Original Research Article

A comparative study on two doses of clonidine 45mcg Vs 60mcg added to 0.5% hyperbaric bupivacaine given intrathecally for infra umbilical surgeries

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Abstract

Background: This study was designed to evaluate the addition of two doses of clonidine (45 µg and 60µg) added to hyperbaric bupivacaine (0.5%) 2.75ml in spinal anaesthesia for sub umbilical surgeries. **Aim of Study:** Time to onset of sensory and motor block, Duration of sensory and motor block, Duration of effective post operative analgesia, Side effects **Materials and Methods:** A total of 60 patients were included in this double blinded randomized controlled study. Patients were divided into 3 groups. Patients in group B received 2.75ml of 0.5% hyperbaric bupivacaine plus 0.4ml saline. Patients in group C1 received 2.75ml of hyperbaric bupivacaine with 45µg of clonidine. Patients in group C2 received 2.75ml of hyperbaric bupivacaine with 60µg of clonidine. **Results:** The results showed that patients who received 2.75ml of hyperbaric bupivacaine with 60µg clonidine has proved to be a better adjuvant in prolonging the sensory and motor blockade intra operatively and duration of effective post operative analgesia compared to 45µg, without significant adverse effects.

Key Words: hyperbaric bupivacaine, intrathecal, post operative analgesia, sensory block.

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INTRODUCTION

Local anesthetics are the commonest agents used for spinal anesthesia, but their relatively short duration of action may lead to early analgesic intervention in the postoperative period.[1,2] A number of adjuvants to local anesthetics have been used intrathecally to prolong the intraoperative as well as postoperative analgesia.[3] Opioids are commonly used as intrathecal adjuvants to improve the quality of intraoperative analgesia and prolong it in the postoperative period without significant motor or autonomic blockade. However, side effects such as pruritus, nausea, vomiting, urinary retention, and delayed respiratory depression have prompted further research toward non-opioid analgesics with less serious side effects. Clonidine, a selective partial α2-adrenergic agonist, is being extensively evaluated as an adjuvant to intrathecal local anesthetics and has proven to be a potent analgesic free of opioid-related side effects.[4] It is known to increase both sensory and motor blockade of local anesthetics.[5] Intrathecal clonidine has been used as an adjuvant to local anesthetics in various surgical procedures without any clinically significant side effects.[6,7] Previous studies have described the use of clonidine in a wide range (15—150 µg).[7,9] This study was designed to evaluate the addition of two doses of clonidine (45 µg and 60µg) added to hyperbaric bupivacaine (0.5%) 2.75ml in spinal anaesthesia for infra umbilical surgeries.

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MATERIALS AND METHODS

This study was conducted at the Narayana Medical College Hospital, Nellore- between OCTOBER 2011 to August 2013 on 60 patients of ASA physical status I and II undergoing infra umbilical surgeries.

Study Design: This study was done in a prospective double blinded randomized manner.

Selection of Cases Inclusion criteria

- Patients in age group of 20 to 60 yrs.
- ASA – I and II
- Infra umbilical surgeries.

Exclusion Criteria

- ASA – III and IV
- Patient refusal
- Renal / hepatic dysfunction
- Allergy to drugs
- Contra indication to sub arachnoid block.

A total of 60 patients were included in this double blinded randomized controlled study. Patients were divided into 3 groups. Patients in group B received 2.75ml of 0.5% hyperbaric bupivacaine plus 0.4 ml saline. Patients in group C1 received 2.75ml of hyperbaric bupivacaine with 45 µg of clonidine. Patients in group C2 received 2.75ml of hyperbaric bupivacaine with 60µg of clonidine.

Pre Anaesthetic Evaluation: Patients included in the study underwent thorough pre-operative evaluation which included the following

History: History of underlying medical illness, previous surgery, anaesthesia and hospitalization. Patients were advised overnight starvation.

Physical examination

1. General condition of the patient, 2.Vital signs, Height and weight,
2. Examination of Cardiovascular, Respiratory, CNS and vertebral columns
3. Airway assessment

Investigations: Hb, PCV, BT, CT, RFT, blood sugar, ECG, CXR, platelet count, Blood grouping and cross matching were done. Patients who satisfied the inclusion criteria were explained about the nature of the study and the anaesthetic procedure. Written informed consent were obtained from all patients included in the study.

How Double Blinding Was Done: Allotment of cases was done by computerized lots. The Consultant who made the drug combination took no further part in the study. We performed the subarachnoid block and made intraoperative observations. Postoperatively in the recovery room, observations were done.

Technique: In the OT, appropriate equipment for airway management and emergency drugs were kept ready. Patient was shifted from premedication room to the OT after giving oral diazepam 5mg 2hrs prior to surgery. The horizontal position of the operating table was checked and patient shifted to the table I.V. line was started and intra venous fluids started. NIBP, SpO2, ECG leads were connected to the patient. Pre operative baseline systolic and diastolic BP, PR, SpO2 and RR were recorded. SAB and observations were made in all the patients involved in the study. Under strict aseptic precautions a midline lumbar puncture was performed using a 23/ 25G Quincke needle in sitting position/right lateral decubitus position. The patient was then immediately placed in supine position. Lumbar puncture was successful in first attempt in almost all patients. The time for intrathecal injection was considered as 0 and the following parameters were observed - sensory blockade, motor blockade, duration of analgesia and sedation.

Vital signs and side effects: The PR, systolic and diastolic BP and SpO2 were recorded every min for 5 mins and then every 5 mins throughout the intra operative period. The above vital signs at the completion of surgery were noted. Hypotension defined as fall in systolic BP > 30 % from baseline or MAP <60 mmHg. This was managed with inj. Ephedrine 6mg increments. Bradycardia was defined as HR <50 /min and this was managed with inj. Atropine 0.01mg/kg i.v. Respiratory depression defined as RR <8/min and or SpO2 <85%

Assessment in Recovery Room: Patient was shifted to recovery room after completion of surgery, the vital signs were recorded, every 15 mins in the 1st hr after surgery and 30 mins interval for next 2 hrs and thereafter at hourly intervals for next hrs. Sensory and motor block assessment were done every 15 mins till recovery of pin prick sensation to L1 and BROMAGE score of 1 respectively. Patients were shifted to post operative ward after complete resolution of motor blockade

Assessment of pain and duration of analgesia: In the recovery room pain assessment using VAS were done every15 mins. At the end of surgery, the degree of pain was assessed using VAS scale till VAS score >4 was reached. Whenever the patient complained of pain and rescue analgesic Inj. Diclofenac 75mg i.m was given. Duration of effective analgesia was defined as time interval between onset of SAB and the time to reach VAS >=4. Patients were monitored for 24 hrs to detect the occurence of side effects - respiratory depression, nausea, vomiting, dry mouth and pruritis. Patients were also enquired about the occurence of transient neurological symptoms which was described as pain / paresthesia in the neck, buttocks, legs or pain radiating to lower extremities after initial recovery from SAB within 72 hrs.

Statistical Analysis: All recorded data were entered using MS Excel software and comparisons drawn. Data was analyzed using the SPSS software for Windows version 20.0(Statistical Presentation System Software, IBM Inc. New York) and categorical tables, Student's t

test Chi-square values, Fischer extract test and the results correlated. Conclusions were drawn from the tabulated results. Test result is considered significant if *p* value is less than 0.05 (i.e. 5%).

RESULTS

Table 1: DISTRIBUTION OF MEAN AGE BY GROUPS

PARAMETERS	GROUP B	GROUP C1	GROUP C2	p- VALUE
No. Of cases	20	20	20	0.694
Mean	40	39	36	
S.D	10.23	11.65	12.6	

Table 2: Distribution of mean height (cms) by groups

PARAMETERS	GROUP B	GROUP C1	GROUP C2	p- VALUE
No. Of cases	20	20	20	
Mean	167.2	164.6	163.05	0.997
S.D	8.33	6.73	9.15	

Table 3: Distribution of mean weight (kgs) by groups

PARAMETERS	GROUP B	GROUP C1	GROUP C2	p-VALUE
No. Of cases	20	20	20	
Mean	60.4	60.9	61.0	0.98
S.D	10.53	6.73	9.59	

The groups were comparable with respect to their age and weight. There is difference among groups with regard to height, it may be due to less sample size.

Table 4: Duration of surgery

PARAMETERS	GROUP B	GROUP C1	GROUP C2	p-VALUE
No. Of cases	20	20	20	
Mean	101.25	119	99.5	0.850
S.D	39.4	45.5	34.19	

The mean duration of surgery is higher in Group-C1 compared to other two groups and Group-C2 has lower mean duration. However, there is no statistical significance among the group.

Table 5: Type of surgery by groups

SURGERY	GROUP B	GROUP C1	GROUP C2
# Both bones leg	2	4	3
DHS	3	2	3
Inguinal hernia	4	3	4
Epigastric hernia	1	1	2
# SOF	2	3	4
Appendicectomy	3	2	3
Implant exit	2	1	1
Diagnostic arthroscopy	3	3	-
Knee arthroplasty	-	1	-

Table 6: Distribution of mean onset of sensory block (secs) by groups

Parameters	Group B	Group C1	Group	P-
No. Of	20	20	20	
Mean	103	177.25	156.25	0.001
S.D	10.809	43.542	32.2357	

There is a significant difference between groups with regard to onset of sensory block, with group C2 having a rapid onset compared to C1

Table 7: Distribution of mean onset of motor block (secs) by groups

PARAMETERS	GROUP B	GROUP C1	GROUP C2	p-VALUE
No. Of cases	20	20	20	0.001
Mean	182.25	199	193.150	
S.D	29.57	15.61	11.663	

There is significant difference between groups in the onset of motor block. Group C2 has a faster onset compared to C1

Table 8: Distribution of max. sensory block among groups

PARAMETERS	GROUP B		GROUP C1		GROUP C2	
	NO	%	NO	%	NO	%
T4	0	0	6	30	10	50
T5	1	5	1	5	0	0
T6	10	50	9	45	10	50
T8	9	45	4	20	0	0

Maximum sensory block of T4 was observed in 50% of cases in group C2 and 30% of cases in group C1

Table 9: Distribution of case by groups and grade of maximum motor block

PARAMETERS	GROUP B	GROUP C1	GROUP C2	p-VALUE
No. Of cases	20	20	20	
Mean	4	4	4	0.997
S.D	0	0	0	

There is no difference between the groups in the grade of maximum motor block.

Table 10: Distribution of mean two segmental regression (mins) by groups

PARAMETERS	GROUP B	GROUP C1	GROUP C2	p-VALUE
No. Of cases	20	20	20	
Mean	128	187.05	211	0.001
S.D	16.091	8.846	21.250	

There is significant difference between groups in two segment regression with C2 having a much longer time compared to C1.

Table 11: Distribution of mean duration of motor block (mins) by groups

PARAMETERS	GROUP B	GROUP C1	GROUP C2	p-VALUE
No. Of cases	20	20	20	
Mean	188.75	263.25	284.5	0.001
S.D	13.848	12.904	16.693	

There is significant difference between groups in duration of motor block with group C2 having longer duration compared to C1.

Table 12: Distribution of mean duration of analgesia by groups

PARAMETERS	GROUP B	GROUP C1	GROUP C2	p-VALUE
No. Of cases	20	20	20	
Mean	219.25	305.75	314	0.001
S.D	9.215	17.341	28.635	

There is significant difference between groups in total duration of analgesia with C2 having a much longer duration compared to C1.

Table 13: Distribution of side effects

EFFECTS	GROUP B		GROUP C1		GROUP C2	
	NO	%	NO	%	NO	%
HYPOTENSION	2	10	1	5	2	10
BRADYCARDIA	1	5	1	5	2	10
SEDATION	0	0	10	50	20	100
DRYNESS OF MOUTH	0	0	1	5	2	10

DISCUSSION

Alpha 2 agonist clonidine added to local anaesthetics have been shown to provide excellent surgical anaesthesia. **Onset Of Sensory Block:** The mean time to onset of sensory block was 103 secs in control group. It is77.25secs in group C1 and 156.25secs in group C2. Onset time is statistically significantly prolonged in group C1.Klimscha *et al*[9] studied intrathecally administered 0.5% bupivacaine 5mg and 150µg clonidine vs plain bupivacaine and showed there is no statistically significant difference between the groups.

Onset of Motor Block: The mean time to onset of motor block was 182 secs in control group. It was 199secs in group C1 and 193 secs in group C2. There is no statistically significant diference among the three groups. This correlated with the study by Acalvoschi lurie *et al*[10] who found that addition of clonidine 2µg /k with 1mg/kg meperidine intrathecally had no significant difference compared to meperidine with epinephrine 200µg in the onset of motor blockade.

Maximum Level of Sensory Block: There was no statistically significant difference among the groups in maximum level of sensory block. De kock *et al*[11] in his study found that addition of intrathecal clonidine in increasing doses (15µg,45µg,75µg)with 8mg of ropivacaine increased the level of sensory block as the dose of clonidine increases.

Maximum Level of Motor Block: The median of maximum grade of motor block measured using modified bromage scale was grade 4 in all the groups. There is no statistically significant difference among the two groups. Klimscha *et al*[12] showed that intrathecal clonidine 150µg added to 0.5% bupivacaine significantly increased the intensity of motor block.

Mean Duration of Motor Block: The mean duration of motor block was 263 mins in group C1 compared to 284 mins in group C2. This was statistically significant and correlated with the study by Dobrydnjov *et al*[13] where clonidine combined.

Time for Two Segmental Regression: The mean time taken for two segmental regression was 211 mins in group C2 compared to 187.05 mins in group C1, group

C2 had significantly prolonged time for two segmental regression compared to C1.This correlated with the study by Fogarty *et al*[14] that addition of 75µg of clonidine with 2.75ml of 0.5% hyperbaric bupivacaine prolonged the time to two segment regression below L4 by 216+/- 97.1 mins compared with control of 138+/-59.9 mins. Fakuda *et al*[15] found in their study that time to two segment regression of sensory block was significantly prolonged when clonidine 150µg was added to 0.5% tetracaine compared with 0.5% tetracaine alone with small dose bupivacaine during subarachnoid block for inguinal hernioraphy prolonged the duration of motor block compared to bupivacaine alone. Study by Bonnet F *et al*[16] compared the effects of oral and subarachnoid clonidine on spinal anaesthesia with bupivacaine showed prolongation of motor block (175+/- 68mins) with spinal clonidine compared to oral clonidine (103±20mins).

Mean Duration of Analgesa: The mean duration of analgesia was 305 mins in group C1 compared to 314 mins in group C2. The difference was statistically significant when compared with control group B. This correlated with study by Stephen strebel[17] where he studied small dose intrathecal clonidine and isobaric bupivacaine for orthopaedic surgeries. There was significant prolongation of analgesia compared to control group. Dobrydnjov *et al*[13] also showed in his study that clonidine added to small dose bupivacaine for inguinal hernioraphy had prolonged analgesia compared to control group.

Complications: In our study, patients in both clonidine groups had sedation with RSS score ≤ 3, which did not require any active intervention. With respect to hemodynamic parameters, incidence of bradycardia and hypotension were not significantly higher in clonidine groups compared to control group. Hypotension and bradycardia were observed in 5-10% of patients in clonidine group. Hypotension was treated with ephedrine and bradycardia with atropine

CONCLUSION

In conclusion the addition of clonidine as an adjuvant to bupivacaine in subarachnoid block prolongs duration of both sensory and motor block. We conclude that 60µg of clonidine hydrochloride added to local anaesthetic in subarachnoid block has proved to be a better adjuvant in prolonging the sensory and motor blockade intra operatively and duration of effective post-operative analgesia compared to 45µg, without significant adverse effects.

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