Original Research Paper

Volume - 13 | Issue - 04 | April - 2023 | PRINT ISSN No. 2249 - 555X | DOI : 10.36106/ijar

Anaesthesiology

ASSESSMENT OF DIFFICULTIES DURING SUB-ARACHNOID BLOCK IN PREGNANT PATIENTS UNDERGOING CAESAREAN SECTION-AN OBSERVATIONAL STUDY

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ABSTRACT **OBJECTIVE:-** Spinal anaesthesia is one of the most commonly using and safe anaesthetic method for Caesarean section, lower abdomen and lower limb surgeries. The anatomical factors predicting the difficulty in performing Sub-arachnoid block (SAB) in pregnant patients undergoing caesarean section were investigated. **METHODS:-** This method was an observational study, it was performed in 52 pregnant patients who underwent Sub-arachnoid block for caesarean section. Demographic information such as age, height, weight, BMI, Curvature of the lumbar spine and grading of Inter-vertebral disc space of all patients were recorded. **RESULTS:-** The correlation coefficient of age, height, weight, BMI, Inter-vertebral disc space, Curvature of lumbar spine with the difficulty of Sub-arachnoid block (SAB) were statistically insignificant P(>0.05). Only the grading of Inter-vertebral disc space was statistically significant (P<0.05). **CONCLUSION:-** From this study on 52 pregnant patients who underwent Sub-arachnoid block (SAB) for caesarean section, based on result we concluded that age, height, weight, BMI and Curvature of lumbar spine has little or no significant effect in causing difficulty in performing Sub-arachnoid block but the grading of Inter-vertebral disc space has the more significant factor in causing difficulty in performing Sub-arachnoid block (SAB). The result of this study will help the anaesthesiologist in assessing the anatomical factor, choosing the appropriate size spinal needle and to facilitate in performing the Sub-arachnoid block (SAB).

KEYWORDS :

Sub-arachnoid block is most commonly performed central neuraxial block, which involves injection of local anaesthetics into the sub-arachnoid space. Sub-arachnoid space extends from the foramen magnum to the sacral hiatus(1). Mostly used in general surgery, obstetric gynaecology, orthopaedics and urological procedures. Sub-arachnoid block is very effective for all lower abdomen and lower limb surgeries. It is also known as Spinal anaesthesia, Intra-thecal block, Spinal block and Intra-dural block(2).

Spinal anaesthesia is one of the golden technique used for most of the caesarean sections(3). This technique is used for caesarean section due to the risk associated with general anaesthesia such as aspiration and difficult intubation . Sub- arachnoid block is considered as the best choice due to reduced systemic toxicity, increasing dense block and its rapid onset of action and to its technical simplicity(4).

When sub-arachnoid block is performed in pregnant patients undergoing caesarean section there may be chance cephalic spread of local anaesthetic agents into high level through the cerebrospinal fluid. More over extreme high spread of local anaesthetic drug in cephalad may cause upper extremity numb and weakness, maternal nausea and vomiting due to hypotension. In contrast , inadequate level may result in pain and discomfort for the patient because of insuffient anaesthesia. In order to predict the distribution of drugs in SAB on pregnant patients, studies on a variety of patient demographic factors, including height, weight, Body Mass Index, Vertebral column length and weight increase during pregnancy, have been undertaken till date(5).

Physiological and anatomical changes of pregnancy:-

Generally anatomical and physiological changes are occurs during pregnancy in order to prepare the body for childbirth, to meet increased metabolic needs and to the development of foetus(6).

In Cardiovascular system, during 8th week of gestation, increasing levels of oestrogen and progesterone produce vasodilation and a reduction in systemic vascular resistance (SVR). Due to the lack of auto-regulation in prenatal placental circulation, cardiac output (CO) must rise to maintain blood pressure (BP). At week 20, the heart displaces cephalad due to the gravid uterus. In supine posture, the gravid uterus compresses the inferior vena cava (IVC) and descending aorta. This results in a reduction in venous return and CO, which causes maternal complications(7).

In Respiratory system, oestrogen causes capillary engorgement of the laryngeal, oropharyngeal, and nasal mucosa. Due to the gravid uterus, the diaphragm moves cephalad. During pregnancy, minute volume rises by 70-200%, $PaCO_2$ drops to 10-15 mmHg, and metabolic demands increase oxygen consumption by 40-75%(8).

In Nervous system, Increased cerebral blood flow, increased permeability of the blood brain barrier (BBB) and increased levels of plasma endorphin and progesterone promote an increase in pain threshold throughout labour and full term. Because the gravid uterus compresses the IVC, the epidural venous plexus dilates, resulting in an increase in epidural fat and a decrease in epidural space and spinal (CSF) volume.

The successful Sub-arachnoid block depends on anatomical factors of the patient such as position, Lumbar column approach and other factors includes the type of needle, the size of needle and choice of drug.

AIMS:-

The aim of the study is to access the difficulty in performing Sub-arachnoid block (SAB) in pregnant patients undergoing Caesarean section.

OBJECTIVES:-

To predict the difficulty of Sub-arachnoid block in pregnant patients by measuring Body mass index (BMI).

To predict the difficulty of Sub-arachnoid block based on the bending of lumbar spine in pregnant patients.

To predict the difficulty of Sub-arachnoid block based on Grading of Inter-vertebral disc space in pregnant patients.

MATERIALS AND METHODS

Study design: An Observational study.

Sample size: Patients underwent elective/emergency caesarean Section under Sub-arachnoid block full filling the inclusion criteria in Department of Anesthesiology, CHRI during the period of 5 month from February to June 2022 which accounted to 52 patients.

Subject selection: All Pregnant patients underwent caesarean section surgeries under sub- arachnoid block.

Inclusion Criteria:

Age group >18 years.
ASA physical status [ASA II and III]. Elective/Emergency.

Exclusion Criteria:

Patients undergoing caesarean section under General anesthesia. Patients not willing to take part in the study.

Study procedure:
After shifted the patient to operation theatre,Standard monitoring of Non-invasive Blood pressure (NIBP), Electro-cardiogram (ECG), Pulse oximetry was established and 18G Intra- venous (IV) cannula was secured for Fluid resuscitation.The level of bending of patient lumbar spine was recorded as (Straight, Convex and Concave).The anesthesiologist rated the inter- vertebral space gap by palpating it, excellent (the inter-vertebral space is easily touched), weak (hardly touched), and none (not palpable). An anesthesiologist administered spinal anaesthesia to the patient in a sitting posture at L3-L4 or L4-L5. The number of tries to achieve the subarachnoid block, the size of the spinal needle used, and lastly the difficulty in completing the method were assessed at seven degrees (0-6) by the anaesthesiologist:

Score 0: The first effort without needle movement
Score 1: The first attempt with one or two needle redirections
Score 2: The first attempt with more than two needle redirections
Score 3: New attempt in the same or another level of inter-vertebral space, Score 4: New attempt with Paramedian approach
Score 5: New attempt with another needle in the same size or larger
Score 6: Failure in performing the technique
The ease or difficulty of performing Spinal anaesthesia was graded as follows by the anaesthesiologist, performing the technique:
Score 0-1: Easy,
Score 2-3: Moderate,
Score 4-5: Difficult,
Score 6: Impossible or failure

STATISTICAL METHODS:
This study was done by using Descriptive statistics, Frequency and Chi-square test.

RESULTS
The study is based on assessment of Sub-arachnoid block in 52 pregnant patients underwent caesarean section. The result is based on the Descriptive statistics, Frequency and Chi-square test. The objective of the study is to predict the difficulty of sub-arachnoid block in pregnant patients based on BMI, curvature of the lumbar spine and grading of Inter-vertebral disc space.

Based on chi-square test the cross-tabulation between the Ease/Difficulty of Sub-arachnoid block with Grading of Inter-vertebral disc space (Table:1), BMI (Table:2), Curvature of the lumbar spine (Table:1) was made.

Table:1 Cross-tabulation between Grading of intervertebral space and Ease/Difficulty of Spinal anaesthesia 8 cells (66.6%) have expected count less than 5. The minimum expected count is .10. The significant value is 0.01 which is Lesser than 0.05. Therefore, there is significant relationship between Ease/Difficulty of Spinal anaesthesia with Grading of Inter-vertebral disc space.

		Grading of intervertebral space			Total
		Normal	Poor	Weak	
Ease/Difficulty of Spinal anaesthesia	Difficult	1	4	8	13
	Easy	17	0	2	19
	Failure	0	0	1	1
	Moderate	8	1	10	19
Total		26	5	21	52

Table:2 Cross-tabulation between Body Mass Index and Ease/Difficulty of Spinal anaesthesia11 cells (68.75%) have expected count less than 5. The minimum expected count is .13. The significant value is .712 which is greater than 0.05. Therefore, there is no significant relationship between Ease/Difficulty of Spinal anaesthesia with Body mass index (BMI).

		BMI				Total
		NORMAL	OVER WEIGHT	OBESITY-I	OBESITY-II	
Ease/Difficulty of Spinal anaesthesia	Difficult	1	7	3	2	13
	Easy	4	7	7	1	19
	Failure	0	0	1	0	1
	Moderate	3	6	6	4	19
Total		8	20	17	7	52

Table:3 Cross-tabulation between Curvature of Lumbar spine and Ease/Difficulty of Spinal anaesthesia 4 cells (50%) have expected count less than 5. The minimum expected count is .29. The significant value is .373 which is greater than 0.05. Therefore, there is no significant relationship between Ease/Difficulty of Spinal anaesthesia with Curvature of lumbar spine.

		Curvature of lumbar spine		Total
		Convex	Straight	
Ease/Difficulty of Spinal anaesthesia	Difficult	4	9	13
	Easy	4	15	19
	Failure	1	0	1
	Moderate	6	13	19
Total		15	37	52

DISCUSSION :
In a study by Simin Atashkhoei et al. on 110 pregnant patients based on age, weight, height, BMI, Body appearance, lumbar spine deformity, ability to bend the waist, anatomical signs and Inter-vertebral interval and based on result he concluded that age, BMI of the patients, weight, inter-vertebral space the not being touched, the reduction of the ability to bend the waist and spinous process position can cause a difficulty in performing Sub-arachnoid block in pregnant patients undergoing caesarean section, compared with our study BMI has no significant relation with difficult sub-arachnoid block and grading of inter-vertebral disc has the significant factor in causing difficulties of sub-arachnoid block (SAB).

In a study by Atallah et al. on 300 patients with Sub-arachnoid anaesthetic urology in that radiological features and bone anatomical markers were considered as the two major factors in the prediction of difficult Sub-arachnoid block. In this study independent predictor of difficult sub-arachnoid block is BMI, based on results the finding regarding BMI, age and weight have the increased probability of difficult sub-arachnoid block compared with our study age and weight has no significant relationship in causing difficult sub-arachnoid block (SAB).

CONCLUSION:
From this study on 52 pregnant patients who underwent Sub-arachnoid block (SAB) for caesarean section, based on result we concluded that age, height, weight, BMI and Curvature of lumbar spine has little or no significant effect in causing difficulty in performing Sub-arachnoid block but the grading of Inter-vertebral disc space has the more significant factor in causing difficulty in performing Sub-arachnoid block (SAB).

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