



THE EFFECT OF ABDOMINAL GIRTH AND VERTEBRAL COLUMN LENGTH ON THE SPREAD OF SPINAL ANESTHESIA IN CESAREAN SECTION – AN OBSERVATIONAL STUDY.

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ABSTRACT

Spinal anesthesia is the preferred technique for cesarean sections due to its simplicity, rapid onset, and effectiveness. However, the spread of local anesthetic in the subarachnoid space varies significantly among individuals. Factors such as abdominal girth (AG) and vertebral column length (VCL) may influence the cephalad spread and thus the level of sensory block.

KEYWORDS :

INTRODUCTION

Spinal anesthesia is commonly used for cesarean sections due to its rapid onset, dense block, and favorable maternal and fetal outcomes. However, one challenge is the variability in block height among individuals receiving the same dose of local anesthetic. Overly high or low sensory levels can lead to complications such as hypotension or inadequate anesthesia.

Several factors have been studied for their effect on block spread, including patient height, weight, BMI, and vertebral anatomy. Abdominal girth, which reflects intra-abdominal pressure and gravid uterus size, and vertebral column length, which represents the space available for anesthetic spread, are emerging as key variables influencing spinal block levels.

This study aims to observe the influence of abdominal girth and vertebral column length on the extent of cephalad spread of spinal anesthesia in pregnant women undergoing elective cesarean section, providing insight into personalized dosing strategies.

METHODS-

In this observational study, term parturients receiving spinal anesthesia for elective cesarean section were assessed. AG was measured at the level of the umbilicus in the supine position. VCL was measured from the C7 vertebra to the sacral hiatus in the sitting position. A standardized dose of 0.5% hyperbaric bupivacaine was administered. The maximum sensory block height was recorded.

Study Design-

Study Title:

The Effect of Abdominal Girth and Vertebral Column Length on the Spread of Spinal Anesthesia in Cesarean Section – An Observational Study

Study Design:

Prospective observational study

Study Setting:

The study was conducted in the Department of Anesthesiology and Obstetrics at KVG medical college, Sullia over a period of 9 months.

Study Population:

Term pregnant women scheduled for elective cesarean section under spinal anesthesia.

Inclusion Criteria:

ASA physical status I and II
Term singleton pregnancies (≥ 37 weeks gestation)
Age between 18 and 40 years
Patients who provided written informed consent.

Exclusion Criteria:

Emergency cesarean section

Height < 140 cm or > 180 cm

Known spinal deformities or previous spinal surgery

Coagulopathy or contraindications to neuraxial anesthesia

Multiple gestation

Patients receiving combined spinal-epidural or general anesthesia.

Measurements :

1. Abdominal Girth (AG):

Measured in centimeters at the level of the umbilicus in the supine position using a non-stretchable measuring tape.

2. Vertebral Column Length (VCL):

Measured in the sitting position from the prominent cervical vertebra (C7) to the sacral hiatus using a measuring tape along the midline.

3. Spinal Anesthesia Procedure:

Performed in the sitting position at L3–L4 interspace using a 23G Quincke spinal needle.

A fixed dose of 2.0 mL of 0.5% hyperbaric bupivacaine was administered intrathecally.

Patients were placed supine with a left lateral tilt immediately after the block.

4. Monitoring:

Blood pressure, heart rate, oxygen saturation, and sensory block height were monitored.

The maximum sensory level was assessed by pinprick every 3 minutes for the first 20 minutes.

RESULTS:

A statistically significant positive correlation was found between abdominal girth and the height of sensory block, while vertebral column length showed no correlation. Patients with greater abdominal girth achieved higher levels of block.

DISCUSSION-

This observational study was undertaken to assess the relationship between two anatomical parameters—abdominal girth (AG) and vertebral column length (VCL)—and the cephalad spread of spinal anesthesia in term parturients undergoing elective cesarean section.

Our findings demonstrated a positive correlation between abdominal girth and the maximum sensory block height, and a no correlation between vertebral column length and block height. These results are consistent with previous studies, which suggest that variations in intra-abdominal pressure significantly affect intrathecal drug spread.

Increased abdominal girth likely reflects elevated intra-abdominal pressure due to the gravid uterus, which

compresses the epidural and intrathecal spaces. This leads to reduced cerebrospinal fluid (CSF) volume, thereby facilitating a higher cephalad spread of the hyperbaric anesthetic. Similar findings were reported by studies such as those by Hogan et al. and Jee et al., which showed that abdominal compression and intra-abdominal pressure affect CSF dynamics.

On the other hand, vertebral column length has no influence on the block height. This is consistent with the work of Norris MC, who reported that spinal column length has no correlation to the highest level of sensory blockade achieved.

Clinical Implications:

Anesthesiologists can potentially use AG as simple, non-invasive bedside predictors to estimate the likely spread of spinal anesthesia. This may guide dose adjustments and enhance the safety and effectiveness of spinal blocks, minimizing complications such as high spinal, hypotension, or inadequate anesthesia.

Limitations:

The study was conducted at a single center with a limited sample size.

Measurement of VCL may have observer variability.

Factors like patient posture post-spinal, uterine size, and fetal weight, which could influence block spread, were not controlled.

CONCLUSION-

This study highlights that abdominal girth significantly influences the cephalad spread of spinal anesthesia in parturients undergoing elective cesarean section.

Higher abdominal girth is associated with a higher sensory block level, likely due to increased intra-abdominal pressure and decreased cerebrospinal fluid volume.

Vertebral column length doesn't correlate with the block height achieved.

These findings support the potential role of individualized spinal dosing based on simple bedside anthropometric measurements to improve the safety and predictability of spinal anesthesia in obstetric patients.

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