Section A -Research paper

COMPETITIVE ASSESSMENT OF ANESTHESIA FOR SPINAL SURGERY ADOPTING INTRATHECAL NALBUPHINE AND BUPIVACAINE VERSUS DEXMEDETOMIDINE COMBINED WITH INTRATHECAL NALBUPHINE AND BUPIVACAINE.

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ABSTRACT
The spinal block has long been utilized in medical therapy for illnesses such as pulmonary edema because of its hypotensive effect. Even for patients who needed continuous spinal anesthesia or 5% xylocaine, anesthesiologists at the time were unclear about whether the benefits of spinal anesthesia exceeded the risks. Local anesthetics act by stopping nerve impulse transmission by blocking the sodium channel in nerve cell membranes. As a result, the study's major goal was to examine and analyze the onset and duration of motor and sensory neurons. We found that postoperative analgesia was superior when spinal anesthesia and dexmedetomidine were coupled with bupivacaine compared to nalbuphine alone.
Keywords: Spinal Anesthesia ,Dexmedetomidine, Bupivacaine ,Nalbuphine motor and sensory neurons.

INTRODUCTION
Central neuroxial block (spinal or epidural anesthesia) causes chemical sympathectomy, sensory block, and motor block paralysis. Due to its limited volume, spinal anesthesia is devoid of any systemic effects. However, epidural block is not always devoid of systemic effects due to the use of large epidural blocks. Epidural and spinal have pros and cons, but combined, they blurred the individual effect and added flexibility to the wide clinical range.[1]Studies have also proved that cocaine was the 1st drug that was used for spinal anaesthesia.[2] Gorton, on the other hand, was the first to argue for the use of deep spinal anesthesia in cranial and cervical surgery. Koster was the first to use a total spinal block for intracranial and intrathoracic procedures. Spinal block has historically been utilized for

medical therapy, such as pulmonary edema, because of its hypotensive effect. According to anesthesiologists, the balance between the risks and benefits of spinal anesthesia, especially for those needing continuous spinal anesthesia or the use of 5% xylocaine, remained unclear during that time period. local anesthetics acts on sodium channel in cell membrane of nerves & thereby blocking TNC.[3,4] Therefore, the main goal of our research was to determine & evaluate the onset & duration of motor & sensory neurons.

AIM

The study's goal was to assess the onset and duration of motor and sensory neuron groups.

INCLUSION CRITERIA

1. Patient age group of 20-35 years of age.
2. Female patient.
3. ASA grade I &II.
4. Patient undergoing elective caesarean section surgeries under spinal anaesthesia .

EXCLUSION CRITERIA

1. Patient refuse to enter in the study.
2. Patient with Emergency lscs.
3. Patient with spine deformity or neurological disorder
4. Patient with any type of local infection at sute of injection.
5. H/o of pot-op hypotension and shock

MATERIALS & METHOD

After receiving clearance from IEC, our study was carried out at KH, with patients taking part after providing written informed consent.

STUDY SITE : Our study was done in Dept of Anaesthesiology, Krishna Hospital, Karad.

STUDY POPULATION: In our study , total of 30 patients in each group undergoing elective caesarean section.

STUDY DESIGN: Our research was prospective randomized, double-blinded hospital-based controlled type of study.

SAMPLE SIZE : For identifying a difference in the duration of >20 minutes in the 2-segment regression of sensory blockage (based on previous study (7) results), the sample calculation is 27 per group for an α value of 0.05 and a power of 80%. Each group will include 30 patients.

METHODOLOGY

PRE-ANAESTHETIC EVALUATION:

One day prior to surgery a detailed pre-anaesthetic checkup was done which includes physical examination & systemic examination. Further, all patients were explained about anaesthesia to be given aftering taking a written informed consent. Finally, patients were kept on NPO for 6 hrs prior to surgery.

LAB INVESTIGATION:

1. CBC , BT & CT.
2. FBS & PPG
3. Urine examination – Routine & Microscopic.

4. ECG

Patients were randomly assigned to one of the two groups using the computer-generated group number. Throughout the block and evaluation, the aide who prepared the medications helped the operator maintain his blindness.

GROUP N+D (n=30) recieved bupivacaine heavy 0.5% 1.4ml + 0.25ml(0.4mg) nalbuphine + 0.1ml (5mcg) dexmedetomidine.

Group N (n=30) received bupivacaine heavy 0.5% 1.4ml + 0.25ml(0.4mg) nalbuphine.

Total volumes in both groups = 1.75 ml.

MATERIAL

1. Inj. Bupivacaine 0.5% heavy (5mg/ml)
2. Inj.Nalbuphine 0.4 mg
3. Inj. dexmedetomidine 5mcg
4. Normal Saline
5. Ringer Lactate
6. Colloid
7. Grading of block

SENSORY BLOCK: It means the duration of time taken for the sensory block to regress up to the S1 dermatome from the highest dermatome attained.

MOTOR BLOCK: It was assessed using Modified Bromage Scale which is as follows:-

Grade 0 : Able to raise wholelower limb at hip joint.

Grade 1: Able to do flexion at knee joint but unable to raise leg at hip.

Grade 2: Able to do plantar flexion ankle joint but unable to flex at knee joint.'

Grade 3 : Not be any movement in lower limb.

RESCUE PLAN

If PR <50 beats/min or decreased more than 30 % of baseline, Inj Atropine 0 .6 mg slow IV was given. Any case of respiratory depression (respiratory rate 8/min or SpO2 90%) were treated with supplemental oxygen via a facemask. Pruritis was treated with a gradual IV injection of 45 mg of pheniramine maleate. Intraoperative , postoperative nausea and vomiting were treated with 10 mg of intravenous metoclopramid. If there was insufficient sensory block, segmental block, or hemodynamic instability, or if significant pharmacological side effects were observed, the patient was transferred to general anesthesia and removed from the study. Tramadol 50 mg intravenous bolus injection will be given. If no pain relief is obtained after 10 minutes, another Tramadol 25 mg I.V. bolus injection will be given. The total amount of tramadol consumed, as well as the total required (24 hours), will be noted.

RESULT

AGE, WEIGHT & HEIGHT

	Group	**N**	**Mean**	**Std. Deviation**	**p Value**
Age in Years	Group N	30	27.33	3.262	0.862
	Group N+D	30	26.63	3.285	
Height in	Group N	30	164.7	7.879	0.204

Cms	Group N+D	30	166.5	6.857	
Weight in Kgs	Group N	30	66.97	3.157	0.113
	Group N+D	30	68.7	2.261	

TABLE 1 : COMPARISON BETWEEN ALL 3 VARIABLES .

In our study we have found that, age of the patients in both the groups ranged between 20 to 35 yrs. The mean age in Group N was 27.33 ± 3.262 Years and in Group N+D was 26.63 ± 3.285.(p = 0.862). Height of the patients were between 150 to 175 cms .the mean height was in group N was 164.7±7.879 cms and group N+D was 166.5±6.857.(p=0.204) & Weight of the patients among both groups were between 60 to 75 kgs .The mean weight (kgs) in group N was 66.97±3.157 and in group (N+D) was 68.7±2.261. (p=0.113)

In addition, age, height and weight were comparable between both the groups and was found to be statistically non significant by applying independent sample test .

SENSORY ONSET

GROUP	N	MEAN	Std. deviation	p value	T Test
N	30	4.85	1.27	0.000	4.254
N+D	30	3.52	1.14		

TABLE 2 :SENSORY ONSET

In our study we have found that,maximum sensory level up to T6 was reached in the nalbuphine group in 4.85±1.27 min, whereas it took 3.52±1.14 min in the nalbuphine + dexmedetomidine group. Between the two groups, the maximum sensory level was found to be statistically significant **p value 0.00 <(0.05).**

2 SEGMENT REGRESSION (MIN)

GROUP	N	MEAN	Std. deviation	p value	T Test
N	30	135.88	7.12	0.005	-2.89
N+D	30	142.13	9.40		

TABLE 3 : SEGMENT REGRESSION.

In our study we have found that,time for two segment regression among between groups was found to be significant as **p value 0.005 < 0.05.**

ONSET OF MOTOR BLOCK

GROUP	N	MEAN	Std. deviation	p value	T Test
N	30	6.47	1.08	0.011	2.61
N+D	30	5.75	1.07		

TABLE 4: ONSET OF MOTOR BLOCK.

In our study we have found that,time for onset of motor block between both the groups was statiscally significant with **p value 0.011 < 0.05.**

DURATION OF MOTOR BLOCK

GROUP	N	MEAN	Std. deviation	p value	T Test
N	30	163.56	10.32	0.00	-34.29
N+D	30	301.45	19.45		

TABLE 5 : DURATION OF MOTOR BLOCK.

In our study we have found that,total duration of motor block in minutes between both the groups was statiscally significant as was **p value 0.00 <0.05.**

TOTAL DURATION OF SENSORY BLOCK

GROUP	N	MEAN	Std. deviation	p value	T Test
N	30	170.76	19.48	0.00	-23.59
N+D	30	297.07	21.91		

TABLE 6: DURATION OF SENSORY BLOCK.

In our study we have found that,total duration of sensory block in between both the groups was significant as **p value 0.00 <(0.05).**

TOTAL DURATION OF ANALGESIA

GROUP	N	MEAN	Std. deviation	p value	T Test
N	30	302.23	17.667	0.00	-14.574
N+D	30	356.03	9.835		

TABLE 7: DURATION OF ANALGESIA.

In our study we have found that, total duration of analgesia in minutes between group was significant as **p value is 0.00 < 0.05.**

COMPARISON OF ADVERSE EFFECTS

Adverse effects	Bradycardia	Non-Bradycardia	Marginal Columan Total
Group N	0	30	30
Group N+D	3	27	30
Marginal Column Total	3	57	60

TABLE 8 : BRADYCARDIA.

In our study we have found that,by applying 'Fisher exact test' statistic value was 0.2373. Bradycardia between both the groups was non significant .

Adverse effects	Hypotension	Non-Hypotension	Marginal Columan Total
Group N	3	27	30
Group N+D	5	25	30
Marginal Column Total	8	52	60

TABLE 9: HYPOTENSION.

In our study we have found that, on applying "Fisher exact test" statistic value is 0.7065. The incidence of hypotension was non significant between both the groups as **p < .05**.

Adverse effects	Nausea	Non-Nausea	Marginal Columan Total
Group N	3	27	30
Group N+D	6	24	30
Marginal Column Total	9	51	60

TABLE 10 : NAUSEA.

In our study we have found that , By applying Fisher exact test statistic value is 0.4716 . The incidence of nausea between both the groups was found to be not significant at **p < .05**.

DISCUSSION

Spinal anesthesia is often utilized for lower abdominal surgeries due to its early onset of action, lower systemic impact than general anesthesia, and minimal exposure to depressive medications. The major goal was to provide effective postoperative pain control with minimal adverse effects. By combining an intrathecal adjuvant with local anesthetics, the duration of anesthesia may be extended. To produce spinal anesthesia, opioids (nalbuphine, morphine, and fentanyl), benzodiazepines (midazolam), alpha-2 agonists (dexmedetomidine), and neostigmine have been used in conjunction with local anesthetics. We selected to conduct this research to look at the effects of Nalbuphine + Dexmedetomidine and Nalbuphine as an adjuvant to Bupivacaine in spinal anesthesia. So, we had 60 people (ages 20–35) in our study, and we split them up into three groups of 30 randomly. So, in one group, we threw in some nalbuphine with dexmedetomidine, and in the other group, we just added some nalbuphine straight without dexmedetomidine into the spinal anesthesia for the C-section.

STUDIES RELATED

Lin et al.,(1992)[5] performed a study comparing intraoperative and postoperative analgesia with adjuvant nalbuphine effects by adding 0.4mg morphine to one intrathecal and 0.4mg adjuvant to bupivacaine.

Al Mustafa et al.,(2009)[6] conducted a randomized controlled study comparing of 5 and 10 g of dexmedetomidine intrathecally as an adjuvant to bupivacaine found that dexmedetomidine

showed dose-dependent effect on the onset of sensory block, the onset of motor block, and the onset of two-segment regression when used intrathecally in addition to bupivacaine in spinal anesthesia.

Sushruth MR et al.,(2019)[7] conducted study with 60 patients, divided equally into two groups, using a prospective double-blind control design. One cohort received a dosage of 5 micrograms of dexmedetomidine, whereas the other cohort was administered plain bupivacaine. The sensory and motor obstruction exhibited a sudden onset and persisted for an extended period. The group that received dexmedetomidine exhibited an extended duration of postoperative analgesia.

In view of the above mentioned studies, we have chosen intrathecally 5 µg dexmedetomidine + 0.4mg nalbuphine intrathecally . We formulated our study to compare the same with intrathecal nalbuphine 0.4mg addition to bupivacaine undergoing cesarean section under spinal anaesthesia.

ONSET OF SENSORY BLOCK

So, basically, we found out in our study that using nalbuphine and dexmedetomidine together made the sensory block kick in earlier (p value 0.00–0.05) than just using nalbuphine by itself. (3.52±1.14 min vs 4.85±1.27 mins.)

STUDIES RELATED

Mukherjee et al.,(2011)[8] conducted a study & concluded that 0.8 mg (1.59±0.18) and 0.4 mg (1.63±0.24) nalbuphine groups showed no statistically significant differences.

Gomaa et al.,(2014)[9] concluded that onset of sensory block intrathecal nalbuphine (0.8 mg) was early onset as compared to intrathecal fentanyl (25 µg) as adjuvants to bupivacaine in caeserian section.

Robin et al.,(2016)[10] conducted a study & found a significant statistical distinction between the group administered with nalbuphine (0.4mg) and the group administered with dexmedetomidine (10 ug), with the former exhibiting a longer QTc interval (6.3±1.64 mins) compared to the latter (3.5±1.10 mins; P value 0.001< 0.05).

2 SEGMENT REGRESSION OF SENSORY BLOCK

In our study, two-segment regression was found to take substantially longer in the nalbuphine and dexmedetomidine groups than in the nalbuphine group. When the two groups are compared, this has a statistically significant p value of 0.005<0.05. The time for two-segment regression in the nalbuphine group (135.88±7.12 min) was compared to the time in the nalbuphine and dexmedetomidine groups (142.13±9.40 min).

STUDIES RELATED

Robin et al.,(2016)[10] conducted a study & concluded that, difference in the two-segment regression of the sensory block between the nalbuphine group (106.13±19.47) and the dexmedetomidine group (122.47±18.62) was statistically significant, with a p value < 0.001.

Sushruth MR et al.,(2019)[7] concluded that,dexmedetomidine 5-ug group had sensory block regression in two segments (140±12.3).

DURATION OF SENSORY BLOCK

So, in our study, we found that the numbness lasted way longer in the group that got nalbuphine plus dexmedetomidine compared to just nalbuphine. So, basically, there was a significant difference between the two groups with a p value of 0.05. So, basically, the nalbuphine group had a sensory block for around 170 minutes, while the nalbuphine and dexmedetomidine groups had it for around 297 minutes.

STUDIES RELATED

Robin et al.,(2016)[10] concluded & found a statistically significant difference in the total duration of sensory block between the groups administered with nalbuphine (200.67±22.11 mins) and dexmedetomidine (276.07±31.28 mins), with a p value <0.001. The group administered dexmedetomidine displayed a longer duration in comparison to the group treated with nalbuphine.

Sushruth MR et al.,(2019)[7] concluded that the total duration of the sensory block in the dexmedetomidine group was 364±48.2 minutes.

ONSET OF MOTOR BLOCK

The onset of motor block was more rapid in the combination group (nalbuphine and dexmedetomidine) compared to the nalbuphine group. which, as a p value of 0.011 0.05 indicates, was statistically significant in distinguishing the two groups. The onset of motor block occurred earlier in the nalnuphine group (6.471.08 min) than in the nalbuphine dexmedetomidine group (5.751.08 min).

STUDIES RELATED

Mukherjee et al.,(2011)[8] concluded that non significant between nalbuphine 0.4mg (140.60±6.02) and 0.8 mg(141.0±5.83) group with P value 0.592.

Robin et al.,(2016)[10] concluded that onset of motor blockage in the dexmedetomidine group was significantly faster than in the nalbuphine group, with a mean time of 6.23±1.38 minutes versus 8.73±1.87 minutes, respectively ($p < 0.001$).

DURATION OF MOTOR BLOCK

The administration of dexmedetomidine resulted statistically significant prolongation of the nalbuphine block, as evidenced by a P value of 0.00<0.05. The duration of the motor block was found to be 163.56±10.32 minutes when comparing the group administered with nalbuphine and the group administered with nalbuphine and dexmedetomidine to the group administered with nalnuphine.

Robin et al.,(2016)[10] concluded from the study findings that statistically significant difference was seen for total duration of motor blockade between the Dexmedetomidine Group (247.43±28.53) and the Nalbuphine Group (184.17±27.10), with a P value < 0.001.

CONCLUSION

We come to conclusion that , when we add dexmedetomidine to nalbuphine & intrathecal bupivacaine then it actions become faster in onset with prolonging the duration for motor & sensory block, prolonging duration of 2 segment regression time & prolonging postoperative analgesia time duration.

Hence, combining dexmedetomidine with nalbuphine to spinal anaesthesia with bupivacaine enhances postoperative analgesia as compared to nalbuphine alone.

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