

Comparison of Three Different Doses of 0.75% Hyperbaric Bupivacaine for Intraoperative Analgesia in Elective Cesarean Sections

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Abstract

Background: Spinal anaesthesia is a safe and preferred mode of anaesthesia for cesarean sections all over the world. In this study we compared the intra-operative analgesia of three different doses of hyperbaric bupivacaine in pregnant patients undergoing elective cesarean sections.

Patients and Methods: 90 pregnant patients coming for elective cesarean sections, fulfilling inclusion criteria were included in this study. They were divided into

3 groups of 30 each. Group A received 1.4 ml, group B 1.6 ml and group C 1.8 ml of 0.75% hyperbaric bupivacaine. All patients were preloaded with 500 ml Ringer's lactate and spinal anaesthesia was administered in sitting position. 30 degree head down position and wedge under right hip was used in all. Vitals were taken and documented on the proforma. Sensory level was checked by using pin prick in all patients.

Surgical anaesthesia was taken as main outcome measured by using ANOVA test with $p < 0.05$ considered as significant. Peak sensory level, motor block, hypotension episodes, vomiting episodes, total amount of ephedrine used and analgesic drugs required or not were additionally noted.

Results: All the patients of three groups were similar in age ($P = 0.057$), weight ($P = 0.148$), height ($P = 0.371$), gestational age ($P = 0.656$), level at which spinal was administered ($P = 0.236$). Surgical analgesia ($P = 0.848$) was comparable among all groups. Frequency of hypotension ($P = 0.834$), peak sensory level and motor block ($P = 0.053$), episodes of vomiting ($P = 0.306$), total amount of ephedrine used ($P = 0.510$), additional use of analgesic drugs ($P = 0.700$) were also equal. All the newborns were active and there was no statistical difference in APGAR at 1 min ($P = 0.238$) and 5 min ($P = 0.680$).

Conclusion: Three different doses of 0.75% hyperbaric bupivacaine used in parturient coming for elective cesarean sections failed to show any statistically

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significant difference in the quality of analgesia.

Key Words: Cesarean section; spinal; hyperbaric Bupivacaine; doses.

Introduction

Rate of caesarean is at rise all over the world.^{1,2} Choice of the anaesthesia depends upon the urgency of surgery, choice and ease of anaesthetist and willingness of patients. This choice could either be spinal, epidural or combined spinal epidural but spinal is commonly practiced.³ General anaesthesia is avoided in parturient due to their airway problems and risk of aspiration pneumonitis.⁴ In regional anaesthesia patient remains awake, can see her child, and foetus is less exposed to the anaesthetic drugs.⁵ Spinal anaesthesia is commonly used for the cesarean section.⁶ It is safer for the mother and favorable for the fetus.⁷ Spinal anaesthesia has quick and reliable onset than epidural anaesthesia.

Epidural anaesthesia has the advantage of post-operative analgesia management.

Combine spinal epidural is a wonderful combination getting the advantage of both quick and intense spinal block and post operative analgesia management with epidural catheter. Drugs distribution in CSF depends upon the drug, dose, concentration, baricity, position of the patient, additives and many other factors.¹⁶⁻²⁰ Various doses of bupivacaine for cesarean sections had been studied to find out safe, small and effective dose. Small doses of isobaric bupivacaine are associated with rapid motor recovery than less hypotensive episodes.¹⁷

We compared the efficacy of locally practiced 3 different doses of 0.75% hyperbaric bupivacaine for elective cesarean sections to see the minimal effective dose in our population.

Methods

The study was conducted between September 09 to November 09 in OBGY operating rooms of Nawaz Sharif Social Security teaching hospital Multan Chungi Lahore Pakistan. After taking permission from institutional review board, and informed consent of the patients, 90 ASA I and II full term parturients planned for elective cesarean sections were included in this study. Patients giving a history of high-risk pregnancy, pregnancy induced hypertension, ante partum haemor-

rhage, twin pregnancy, and emergency cesareans were excluded from the study. Additionally if patient have any contraindication to spinal anaesthesia like, infection at the site of injection, spinal deformity, coagulopathy, peripheral neuropathy and known hypersensitivity to amide local anaesthetics were also excluded from the study.

All patients had their pre-operatives day before surgery. Routine investigation including CBC, blood grouping, coagulation profile, screening for Hep. B & C, urinalysis, liver and renal profile and any specific lab if required were done preoperatively. Patients were kept fasting from midnight. In the operation theater monitors including NIBP, ECG, SPO₂ were applied and baseline readings noted. Intravenous line was secured and preloading with Ringer's lactate 500 ml done in all. The patients were randomly allocated to one of the three groups. They were divided into 3 groups of 30 each. Group A received 1.4 ml, group B 1.6 ml and group C 1.8 ml of 0.75% hyperbaric bupivacaine. After taking all aseptic measures spinal anaesthesia was administered in sitting position using 25G Quincke type spinal needle. Drug was injected after ensuring free flow CSF aspiration. Immediately patients were lie down in 30 degree head down position and wedge was placed under right hip. Initial blood pressure was measure with 2 min interval for first 10 minutes and then 5 min interval afterward. Hypotension was taken as > 30% decrease in baseline blood pressure or < 90 mm of Hg systolic blood pressure. Sensory level was checked by using pin prick method. Motor block was assessed by using Bromage scale will be measured as; 0 – full extension of feet and knee possible and able to lift extended leg. 1 – unable to lift extended leg; just able to flex knees and flexion of feet. 2 – unable to flex knee but feet flexion possible; 3 – unable to move legs or feet.

Variables Measured

Our primary outcome measure was intra-operative analgesia. Degree of analgesia was classified as:

- E: Excellent analgesia providing good surgical relaxant and patient satisfaction.
- M: Mild to moderate pain requiring addition of analgesic drug but good surgical relaxation.
- P: Severe pain and inadequate relaxation requiring conversion of spinal anesthesia to general anaesthesia.

Other parameters measured included:

Table 1: Statistical Analysis of Data.

Group		Age	Weight	Height	Gestation	Sensory	Vepressor	Apgar ¹	Apgar ⁵	Hypotension
A	Mean	26.40	63.30	5.110	38.80	5.67	7.17	6.77	9.03	1.43
	N	30	30	30	30	30	30	30	30	30
	Std. Deviation	3.953	8.631	.2295	1.064	2.383	13.814	1.165	.615	1.888
B	Mean	25.67	66.07	5.023	38.57	4.90	7.50	7.27	9.37	1.70
	N	30	30	30	30	30	30	30	30	30
	Std. Deviation	2.881	9.829	.2674	.971	1.423	14.957	.740	.809	1.765
C	Mean	28.03	67.40	5.0 NV * group Cross tabulation Count 77	38.70	4.60	4.17	7.07	9.43	1.57
	N	30	30	30	30	30	30	30	30	30
	Std. Deviation	4.537	7.541	.2176	.915	1.133	5.736	1.413	.679	1.455
Total	Mean	26.70	65.59	5.070	38.69	5.06	6.28	7.03	9.28	1.57
	N	90	90	90	90	90	90	90	90	90
	Std. Deviation	3.936	8.788	.2391	.979	1.770	12.168	1.146	.719	1.696

P value > 0.05

- Sensory level.
- Frequency of hypotension.
- Total amount of ephedrine used.
- Analgesic drug top up required or not.
- Conversion to general anaesthesia.
- Nausea and vomiting.
- APGAR score at 1 and 5 min.

Statistical Analysis

Data analysis was done using the SPSS version 14.0 for Windows. P value > 0.05 was taken as non-significant.

One way ANOVA test was applied to find out the statistical significant differences in the patient parameters and outcome measures.

Results

In our study all patients of three groups were similar in age 26.70 ± 3.90 (P = 0.057), weight 65.59 ± 7.80 (P = 0.148), height 5.07 ± 0.23 (P = 0.371) and gestational age 38.69 ± 0.97 (P = 0.656).

Level at which spinal was administered (P =

Table 2: Frequency of Nausea and Vomiting.

	Group			Total
	A	B	C	
NV Yes	2	1	2	5
NV No	28	29	28	85
Total	30	30	30	90

P value > 0.05

0.236) was also comparable among all. Maximum sensory level remained $T 5.06 \pm 1.77$ ($P = 0.053$).

Surgical analgesia ($P = 0.848$) was comparable among all groups. 8 patients in group A, 9 in group B and 7 in group C required some additional analgesic drug in the form of opioids or low dose Ketamine.

Frequency of hypotensive episodes remained equal among all three groups ($P = 0.834$). Total amount of ephedrine ($P = 0.510$) and analgesic drugs ($P = 700$) consumption were same.

Total episodes of vomiting ($P = 0.306$) also remained equal.

All newborn were active and there was no statistical difference in APGAR scoring at 1 min ($P = 238$) and 5 min ($P = 0.68$).

Table 3: Evaluation of Surgical Analgesia.

		Group			Total
		A	B	C	
Analgesia	E	22	21	23	66
	M	8	9	7	24
Total		30	30	30	90

P value > 0.05

Table 4: Requirement of Analgesic Drug.

		Group			Total
		A	B	C	
Drugs	Yes	4	3	2	9
	No	26	26	28	80
Total		30	29	30	89

P value > 0.05

Discussion

Cesarean mode of delivery is increasing all over the world due to multiple factors.⁸

Choices for the cesarean section would be general anaesthesia or regional anaesthesia depending upon the urgency of surgery, condition of the patient, local protocol and choice of the patients. Regional choice of anaesthesia is preferred in most of the centers.⁹

Recently in a review article, the role of regional anaesthesia techniques in obstetrics is supported. Regional anaesthesia is used for elective as well as emergency procedures. It is safer for the mother and foetus. It allows immediate contact of mother with foetus. Spinal is most common in elective while epidural for emergency cases having epidural in situ for labour analgesia. Hypotension is the most common side effect of the regional anaesthesia that is manageable and very few other side effects of this technique.¹⁰

Safety concern of general anaesthesia in obstetrics was reviewed in a recent review article and it favored the mode of general anaesthesia in obstetrics due to improvement in the management of gastric aspiration and difficult airway.¹¹ There are many choices of local anaesthetics for spinal anaesthesia but hyperbaric 0.75% bupivacaine is most commonly practiced in Pakistan due to its easy availability but now 0.5% isobaric bupivacaine is also available in the market.

Bupivacaine is preferred in obstetric practice because of long duration, differential sensory and motor block, lack of tachyphylaxis and low concentration in the foetus umbilical cord.^{12,13}

Bupivacaine related cardio-toxicity is an alarming issue^{14,15} for which other options in the form safe alternative drugs and additives are opted to improve safety. In cesarean section the addition of fentanyl and morphine has show to reduce the dose of bupivacaine and produced acceptable sensory level and good surgical anaesthesia with few complications.^{16,17}

Studies regarding role of baricity have controversial results. Some studies favored isobaric bupivacaine in producing rapid onset more motor block for prolong duration¹⁸ while others associated isobaric bupivacaine with more hypotension and delayed onset.^{19,20}

Various doses of bupivacaine for cesarean sections had been studied to find out safe, small and effective dose. Small doses of isobaric bupivacaine are associated with rapid motor recovery than less hypotensive episodes.¹⁷ Head down positioning just after the block also supports the benefit of small dose of hyperbaric bupivacaine for cesarean sections.²¹

Our study has failed to show any statistically significant difference of the small dose hyperbaric bupivacaine for elective cesarean section over large doses. Comfort of the patients and surgical anaesthesia was comparable among all three groups. Hypotension severity and requirement of analgesic drugs were also same. None of the patients required conversion of block to general anaesthesia.

Conclusion

Our study failed to demonstrate statistically significant difference of higher doses for intra-operative analgesia in elective cesarean sections in our population group.

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