups Group A(Lateral position) and Group B(Sitting position) with 50 patients in each group using a computer –generated randomization. For both the groups baseline parameters such as Non invasive blood pressure(NIBP) ,electrocardiogram(ECG), Heart rate(HR), pulse-oximetry (Sp02) was assessed and noted.

All patients received 10 mL/kg crystalloid solution before spinal anaesthesia as preloading.

Spinal anaesthesia was administered with 0.3mg/kg of 0.5% hyperbaric bupivacaine by a 25-gauge Quincke spinal needle either in the sitting or in the lateral decubitus position. The needle was introduced with the bevel parallel to the sagittal plane. The technique used was lumbar puncture in the midline approach at the L3-L4 intervertebral space using a standard aseptic precaution and procedure. In the lateral decubitus position, patients at the rim of the operating table, their thighs bent on their belly, and their neck flexed to enable the forehead to be as close as possible to the knees. Vitals were recorded every three minutes after spinal anaesthesia for the first 15 minutes. Data was collected by an unaware nurse.

Level of sensory and motor block was assessed. If systolic blood pressure decreased more than 20% below the baseline or to < 90 mmHg, intravenous Mephentermine and an additional intravenous fluid bolus of 500 ml of lactated Ringer's solution was given. If heart rate decreased to less than 50 beats/min, inj Atropine sulphate 0.6mg was administered intravenously.

The intensity of PDPH was assessed postoperatively using a Numeric Rating Scale (NRS) immediately on postoperative day (POD) one, two, or three as described to the patient during the preoperative visit. NRS is a 10-point numeric scale for patient self-reporting of pain intensity. On the scale, 0 is the absence of headache, 1 - 3 mild pain (nagging, annoying, and interfering slightly with activities of daily living [ADL]), 4 - 6 is moderate pain (interferes significantly with ADL), and 7 - 10 is severe pain (disabling; unable to perform ADL).

Therapy with NSAIDs and hydration was recommended to patients experiencing postural headache.

Statistical Analysis

Statistical data was analyzed by IBM SPSS 25.0 version software. Collected data were spread on excel sheets and master chart was prepared from the collected data.

For quantitative data analysis, descriptive statistics were done like mean, standard deviation . Independent samples "t" test was used to compare the mean values between two variables for statistical significance.

For qualitative data analysis chi-square test and Fisher exact probability tests were applied for statistically significant data. $P \leq 0.05$ was considered statistically significant for all comparisons.

Results:-

A total of 100 patients who had been scheduled for elective lower abdominal surgeries with ASA I or II status were randomly distributed into two groups.

Table 1:- Patient Characteristics.

Variable	Sitting Position (n = 48)	Lateral Decubitus Position (n = 46)	P Value
Age(years)	29.37 (5.49)	28.36 (5.48)	> 0.05 (NS)
Weight (kg)	58.47 (13.99)	56.14 (15.37)	> 0.05 (NS)
Height (cm)	156.83 (5.25)	157.84 (7.24)	> 0.05 (NS)
BMI (kg/m^2)	29.23 (4.65)	28.58 (4.72)	> 0.05 (NS)

Amongst these patients, 48 patients had successful one dural puncture in the sitting position and 46 patients in the lateral position. Five patients were excluded from the study because more than one dural puncture had been attempted. No patients were switched to general anesthesia.

The overall incidence of PDPH was 15.9%. Eleven patients (22.9%) had PDPH in the sitting group and only 3 patients (6.5%) in the lateral group (Table2).

Table 2:- Incidence of PDPH in Various Times.

Variable	Sitting Position (n = 48)	Lateral Decubitus Position (n = 46)	P Value
Incidence of PDPH	11 (22.9)	3 (6.5)	0.019
Incidence of PDPH on POD 1	6 (12.5)	0	> 0.05 (NS)
Incidence of PDPH on POD 2	9 (18.7)	2 (4.3)	> 0.05 (NS)
Incidence of PDPH on POD 3	11 (22.9)	4 (8.6)	0.03

The incidence of nausea and vomiting (concomitant symptom of PDPH) in the sitting position was remarkably more common than that in the lateral decubitus position patients.

Discussion:-

Spinal anesthesia is a form of regional anesthesia involving injection of low dose of local anesthetic into the cerebrospinal fluid of the patient's subarachnoid space to anesthetize the spinal nerve roots running through it. It is a relatively simple technique, which produces adequate surgical conditions by injecting a small amount of drug with easy landmarks.[6]

Neuraxial blocks may reduce the incidence of venous thrombosis and pulmonary embolism, cardiac complications in high-risk patients, bleeding and transfusion requirements, vascular graft occlusion, and pneumonia and respiratory depression following upper abdominal or thoracic surgery in patients with chronic lung disease. Neuraxial blocks may also allow earlier return of gastrointestinal function following surgery.

Karl August Bier, a German surgeon, injected cocaine 10±15 mg into the subarachnoid space of seven patients including himself and his assistant, Hildebrandt. All the seven patients described the symptoms associated with PDPH. Bier concluded that the headache was attributable to loss of CSF.

In this prospective randomized study, the effect of position which has least incidence for post dural puncture headache in lower abdominal surgeries was evaluated.

This study showed that the incidence and intensity of PDPH were higher in the sitting position than in the lateral position in lower abdominal surgeries.

This study defined PDPH as a post dural headache in the frontal or occipital area, and its symptoms are aggravated by assuming the sitting position ,ambulation and are alleviated by recumbency. One of the most important reasons for longer stay in the hospital.

PDPH is caused by leaking of the CSF through a tear in the dura causing intracranial hypotension, classically described as a postural, occipito-frontal headache, which occurs 24-48 hours after dural puncture. It can be associated with nausea, vomiting, neck stiffness, auditory or visual disturbances and may rarely progress to cranial nerve palsy, convulsions and subdural hemorrhage.[10]

The fibroblastic proliferation of the surrounding tissue and blood clot facilitate the process of healing of the dura mater. The fibroblastic proliferation emerges from the cut edge of the dura.

The healing of the dura is longer in the sitting position than in the lateral decubitus position because the intervertebral spaces are more evident in the sitting position.

CSF pressure in the sitting position is 40cm H2O and that in the lateral position is 5 - 20 cm H2O. In the sitting position, this higher CSF pressure can lead to a larger hole in the dura and can cause a prolonged CSF leak.

The needle is perpendicular to the outer dura fiber in the sitting position, thus causing a larger hole and more CSF leakage In our study, the incidence of PDPH was 15.9% % with a 25- gauge Quincke spinal needle. Similar to previous studies, PDPH was significantly lower when the spinal block was performed in the lateral decubitus position than in the sitting position.[13,14]

Davoudi M et al.[4] also found that the incidence was more in sitting (20.8%) than in the lateral posture (4.3%) (P = 0.017). Majd SA et al.[7] found that the incidence was significantly less in the lateral posture (16.6%) as compared to the sitting posture (45%). The meta-analysis by Zorilla-VacaA[8] showed results similar to our study.

The limitation of the study is that being a simple observational study there is no comparative evaluation between the different sizes of needles.

Conclusion:-

We conclude that there is a decreased incidence and severity of PDPH when the spinal anaesthesia is administered in the lateral recumbent posture as compared to that given in the sitting posture. Thus, it is preferable to give spinal anaesthesia in the lateral posture than in sitting position.

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