

Comparative study of quality of subarachnoid blocks for caesarean section by using bupivacaine alone & bupivacaine-fentanyl combination

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Abstract

Background: The popularity of subarachnoid block (SAB) in cesarean section in recent times is due to better understanding of the physiological changes associated with it and proper appreciation of its advantages & complications. Hyperbaric bupivacaine in adequate dose (12mg or more) for SAB often causes complications like hypotension, shivering, nausea, vomiting, chest pain & epigastric pain. This study is conducted by department of anesthesia, Eastern medical college and Hospital over last one year from January to December 2017. **Objectives:** The aim of study is to reduce these complications by using bupivacaine-fentanyl combination. **Methods:** It was a clinical experimental study. 100 patients of ASA grade I & II waiting for cesarean section under SAB were randomly allocated in to two equal groups. Group A: Received 0.5% hyperbaric bupivacaine-10mg (2ml), Group B: Received 0.5% hyperbaric bupivacaine-8mg (1.6ml) & fentanyl-15ug[0.3ml] Parametric data like pulse, blood pressure, other complication like chest discomfort, epigastric pain, nausea, vomiting were analyzed or recorded. **Results:** In this study we found better analgesia & quality of block in bupivacaine-fentanyl group than bupivacaine alone group ($p<.001$). **Conclusion:** By adding fentanyl we can reduce the dose of bupivacaine & also improve the quality of block and reduce the dose of bupivacaine and therefore its harmful effects.

Key words: subarachnoid block, bupivacaine-fentanyl combination, quality of block.

J Ar M Coll Cu. 2018, July;1 (1): 17-20

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Introduction

Spinal anesthesia is the preferred means for cesarean section being simple to perform, economical and produces rapid onset of anesthesia and complete muscle relaxation. It carries high efficiency, involves less drug doses, minimal neonatal depression, awake mother and lesser incidences of aspiration pneumonitis. However, it also produces a fixed duration of anesthesia, postdural puncture headache, hypotension and lesser control of block height¹ bupivacaine, an amide type of local anesthetic, has high potency, rapid onset (3-8 min) and long duration of action (1.5 to 2 hours). For cesarean section intrathecal dose of hyperbaric bupivacaine is 10 to 15 mg². Cesarean delivery requires traction of peritoneum and handling of intraperitoneal organs, resulting in intraoperative visceral pain. With higher doses of hyperbaric bupivacaine, incidence of intraoperative visceral pain associated with higher blocks is reduced³ if motor blockade extending to the

roots of the phrenic nerves (c3 – c5) causes apnea⁴. But intraoperative common complications of SAB like hypotension, shivering, nausea, vomiting, chest pain and epigastric pain are common when using bupivacaine alone in this dose. The addition of intrathecal fentanyl 10-20 microgram may reduce the dose of bupivacaine & there by reducing the intraoperative complications. Bogra et al showed that fentanyl as adjunct of local anesthetics in SAB in various doses has effects on following parameters - visceral pain, hemodynamic stability, intraoperative sedation, intraoperative & postoperative shivering & postoperative pain. They also showed that, fentanyl is able to reduce the dose of bupivacaine & therefore its harmful effects⁵. In view of these points discussed above, the current study is intended to make a comparison of quality of block with different small doses of bupivacaine along with fentanyl and various complications occurring intraoperatively during cesarean section under SAB.

Received January 2018

Accepted May 2018

Methods

After taking informed written consent 100 healthy women with term pregnancy, aged between 20-35 years, height between 150-157.5cm, ASA I & II undergoing elective cesarean section under SAB were randomly allocated into two equal groups by simple lottery method. None of the patients had any contraindication for spinal anaesthesia. Complicated pregnancies such as multiple pregnancies, pregnancy induced hypertension and placenta previa were excluded. Foetal and maternal distress patients were also excluded from the study.

Group A: Received 0.5% hyperbaric bupivacaine 10mg(2ml)

Group B: Received 0.5% hyperbaric bupivacaine-8mg (1.6ml) & fentanyl- 15 microgram (0.3ml).

No premedication was given. SAB was done in lateral decubitus and sitting position at L3-L4 interspace using 25G Quincke spinal needle in each patient. Drugs were injected as per allocated schedule. Then the patients were turned supine position with a wedge under right buttock & 4L/min O₂ by face mask was started. Heart rate, blood pressure & oxyhaemoglobin saturation were measured just after positioning the patient & was recorded continuously at 2 minutes interval from induction to 20 mins. & then at 5 min intervals upto the end of operation. After assuming the supine position, the upper level of block was evaluated. Sensory block was evaluated by using pinprick & chlorhexidin soaked swab by wiping it up to the abdomen, starting from inguinal region up to 4th intercostal space in midclavicular line. Hypotension was defined as a decrease in systolic arterial pressure below 90 mm Hg or 25% decrease from the base line and was treated with IV isotonic fluid & ephedrine 5mg incremental dose as required intraoperative sedation was used.

Each patient was asked a complete standard questionnaire regarding nausea, vomiting, chest pain, epigastric pain, pruritus. Shivering was treated by wrapping the patient with warm blanket & warmed IV fluid.

Results

There was no significant difference between groups in ages, parity & gravida. Regarding sensory block 74% in group A, 92% in group B was at the level of T₇. The level of sensory block was significantly ($p < 0.05$) higher in group B.

The incidence of nausea & vomiting was significantly ($p < 0.05$) higher in group A with compared to group B. There was no significant difference between 2 groups in other complications like shivering, chest heaviness, pruritus. But the level of satisfaction of patients was significantly ($p < 0.05$) higher in group B with compared to group A.

Table 1: Distribution of level of sensory block

Level of Sensory Block	Group A (bupivacaine) (n = 50)		Group B (bupivacaine-fentanyl) (n = 50)		P Value
	n	%	n	%	
T6	10	20.0	0	0.0	0.35
T7	37	74.0	46	92.0	0.02*
T8	3	6.0	4	8.0	-
Total	50	100.0	50	100.0	

* Statistical analysis was done by Chisquare test. Values were regarded as significant $P < .05$

The mean difference of pulse at different times was not statistically significant.

The mean differences of systolic & diastolic blood pressure, SpO₂, respiratory rate were not statistically significant.

Table 2: Distribution of Patients according to side effect

Pain	Group A (bupivacaine) (n = 50)		Group B (bupivacaine-fentanyl) (n = 50)		P Value
	n	%	n	%	
Chest pain	23	46.0	4	8.0	0.001 ***
Epigastric pain	9	18.0	2	4.0	0.001 ***

* Statistical analysis was done by chisquare test. Values were regard as significant $p < .05$

Chest pain & epigastric pain of the patients were very highly significant ($p < 0.001$) higher in group A with compared to group B.

Table 3: Distribution of patient's satisfaction level

Satisfaction of patient	Group A (bupivacaine) (n = 50)		Group B (bupivacaine-fentanyl) (n = 50)		P Value
	n	%	n	%	
Excellent	17	34.0	40	80.0	0.010 **
Good	33	66.0	10	20.0	-
Total	50	100.0	50	100.0	

Statistical analysis was done by chisquare test. Values were regarded as significant $P < 0.05$

Discussion

Recent trends of obstetrics anesthesia show increased popularity of regional anesthesia amongst obstetric anesthetists. The increasing use of low dose technique of local anesthetics & opioids in recent years become popular for elective cesarean sections. Hyperbaric bupivacaine at 10mg or less has been shown to carry a risk of inadequate block. For this reason most of the anesthesiologists have favoured the use of higher doses (12mg or more) to overcome the incomplete blocks during cesarean section.⁶ But higher dose itself has some complications. Bogra et al in 2005 showed that fentanyl as adjunct of local anesthetics in SAB in various doses has effects on following parameters - visceral pain, hemodynamic stability, intraoperative sedation, intraoperative & postoperative shivering & postoperative pain. They also showed that fentanyl is able to reduce the dose of bupivacaine & its harmful effects⁶. This randomized prospective study was carried out with an objective to compare the incidence of intraoperative complications in cesarean section under spinal anesthesia with bupivacaine alone & the addition of fentanyl with bupivacaine. Regarding the quality of block addition of fentanyl to hyperbaric bupivacaine significantly improved of intraoperative surgical anesthesia for caesarean section. In this study we have found complete analgesia & quality of block were better in bupivacaine - fentanyl group than bupivacaine only group. In our study the level of sensory block was up to T₇ in majority such as 74% in group A, 92% in group B. The level of sensory block T₇ was significantly (p<0.05) higher in group B with compared to group A whereas T₆ level was not significant between group A and group B. Although ideally T₄ level of block is required for caesarean sections, but in our study the level of analgesia achieved is T₆ which is sufficient for caesarean section. In this study, there were no significant difference among two groups regarding haemodynamic parameters, SpO₂ and respiratory rate. Comparing of equipotent doses of bupivacaine alone & bupivacaine fentanyl combination, we found no significant change after four, six, eight & ten minutes. Bogra et al. also have found that intraoperative hypotension increases with increasing the doses of bupivacaine along with fentanyl. In our study we used smaller dose of fentanyl in subarachnoid space thereby producing no effect on APGAR score of newborn babies in group B. Dahlgren et al has also showed that, use of the smallest

effective opioid dose minimize potentially adverse maternal & neonatal risks⁷. Chest pain was very highly significant (p<0.001) in group A (46%) compared to group B (8.0%). Palmer CM et al. proved that 47.3% patients developed symptoms of chest pain during cesarean delivery under regional anesthesia & electrocardiographic changes occurred⁸. The changes were suggestive of myocardial ischemia. No patient without electrocardiographic change developed symptoms of chest pain. Incidence of chest pain was similar to our study. But we did not monitor ECG changes of the patients. In same way, epigastric pain was found 18% in group A & a few was found in group B. Cesarean section required traction of peritoneum & handling of intraperitoneal organs resulting in intraoperative visceral pain. In our study time appearance of epigastric pain during operation was correlated with the time of peritoneal closing. Most probably this visceral pain might be expressed by patients as epigastric pain. In this study, nausea & vomiting was significantly (p<0.05) higher in group A with compared to group B. Jaishri et al² also reported that incidence of vomiting was more in bupivacaine alone group than fentanyl combination group. Nausea & vomiting have multiple etiologies, which include hypotension, vagal hyperactivity, visceral pain, I/V opioid supplementation, uterotonic agents & increased gut motility. In our study all groups were haemodynamically stable. Despite achieving an adequate sensory level nausea during manipulation of the uterus & at the time of peritoneal closure was sometimes a problem in the present study group A. Christer Hulstrand et al. have shown beneficial effects of adding various opioids to the local anesthetic solution administered intrathecally. Subarachnoid opioids successfully decrease the incidence of intraoperative visceral pain. In our study incidence of nausea & vomiting was negligible in group B. Chest heaviness was highly significant (p<0.001) in group A compared to group B. Alone lower concentration of Bupivacaine could not completely removed the visceral pain. Incidence of nausea, vomiting and shivering reduces significantly by using this combination. Postoperative pain relief and pruritus, maternal respiratory depression and changes in APGAR score of babies did not occur with this combination⁹. Incidence of intraoperative complications (like chest pain, epigastric pain, nausea - vomiting) during elective caesarean section under SAB in mentioned and in our study are same. We can minimize the intraoperative complication by reducing the

dose of bupivacaine and adding small dose of fentanyl (15ug)

Conclusion

We can routinely use fentanyl in combination with bupivacaine intrathecally to improve the quality of subarachnoid block and reduces the dose of bupivacaine and therefore its harmful effects.

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