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Comparison Of Low Doses Bupivacaine With Neostigmine Combination With Low Dose Bupivacaine With Clonidine For Subarachnoid Block

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Abstract:

Background and Objectives: Intrathecal administration of clonidine and neostigmine has been found to have effect separately on prolongation of subarachnoid block. However there have not been many researches comparing the two medications especially in this sub region. This study compared the onset of block, duration and quality of block, return of muscle functions and incidences of complication between combinations of low doses hyperbaric bupivacaine with either neostigmine or clonidine.

Methodology: This randomized double blind study was carried out on 75 ASA 1 and II patients that had caesarian section under spinal anaesthesia. They were randomized into three groups of twenty five patients each .Group A were given 2.5mls of heavy bupivacaine and 1ml of 75mcg of neostigmine while group B had 2.5mls of heavy bupivacaine and 1ml of 25mcg of clonidine and group C 2.5mg bupivacaine and Iml of normal saline. The onsets of sensory and motor blocks were noted as well of duration of block and time of return of muscle functions. Incidence of complications was also recorded.

Results: The results showed that Onset of sensory and motor blocks were earlier in groups A and B than in the group C however it was much earlier in group B. The duration of block in the order of decreasing order was B, A and C.There was more incidence of vomiting in group B more than A while there were only few incidence of vomiting in group C. The result shows that intrathecal Neostigmine and clonidine improves the quality and duration of block. While neostigmine does it better than clonidine it was associated with more incidence of vomiting.

Keywords: Neostigmine, Clonidine, bupivacaine, subarachnoid block.

I. INTRODUCTION

Spinal anaesthesia otherwise known as subarachnoid block is a common form of anaesthesia usually used for surgeries below the umbilicus. It is a preferred mode of anaesthesia because it avoids most complications associated with general anaesthesia, It also reduces blood loss, reduces metabolic response to surgery and also the incidence of deep venous thrombosis.

It allows early ambulation and discharge from the hospital.

It is a common practice to add different therapeutic regimen to intrathecal bupivacaine to improve intra operative analgesia, prolong block or improve postoperative analgesia however each of this measures have different side effects.

Opioids were tried but were associated with nausea vomiting and pruritus. This study compared adding clonidine or neostigmine to bupivacaine to improve block.

Neostigmine is a selective alpha 2 adrenoceptor antagonist with receptors in the periphery and spinal neurones. Activation of this adrenoceptors leads to inhibition of neurotransmitter transmission and release of substance P.

Intrathecal neostigmine also increases block by causing the inhibition of breakdown of synaptically produced acetylcholine.

This study compared the effectiveness of combination of either clonidine or neostigmine with low dose bupivacaine to enhance block.

II. MATERIALS AND METHODS

After obtaining approval from the hospital ethical committee 75 patients being planned for elective lower segment ceaserian sections were recruited for the study. It was a double blinded study; patients were randomized into three groups by picking from computer generated table of random numbers all in a concealed envelopes.

Patients were only recruited when they satisfy the inclusion criteria which included patients ASA I and II, age between 18 and 65.They were excluded if they have neuromuscular disease or any other comobidities or if they have any history of reaction to any of the study medications.

The study medications were produced by a resident in the department in two mls syringes and labelled A, B and C. Patients were reviewed a day before surgery and basic investigations like packed cell volume, electrolyte urea creatinines and clotting profiles were done. They were fasted for at least ten hours before surgery.

On the morning of surgery in the theatre preoperative equipments check were done, intravenous line established and preoperative vital signs like the blood pressure, pulse rate, respiratory rate and oxygen saturations were checked.

Patients were preloaded with 1litre of normal saline and then seated up while the middle of the imaginary line joining both iliac crests which corresponds to L3/L4 was used as landmark where size 25 pencil tip needle was advanced after infiltration of the skin with 1% lidocaine. The needle was advanced until a give was felt followed with free flow of cerebrospinal fluid. The study drugs were slowly injected into the subarachnoid space with 2.5 mls of bupivacaine and patients were made to lie supine. Vital signs were checked and the level of block checked with spirit cotton wool swab.

The time between the injection of the agents and the time when block is well established is noted. The extent of block was assessed using the bromage scale. Intraoperative hypotension was noted as systolic blood pressure less than 90mmHg or 60% below the preoperative value and was treated with additional 500mls of normal saline and if ephedrine in incremental doses of 3mg were given. Block up to T10 or Bromage 3 was taken as optimal for surgery. Blood loss was assessed by counting number of soaked gauzes and measuring the volume of blood in the suctioning machine. Intraoperative vital signs were taken every 5mins for the first 30mins then every 15minutes thereafter.

Motor block assessment were done every 15mins .At the end of surgery the block level and the Bromage scale were noted and patient taken to the recovery room where assessment and monitoring continued.

Time to first analgesic request was noted which is taken as the interval between the intrathecal injection of the study medications and the time of request of the analgesic. The bromage scale at the point of first analgesic request were noted as well as time taken to achieve bromage scale 6.Resque analgesic was 30mg pentazocine and the total amount given were noted. Pain was also assessed every 15mins in the postoperative period using Visual Analogue Scale (VAS).

Complications like vomiting, bradycardial, hypotension and others were also recorded.

Data was analyzed using SPSS version 16. Data were expressed as mean and standard deviation (SD).Fisher exact test and chi square were used for categorical data with P less than 0.05 considered as significant.

III. RESULTS

The time to first analgesic request was significantly higher in groups B and A than group C. However it was also higher in group B than A p value 0.04 (Table 1)

The VAS score at first analgesic request was also higher in groups C and A than in B while the time to bromage score less than 2 was shorter in group B compared to A and C. (Table 1)

The number of patients that requested for risqué analgesic as well as frequency of. analgesics were higher in C and A compared to group B while time to return to full motor function of the lower limb (Bromage 6) was higher in group B compared to A and C. (Table 1)

The three groups were comparable in terms of the preoperative vital signs (Table 2)

Intraoperatively and postoperatively groups A and B maintained lower levels of both systolic and diastolic blood pressures. (Table 2)

More incidences of hypotension recorded were in group A while greater percentage of group B patients had vomiting. (Table 3)

Parameters	Group A	Group B	Group C	P value
Time to Bromage score less than 2 (mins)	4.2+_0.52	3.5+_0.64	8.4+_0.64	0.02
Mean time to first analgesic request(hr)	2.40+_0.08	3.2+_0.21	1.74+_0.54	0.004
Frequency of administration of Rescue analgesic	1±0.8	0	2±0.5	0.002
VAS at first Analgesic request	7.2+_0.82	6.4+_0.90	8.08+_1.86	0.04
No of patients that had supplementary analgesic	12	0	23	0.001
Time to recovery of lower limb motor function(Bromage scale 6)(hr)	2.4+_0.82	2.82 +_0.64	1.92+_0.82	0.04

Table1: Comparison of Mean VAS scores at first analgesic request, frequency of analgesic, Mean time for first analgesic request and number of patients requesting for supplementary analgesic between the studies populations

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Baseline clinical characteristics	GROUP A Mean±SD	GROUP B Mean±SD	GROUP C Mean ±SD	P value
Pulse rate (beats/min)	91.2(31.9)	87.9(12.3)	88.9(12.5)	0.55
Systolic blood pressure(mmHg)	136.2(19.0)	131.2(12.0)	130(11.9)	0.01
Diastolic blood pressure (mmHg)	87.4(12.4)	85.7(10.7)	84-8(9.8)	0.19
Base line SPO2 (%)	98.0(1.3)	98.5(1.2)	98.4(1.1)	0.70
Baseline respiratory rate (cycles/min)	20.0(2.0)	19.4(2.9)	18.6(2.5)	0.10

Table 2: Comparison of mean baseline vital signs of study groups

INTRAOPERATIVE VITAL SIGNS	GROUP A Mean ±SD	GROUP B Mean±SD	GROUP C Mean ±SD	P value
Pulse rate (beats/min)	72(30.2)	88.6(14.3)	86.4(12.8)	0.46
Systolic blood pressure(mmHg)	100(18.2)	120.4(11.8)	130.2(12.1)	0.03
Diastolic blood pressure(mmHg)	70(11.8)	84.8(10.4)	90.6(11.6)	0.12
SPO_2	98.3(1.1)	98.6(1.2)	98.4(1.2)	0.62

Table 3: Comparison of Mean intraoperative vital signs of study groups

	GROUP A N (%)	GROUP B N (%)	GROUP C N (%)	P value
Bradycardia	1(3%)	10(30%)	0(0)	0.001
Hypotension	02(6.6%)	08(26.7%))	1(3%)	0.005
Vomiting	04(13.3%)	22(73.3%)	02(6.6%)	0.001

Table 4: Incidence of complications

IV. DISCUSSION

The results showed that the time to complete motor block was shorter with group B (Neostigmine group) while the time to recovery of motor function was longer in the neostigmine group than in the other groups. Less patients requested for resque analgesic in the neostigmine group while the frequency of administration was also lesser in the group compared to the clonidine and the control groups. The result of this study is in agreement with other studies that claimed that neostigmine improves block when added to bupivacaine.

Dobrydnjor et al. using 30mcg of clonidine with 75mcg also obtained similar results with Strebel, Kaabachi and Sethi et al in different studies

The frequency and the total dose of rescue analgesic was more in the clonidine than the neostigmine this is not in keeping with other previous studies that concluded that the postoperative analgesic requirement were same in both clonidine and neostigmine

The result differs possibly because of the lower dose of neostigmine used in their studies compared to the dose used in this study.

In terms of intraoperative cardiovascular stability it was better with the clonidine group as there were more incidences of bradycardia and hypotension with the neostigmine group. Similar findings were recorded in previous studies.

This may be due to the blockage in the sympathetic outflow which was more in the neostigmine group. All the incidences of hypotension were treated with supplemental intravenous fluid first then incremental dose of 3mg ephedrine while incidences of bradycardia were treated with 0.5mg of atropine.

Vomiting which was the commonest complication was observed more in the neostigmine group. This is in agreement with other studies that also concluded that neostigmine is associated with more nausea and vomiting when used intrathecally to prolong subarachnoid block.

Patients that had vomiting were treated with a dose of metoclopramide which abated the vomiting.

V. CONCLUSSION

From the result of this study it was concluded that neostigmine when administered intrathecally prolongs subarachnoid block with bupivacaine. If confronted with the need for choice between neostigmine and clonidine, neostigmine does it better though with more incidence of vomiting?

VI. RECOMMENDATION

Neostigmine and clonidine use should be encouraged to potentiate subarachnoid block. More studies using a lower dose of neostigmine is recommended to know if the vomiting associated with it is dose related and possibly reduce the incidence.

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