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COMPARISON OF INTRATHECAL BUPRENORPHINE VERSUS CLONIDINE AS AN ADJUVANT TO 0.5% HYPERBARIC BUPIVACAINE IN LOWER ABDOMINAL SURGERIES

Anaesthesiology

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ABSTRACT

Introduction: Management of postoperative pain is an important part of post-operative care. Spinal anesthesia when used with adjuvants can prolong analgesia well into the early postoperative period and is one of the commonly used methods in most lower abdominal and lower limb surgeries

Methods: 90 ASA I and II patients undergoing lower abdominal surgeries were randomly allocated into three groups(n=30). Group A received 3ml of 0.5% hyperbaric bupivacaine with 1ml normal saline, GroupB received 3ml of 0.5% hyperbaric bupivacaine with 60 mcg buprenorphine(1:5 dilution) and Group C received 3ml of 0.5% hyperbaric bupivacaine with 30mcg clonidine(1:5 dilution) respectively (Total volume 4ml).

Results: VAS score was statistically significant throughout the postoperative period and itwas highest in Group A (control group) and lowest in Group C (clonidine group) ($p<0.05$) from 90 minutes postoperatively up to first request for rescue analgesic.

Conclusion: On comparing the two drugs, Clonidine appears to be superior in terms of postoperative analgesia.

KEYWORDS

Clonidine, Buprenorphine, Intrathecal

INTRODUCTION

Acute postoperative pain is due to the complex physiologic reaction to tissue injury manifested by autonomic, behavioral and psychological responses that result in unpleasant sensory and emotional experience. The various modalities for treatment of post-operative pain include the use of systemic analgesics, neuraxial techniques, and regional nerve blocks. Among these, spinal anaesthesia is the most commonly used neuraxial technique for various types of lower abdominal and lower limb surgeries.[1]

Lower abdominal surgeries may be performed under regional (spinal or epidural) or general anaesthesia. Spinal block is still the first choice because of its rapid onset, superior blockade, lower risk of infection, lesser failure rates, and cost-effectiveness but has the drawbacks of shorter duration of block and less postoperative analgesia.Local Anaesthetics when used alone is associated with short duration of action. Thus, early analgesic intervention is needed in postoperatively period. Various adjuvants have been used intrathecally to improve the quality and duration of spinal anaesthesia with better postoperative analgesia like epinephrine, neostigmine, midazolam, ketamine, fentanyl, buprenorphine, clonidine and dexmedetomidine.[2]

With this background, this study was designed to compare the efficacy of intrathecal buprenorphine and clonidine with control group for onset and duration of sensory and motor block, duration of analgesia, sedation and to evaluate the side effects, if any.

MATERIAL AND METHODS

This was a randomized, double blind study, 90ASA I and II, aged 25-55yrs, of either sex, body weight 45-70kgs scheduled for lower abdominal surgeries under spinal anaesthesia were chosen for the study.

Preanaesthetic check-up was done one day prior to the surgery. Patients were evaluated for any systemic diseases and laboratory investigations recorded. The patients with contraindication to spinal anaesthesia (e.g. coagulation defects, infection at puncture site and allergy to drugs used) were excluded from the study.

The patients were educated about the use of visual analog scale (VAS) scoring system. On the day of surgery patients were randomly allocated into three groups (n=30) using sealed envelope technique.

After confirming overnight fasting, patient was taken on the operation table, was connected to monitors and baseline vitals like BP, pulse rate, respiratory rate was recorded. After an 18G intravenous cannula was inserted at the forearm level, lactated Ringer's solution was administered as a bolus of 10ml/kg before subarachnoid block to all patients.

Vitals were noted just before lumbar puncture. Spinal anaesthesia was performed at L3-L4 interspace with the patient in sitting position by using a 25G Quincke needle under strict aseptic conditions. Free flow of cerebrospinal fluid was verified before injection of the anaesthetic solution 4ml volume, which was administered over 30 seconds. The drug compositions were according to group to which patients were allocated. Group A received 3ml of 0.5% hyperbaric bupivacaine with 1ml normal saline, Group B received 3ml of 0.5% hyperbaric bupivacaine with 1ml (60mcg) of buprenorphine (1:5 dilution) and Group C received 3ml of 0.5% hyperbaric bupivacaine with 1ml (30mcg) clonidine (1:5 dilution).The direction of the needle aperture was cranial during the injection. All patients were immediately placed in supine position. All the patients in three groups received identical volume (4ml) of study drug prepared in an identical syringe by an anaesthesiologist who was not involved in the anaesthetic management of the patients. Monitoring was done using continuous electrocardiography (lead II & V), heart rate, non-invasive blood pressure and continuous pulse oximetry ($Sp0_2$) and patients were given 4.0L/min of oxygen by venti-mask.Vitals were checked every 5 minutes for first 30 minutes then every 10 minutes till the end of the surgery. When adequate spinal block was achieved, the time from the end of intrathecal injection to readiness for surgery was recorded. Then the patient was positioned for planned surgery.

Statistical Analysis

Statistical analysis was performed with SSPS (Statistical Package for the Social Sciences) software version 21 (SPSS inc., Chicago, IL,USA).

RESULTS

The demographic data, such as age, sex, height, weight, ASA status, type of surgery and duration of surgery were comparable among the groups thereby not having any influence upon the outcomes. There was no statistically significant differences in the demographic variables between the groups ($p>0.05$).

Table 1: Demographic Variables (Mean±SD)

Parameters	GroupA (n=30)	Group B (n=30)	Group C (n=30)	P value
Age (years)	42.25±7.14	40.10±6.32	41.40± 6.21	>0.05
Sex (M/F)	7/23	7/23	8/22	>0.05
ASA I/II	22/8	27/3	25/5	>0.05

All groups were comparable.

The hemodynamic parameters such as pulse rate, mean systolic blood pressure (SBP), mean diastolic blood pressure (DBP) and mean arterial pressure (MAP) were not statistically significant at different time intervals intraoperatively and postoperatively ($p>0.05$).

VAS score was statistically significant throughout the postoperative period and itwas highest in Group A (control group) and lowest in Group C (clonidine group) ($p<0.05$) from 90 minutes postoperatively up to first request for rescue analgesic.

Postoperative Sedation score was significantly more in patients of Group C and Group B as compared to control group.

Table 2: Characteristics Of Motor And Sensory Block

Parameters	Group A		Group B		Group C		p-value
	Mean	SD	Mean	SD	Mean	SD	
Duration of analgesia (min)	132.21	19.11	272.12	24.42	353.49	37.46	0.01
2 segment regression (min)	93.23	23.19	119.36	11.23	165.32	22.12	0.01
Duration of motor block (min)	115.23	16.02	201.23	46.06	232.30	37.26	0.01
Onset of sensory block (min)	5.09	1.15	3.31	0.72	3.05	0.79	0.01
Onset of motor block(min)	5.62	1.39	4.13	0.78	4.01	0.58	0.01

Data presented as Mean±SD. SD-Standard deviation, $p<0.001$ suggests statistically significant difference. Group A- Control; B-Buprenorphine; C-Clonidine. Statistical test- ANOVA test, Post Hoc turkey test.

DISCUSSION

With this background a comparative study was performed to know the effectiveness of intrathecal buprenorphine versus clonidine as adjuvants to 0.5% hyperbaric bupivacaine in patients undergoing lower abdominal surgeries in relation to time of onset and duration of motor and sensory block and duration of analgesia. Incidence of side effects were also noted and compared.Our study showed that patients receiving 0.5% Bupivacaine had least duration of analgesia (131.50 minutes) whereas addition of 60 µg buprenorphine to 0.5% bupivacaine, the duration increased to 277.10minutes but when 30µg clonidine was used as an adjuvant, the duration was maximally prolonged upto 354.50 minutes. Our results have been strengthened by findings of **Rashmi Pal et al**[6] who demonstrated prolonged analgesia with 50mcg clonidine(353.19±7.69min) and 75mcg buprenorphine (294.00±17.93min). When clonidine used intrathecally prolongs the analgesic action by acting spinally through the activation of postsynaptic alpha2 receptors in substantia gelatinosa of spinal cord[15,16]and block the conduction of C and A delta fibres.[3]

Our results were further strengthened by findings of **Negi AS et al**[5] who showedduration of analgesia was more with 37.5mcg clonidine (355.80±63.85 min) as compared to 75mcg buprenorphine (283.20±51.84 min). Similarly, **Srinivasagam K et al**[7] also found addition of 50 mcg clonidine to hyperbaric bupivacaine increases the duration to first time of rescue analgesia. Similar results were shown by **Lomate P et al**[8] who used 30mcg clonidine. We also used 30 mcg clonidine in our study which showed similar results to all above studies.

The onset of sensory and motor block was not prolonged in clonidine and buprenorphine.Our results were supported by the study done by **Lomate P et al**[8],**RashmiPal et al**[6]and**Srinivasagam K et al**[7]. The duration of sensory block and motor block was more with clonidine as compared to buprenorphine and control group. **Lomate P et al**[8] observed similar results which used 30mcg clonidine in their study.

In our study hemodynamic parameterswere comparable at different time intervals intraoperatively and postoperatively. Many studies who have used very low doses of intrathecal clonidine such as 15-30 mcg[2,4]in humans found no hemodynamic instability which is proven in our study as we have used low dose clonidine (30mcg).Our findings are similar to study done by **Negi AS et al**[5] who had used 37.5mcg clonidine in patients undergoing lower limb surgeries showed no hemodynamic instability.

In our study, postoperative sedation score was highest with clonidine group. Patients developed sedation as assessed by sedation scores but were easily arousable.

CONCLUSION

Clonidine appeared to be better in terms of prolongation of the duration of analgesia as compared to buprenorphine.

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