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COMPARISON OF MATERNAL HYPOTENSION OF TWO DIFFERENT DOSES (12MG AND 15MG) OF 0.75% BUPIVACAINE SPINAL ANESTHESIA IN C-SECTION AT AIMS HOSPITAL MUZAFFARABAD

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Abstract

This is a summary of a study conducted at Aims Muzaffarabad AJK from April 2024 to Sep 2024, which compared the effects of two different doses of bupivacaine (12mg and 15mg) on maternal hypotension after spinal anesthesia in patients undergoing elective cesarean section. The study found that 16% of patients in Group A (12mg bupivacaine) experienced hypotension 24 % of patients in Group B (15mg bupivacaine) experienced hypotension. We also compared other complications such as bradycardia, respiratory depression, nausea/vomiting, and patient irritation. The study concludes that a spinal dose of 12mg bupivacaine causes less maternal hypotension compared to 15mg, and these findings can help prevent significant hypotension in patients undergoing elective cesarean section under spinal anesthesia, as well as avoid harmful medications like volume overload and vasopressors for correction of drug-induced hypotension.

Here is a breakdown of the study:

Study design: *Experimental study*
Sample size: *100 patients (50 in each group)*
Inclusion criteria: *Patients between 20-45 years, ASA physical status I & II, undergoing elective cesarean section, intervertebral Space L3, L4.*
Intervention: *Spinal anesthesia with 12mg or 15mg bupivacaine*
Outcome measure: *Frequency of maternal hypotension*
Results: *Less hypotension in Group A (12mg) compared to Group B (15mg)*

This study contributes to the existing literature on optimizing spinal anesthesia for cesarean sections while minimizing maternal hypotension.

INTRODUCTION

Spinal anesthesia is a type of regional anesthesia that involves the injection of a local anesthetic into the spinal fluid surrounding the spinal cord, typically in the lower back (lumbar region), to produce numbness, muscle relaxation, and pain relief in the lower abdomen, legs, and pelvis. Spinal anesthesia is also known as intrathecal anesthesia or subarachnoid block. This approach provides effective pain relief while minimizing impact on the rest of the body's circulatory system. [(1)]. on the other hand, the major

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disadvantage of spinal anesthesia is that it is very difficult to predict height of block, extent and the level of spread after the injection. It varies patient to patient primarily depending on local anesthetic agent properties, position of the patient along with the level of prick [2, 3]. Blocks that involve segments higher than desired put the patients on risk of complications associated with either higher spinal or total spinal anesthesia. Thus, extreme care must be taken while performing such blocks. Its importance has further strengthened among obstetric population presenting for the cesarean sections, because of enhanced intra-abdominal pressure thus causing more cephalad spread of the local anesthetic drug, thus causing higher incidence of complications [4], cesarean section is usually performed via lower segment of the uterus (LSCS).It seems that only the nerves supplying the lower abdomen should be blocked in order to carry out such operations. But the dermatomal innervations and manipulation of the structures attached with uterus during the procedure risks surgical complications and primarily the pain, during this procedure [5, 6]. In keeping this anatomical distribution, a minimal sensory block up to T4-T5 has been recommended to carry out cesarean section without putting the patient in pain and further associated complications related with the procedure[7]. Theoretically and most of the times practically, blocks up to the T4 sensory levels provide adequate anesthesia to conduct the operation comfortably, but some peritoneal innervations still may get spared thus causing feeling of slight pain during the procedure[8]. Patients counseling, reassurance, coordination of the surgeons and finally supplemental analgesia may prevent such minor discomfort during the operation [9]. The technique of anesthesia for cesarean section depends on indications of cesarean, its urgency, physical status of the patient and the preference of patient and surgeon [8, 9]. Regional anesthesia is more preferred because of less risk of gastric aspiration, failed intubation and depressant effects of anesthetic drugs on fetus [10] Hyperbaric bupivacaine is one of the commonly administered spinal anesthetic agents for caesarean section that is associated with significant maternal hypotension [11]. The magnitude of problem is very high with conventional dose of 12-15 mg hyperbaric bupivacaine with reported incidence of 69% to 80% [12]. Adjusting the appropriate dose of hyperbaric bupivacaine will produce effective surgical anesthesia with minimal maternal and neonatal side effects [13]

"Using a lower dose of hyperbaric bupivacaine in spinal anesthesia has been shown to have several advantages over traditional dosing. These benefits include improved stability in maternal blood pressure and circulation, as well as increased patient satisfaction due to reduced motor duration blockage and shorter of numbness. This approach can lead to better outcomes for mothers undergoing spinal anesthesia [14]. Maternal hypotension is the most frequent complication of spinal anesthesia with incidence approaching 90% Untreated severe hypotension can pose serious risks to both mother (unconsciousness, pulmonary aspiration, apnea, or even cardiac arrest) and baby (impaired placental perfusion leading to hypoxia, fetal acidosis, and neurological injury). Although there is some variation, most workers define hypotension as a maternal systolic blood pressure below 70% to 80% of baseline recordings, an absolute value of less than 90 mmHg to 100 mmHg, or both [15].

The objective of study was to evaluate whether the administration of 12mg of 0.75% bupivacaine was helpful than 15mg of 0.75% bupivacaine in reducing maternal hypotension in spinal anesthesia during caesarean section. The results, which obtained from this study, will help us for preventing hypotension in these patients who undergoes for elective caesarean section under regional anesthesia and to avoid harmful medication like volume overload and use of vasopressors for correction of drug-induced hypotension [16].

Materials and Methods

The objective of this randomized controlled study was to compare the frequency of maternal hypotension following spinal anesthesia with 12 mg versus 15 mg of 0.75% bupivacaine in elective caesarean sections. Conducted in the Department of Anesthesiology, AIMS AJK Muzaffarabad, from April to September 2024, the study included 100 patients aged 20–45 years with ASA physical status I or II. Spinal anesthesia was administered at the L3-L4 intervertebral space. Patients were excluded if they had uncontrolled systemic diseases (e.g.,

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hypertension, diabetes, cardiac conditions), were undergoing emergency procedures, had allergies to bupivacaine, or met other exclusion criteria such as coagulopathy, infection at the injection site, hypovolemia, increased intracranial pressure, abnormal block levels, extreme weight, or ASA status III or higher. Informed consent was obtained from all participants prior to enrollment.

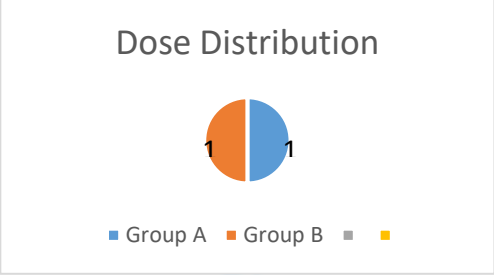
Results

A total of 100 cases fulfilling the inclusion/exclusion criteria were enrolled to compare the frequency of maternal hypotension between spinal doses of 12mg and 15 mg of 0.75% hyperbaric bupivacaine in elective cesarean section. Total no of patients was 100. Group A contain 50 patients and Group B contain 50 patients (table 4.1)

Groups	Size
Group A	50
Group B	50

All the patients in Group A were given 12mg of Bupivacaine and 15mg were given to all patients in Group B (Table 4.2)

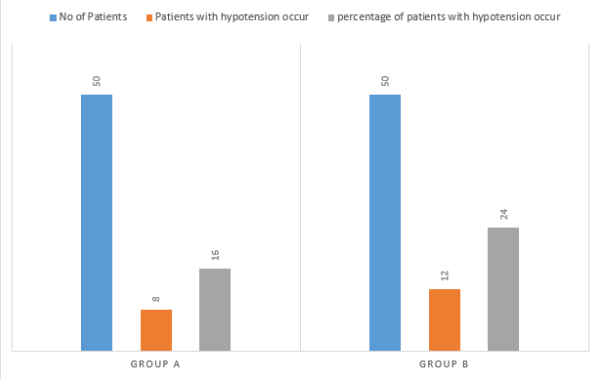
GROUPS	NO. OF PATIENTS	DOSAGE O BUPIVACAINE
Group A	50	12mg
Group B	50	15mg



Blood pressure was regularly monitored in all patients, hypotension was recorded properly.
The frequency of hypotension varied in two different doses are between Group A and Group B.

Table 4.3: showing hypotension occurrence in groups.

Groups	Total no of patients in Groups	No of patients in which hypotension occur	%age of patients in which hypotension occur
Group A	50	8	16%
Group B	50	12	24%



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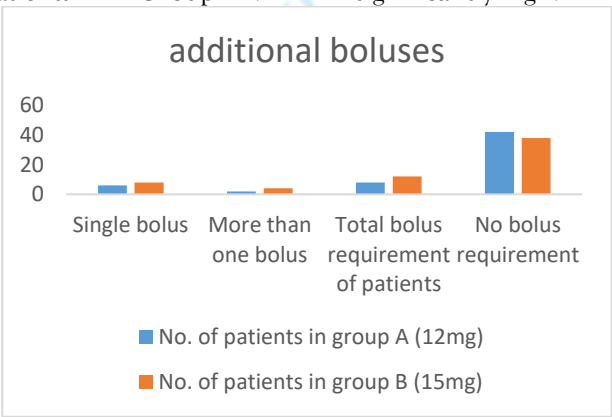
Comparison of complications:

In our study, we compared the complications i.e. hypotension, bradycardia, respiratory depression, nausea/vomiting and patient irritation. Hypotension occurred in 16% of patients in group A while 24% of patients in group B. Incidence of bradycardia occurred in 8% patients in group A and 16% patients in group B. Similarly, respiratory depression and nausea/ vomiting occurred in 6% and 20% of patients in group A and 14% and 30% of patients in group B respectively. Frequency of irritation in Group A were 12% and 18% in Group B. Result of statistical analysis revealed that hypotension in group A was 0.1600±0.3707 and in Group B hypotension was 0.3400±0.4785 with the P value of 0.38 which showed significant result with lesser incidence of hypotension in Group A is comparison with Group B. After these data, we concluded that there is less complications in Group A as compared to Group B.

Table: 4.5: comparison of complications

Variables	Group A (12mg) Mean±S.D	Group B (15MG Mean±S.D	P. Value
Hypotension	0.1600±0.3703	0.3400±0.4785	0.38
Bradycardia	0.0800±0.2740	0.1800±o.3880	0.140
Respiratory depression	0.1200±0.3282	0.2200±0.4184	0.187
Nausea/vomiting	0.1600±0.3703	0.2800±0.4535	0.150
Patient irritation	0.3400±0.4785	0.1800±0.3880	0.069

Additional boluses of vasopressor were required in both groups A and B. In Group, A (12mg) 8 patients received vasopressors and 12 patients in Group B received additional dose of vasopressor. As shown in table 4.5 additional bolus requirement of patient to correct hypotension in Group A was less compared to bolus requirement of patients in Group B. Therefore, it revealed that 12mg of 0.75% Bupivacaine cause less hypotension and then requirement of additional IV fluid and vasopressor to correct hypotension in comparison with 15mg of 0.75% Bupivacaine Group in which incidence of hypotension and vasopressors requirement is significantly high.



Discussion

Spinal anesthesia is preferred anesthetic technique for elective caesarean deliveries. Hypotension is most common side effect and has both maternal and neonatal consequences. Different strategies have been to pervert spinal induced hypotension, including the use of low dose Bupivacaine.

The present study was conducted to find out the comparison of maternal hypotension between two different doses 12mg and 15mg of 0.75% Bupivacaine in spinal anesthesia caesarean section. In this study, we identified that using low dose Bupivacaine causes less maternal hypotension as compared to conventional dose of 0.75%

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Bupivacaine in spinal anesthesia during caesarean sections. We also found that low dose spinal drug Bupivacaine decreases maternal side effects (hypotension, bradycardia, intra operative nausea vomiting, and ponv) short stay in recovery room and improve maternal satisfaction.

In previous study conducted in 2010, *Mebazaa at; al* compared the efficacy and adverse effect of low dose Bupivacaine (7.5mg) with conventional dose (10mg) for elective C section which revealed 23% reduction in the incidence of1 maternal hypotension in low dose group as compared to unconventional group .

Sample of 100 patients was taken and divided into two groups of 50 each. One group received conventional dose of 12mg of 0.75% bupivacaine while the second group received high dose 15mg of 0.75% bupivacaine. Our study, showed significant result with lesser incidence of hypotension in Group A as compared to Group B.

Additional boluses was given to 16% patients in 12mg of 0.75% of bupivacaine group and 24% of patients in 15mg of 0.75% of bupivacaine group. Additional boluses of vasopressors were required in both groups A and B. In A (12mg) group, 8 patients received vasopressors and 12 patients in group B received additional dose of vasopressor. As showed in table 4.5. Additional bolus requirement of patients to correct hypotension in group A was less as compared to bolus requirement of patients in group B. Therefore, it revealed that 12mg of hyperbaric Bupivacaine cause less hypotension and then requirement of additional IV fluid and vasopressors to correct hypotension in comparison with 15mg of 0.75% Bupivacaine group in which incidence of hypotension and vasopressors requirement is significantly high.

In previous study, the use of low dose Bupivacaine (7.5 to 10mg) may not cover the analgesic effects as whole, the patient could feel pain about 71%, so adjuvants were used with local anesthetic to improve the analgesic effect, and this effect was not included in our study being the limitations of our research, which may be done in coming trials.

Conclusion

Our study demonstrated that a spinal dose of 12mg of 0.75% Bupivacaine resulted in less maternal hypotension as compared to 15mg of 0.75% Bupivacaine in patients undergoing caesarean section. This finding is significant because it enables us to minimize the risk of hypotension in patients undergoing elective caesarean section under spinal anesthesia. Additionally, our results suggest that using a lower dose of Bupivacaine can help avoid the need for pharmacological interventions, such as volume expansion and vasopressor administration, which can have harmful side effects. By using a lower dose of Bupivacaine, we can provide a safer and more effective anesthetic technique for our patients.

Limitation

This study has several limitations that should be considered when interpreting the results. First, the sample size was relatively small and drawn from a single center, AIMS Hospital Muzaffarabad, which may limit the generalizability of the findings to broader populations or different clinical settings. Additionally, only two specific doses of 0.75% bupivacaine (12 mg and 15 mg) were evaluated, leaving the effects of other doses unexplored. The study primarily focused on the immediate incidence of maternal hypotension during cesarean section, without assessing long-term maternal or neonatal outcomes. Furthermore, factors such as patient comorbidities, fluid management, and use of vasopressors were not standardized, which could have influenced the incidence and severity of hypotension. Variability in the clinical definition and measurement of hypotension may also have affected the consistency of the results. Lastly, if blinding of anesthesiologists or outcome assessors was not implemented, there is a potential risk of bias in treatment administration and data collection.

RECOMMENDATIONS

Administration of 15mg of 0.75% Bupivacaine via spinal dosing may lead to significant hypotension in patients undergoing elective caesarean section under spinal a anesthesia. To minimize this risk, our findings suggest that using a dose of 12mg Bupivacaine may help prevent significant hypotension. Moreover, this approach can also help avoid the need for harmful medications, such as excessive fluid administration (volume overload) and vasopressors, which are used to correct drug induced hypotension. By using the optimal dose of

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Bupivacaine, we can provide a safer and more effective anesthetic technique for our patients.

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