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OUTCOMES OF DIFFERENT DOSES OF CLONIDINE ADDED TO HYPERBARIC BUPIVACAINE DURING SPINAL ANAESTHESIA

Anaesthesiology

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ABSTRACT

Background: Spinal anaesthesia is the preferred technique for most of lower abdominal and lower limb surgeries. It allows the patient to remain awake and minimizes or completely avoids the problem associated with airway management. Oral clonidine was used to prolong spinal anesthesia. Addition of clonidine to bupivacaine intrathecally prolongs analgesia, motor blockade and decreases morphine consumption postoperatively more than oral clonidine. **Aim&objectives:** To evaluate the effects of different doses of clonidine given intrathecally as adjuvant to 0.5% bupivacaine (heavy) in infraumbilical surgeries and to evaluate1. Onset of sensory blockade was assessed by loss of sensation to pin prick. 2. Duration of sensory blockade was assessed by two segment regression and duration of motor blockade by modified bromage scale. 3.Duration of analgesia was assessed from the onset of subarachnoid block to the time of administration of rescue analgesia and Hemodynamic parameters like HR, SBP, DBPwere recordedfor every 10 min till 30min, every 30minutes till 3hours and every 60minutes till the requirement of rescue analgesia. Side effects if any like nausea, sedation by sedation score, dry mouth, and bradycardia were recorded during study period. **Materials And Methods**:This is aprospective controlled study, approved by the institutional ethical committee. An individual informed consent was taken from all patients selected for the study. All patients belonging to ASA grade 1 and 2, between the age group of 20 to 50 years posted for elective surgeries with SUB ARACHNOID BLOCKS. Total 90patients undergoing elective surgeries with sub arachnoid blocks are included.They were divided into Group 1 (Clonidine): Bupivacaine and Clonidine 30 µg(30 Patients),Group 2 (Clonidine): Bupivacaine and Clonidine 60 µg(30 Patients),Group 3 (Clonidine): Bupivacaine and Normal Saline(30Patients). **Interpretation&conclusion:** Oral clonidine has been used to prolong the duration of intrathecal bupivacaine analgesia.From the present study it is concluded that the addition of clonidine as an adjuvant to bupivacaine in subarachnoid block intrathecally for spinal anaesthesia for infraumbilical surgeries has the advantage of prolonging the duration ofmotor blockade and analgesia andproduces sedation in which patients were asleep but easily arousable.

KEYWORDS

Hyperbaric Bupivacaine, Clonidine, Subarachnoid block.

INTRODUCTION:

Spinal anaesthesia is one of the most common approaches for most of lower abdominal surgeries. Spinal anaesthesia with cocaine was initially produced inadvertently by J Leonard Corning in 1885 and first used deliberately by August Bier in 1898. For decades lignocaine had been the local anesthetic of choice for spinal anaesthesia. Its advantages are rapid onset of action and good motor block manifested as good muscle relaxation. Its use is limited by its short duration of action and has been implicated in transient neurologic symptoms and cauda equina syndrome following intrathecal injection. Bupivacaine is three to four times more potent than lignocaineand has longer duration of action. Its disadvantages are slow onset of action and decreased motor block. Hyperbaric bupivacaine 0.5% is extensively used for spinal anaesthesia. Though the duration of action of bupivacaine is prolonged, it will not produce prolonged post-operative analgesia. Hence addition of an adjuvant to intrathecal bupivacaine can prolong postoperative analgesia. Clonidine, an α2 adrenergic agonist, has a variety of different actions. Clonidine has antihypertensive properties and the ability to potentiate the effects of local anesthetics. Clonidine has been shown to result in the prolongation of the sensory and motor blockade and the reduction in the amount or the concentration of local anesthetic required to produce post- operative analgesia. Oral clonidine was used to prolong spinal anesthesia with lidocaine, tetracaine, and bupivacaine. Addition of clonidine to bupivacaine intrathecally prolongs analgesia, motor blockade and decreases morphine consumption postoperatively more than oral clonidine.Optimal doses of clonidine through intrathecal route as an adjuvant to local anesthetic producing prolonged post-operative analgesia and minimal side effects would be a true alternative to opioids with their dangerous side effects. Clonidine has been recently introduced in India in the parenteral form. Hence there is a need to study its effects when used along with bupivacaine heavy, through intrathecal route.

MATERIALSAND METHODS:

Present clinical study was undertaken to compare the efficacy of clonidine as an adjuvant to 0.5% bupivacaine (heavy) for subarachnoid block in infraumbilical surgeries. It was prospective controlled study done on 90 patients undergoing elective infraumbilical surgeries. The study was conducted between December 2022- December 2023 at Alluri Sitarama Raju Academy of Medical Sciences, Eluru, after getting approved by the institutional ethical committee. An individual informed consent was taken from all the patients selected for the study from GENERAL SURGERY and OBG departments posted for elective surgeries.

Inclusion Criteria

- Patients aged 20– 50 years of either sex
- ASA grade I and II
- Undergoing elective surgeries with SUB ARACHNOID BLOCK

Exclusion Criteria

- Patients having bleeding and coagulation disorder
- Unwilling patients.

Total 90 patients are included in the study. Pre anaesthetic evaluation was done a day prior to the elective surgery. History of present complaints, history of allergy to study drugs and any other drugs, any co-existing disease, medication, previous surgery, hospitalization etc. werenoted. A thorough physical and systemic examination (including weight of thepatient, height of the patient, vital signs, spine, air way assessment, etc.) was done.

On the day of surgery, on arrival at operation theatre two IV lines weresecured. An 18-gauge IV cannula with triway, kept open with Ringers Lactatesolution was used for pre-loading, and for giving additional boluses of I.V.fluids during an event of hypotension. Another 20-gauge IV cannula withtriwaywas usedfor injecting ephedrine andfor infusionof fluids duringanaesthesia.

90patients of both genders were randomly allocated into three equal groups of 30each.

Group 1 (Clonidine): Bupivacaine and Clonidine 30 µg.
Group 2 (Clonidine): Bupivacaine and Clonidine 60 µg.
Group 3 (Clonidine): Bupivacaine and Normal Saline.

Procedure:

All the Patients were examined the day before surgery, and preanesthetic counselling was done. All patients received Alprazolam 0.5mg orally on the night before surgery. Inj. Ondansetron 0.1mg/kg i.v. and Inj.Ranitidine 1mg/kg i.v. given on day of surgery.

Under strict aseptic conditions, with the patient in the left lateral position, lumbar puncture was performed at L3-L4 intervertebral space. After ensuring free flow of CSF, Group 1 patients received 0.5%

heavy bupivacaine 3ml with clonidine 30 µg and Group 2 patients received 0.5% heavy bupivacaine 3ml with Clonidine 60 µg equal volume and Group 3 patients received 0.5% heavy bupivacaine 3ml with normal saline in equal volume. After the intrathecal injection patients were returned to supine position. Hemodynamic parameters such as pulse rate, systolic blood pressure**,** diastolic blood pressure, mean arterial blood pressure and SpO2 of the patients were recordedduring the studyperiod.

Following parameters were recorded:

Onset of sensory blockade was assessed by loss of sensation to pin prick every 30 seconds till the level of T10 dermatome was achieved. Intensity of motor blockade was assessed by modified bromage scale every 2 minutes for first 10 minutes.

Duration of sensory blockade was assessed by two segment regression. Duration of analgesia was assessed from the onset of subarachnoid block to the time of administration of rescue analgesia. Duration of motor blockade by modified bromage scale.

Hemodynamic parameters like heart rate, systolic, diastolic blood pressure were recorded every 10minutes till 30minutes, every 30minutes till 3hours and every 60minutes till the requirement of rescue analgesia. ECG, SpO2 and sedation were monitored continuously.

Side effects if any like nausea, sedation by sedation score, dry mouth, and bradycardia were recorded during study period

RESULTS:

Table: 1 Comparison Of Time Of Onset Of Sensory Blockade

	GROUP 1(n=30)	GROUP 2(n=30)	GROUP 3(n=30)	'P' value
TIME IN MINUTES	2.54±0.34	2.25±0.18	2.5±0.19	P<0.05

Table: 2 Comparison Of Time Of Onset Of Motor Blockade

	GROUP 1(n=30)	GROUP 2(n=30)	GROUP 3(n=30)	'P' value
TIME IN MINUTES	2.30±0.45	2.20±0.50	7.41±0.55	P<0.05

Table: 3 Comparison Of Time Of Two Segment Regression

	GROUP 1(n=30)	GROUP 2(n=30)	GROUP 3(n=30)	'P' value
TIME IN MINUTES	209.50±22.94	210.50±6.86	125±5.08	P<0.05

Table: 4 Comparisonofduration Of Motor Blockade

	GROUP 1(n=30)	GROUP 2(n=30)	GROUP 3(n=30)	'P' value
TIME IN MINUTES	216±35	220±9.55	155.2±6.22	P<0.05

Table: 5 Comparison Of Duration Of Analgesia

	GROUP 1(n=30)	GROUP 2(n=30)	GROUP 3(n=30)	'P' value
TIME IN MINUTES	264.75±44.3	650±9.22	230.2±26.05	P<0.05

Table: 6 Comparison Of Occurrence Of Postoperative Complications/side Effects

	GROUP 1(n=30)	GROUP 2(n=30)	GROUP 3(n=30)
Nausea	0(0%)	2(6.66%)	2(6.66%)
Sedation	2(6.66%)	4(13.3%)	0(0%)
Dry mouth	0(0%)	3(9.99%)	1(3.33%)

Table: 7 Comparisonofheartrates(mean±sd)inbothgroups(n=90)

TIME IN MINUTES	GROUP 1(n=30)	GROUP 2(n=30)	GROUP 3(n=30)	P-Value
Baseline	84±9.5	85±10.5	83.60±3.529	P>0.05
SAB	83.7±4.56	83.60±3.529	85.00±10.14	P>0.05
10	82.90±10.83	83.40±6.63	83.00±10.52	P>0.05
20	82.99±5.97	83.00±11.88	82.20±9.75	P>0.05
30	82.7±10.49	82.90±10.83	82.00±7.13	P>0.05
60	83.00±8.03	82.50±8.02	82.40±10.73	P>0.05
90	83.9±10.3	82.70±10.27	82.50±10.14	P>0.05
120	82.4±5.94	82.80±10.83	82.70±12.48	P>0.05
150	83.5±4.44	82.90±5.97	83.00±11.38	P>0.05
180	82.5±7.45	83.00±6.63	83.10±8.25	P>0.05
240	82.8±8.45	83.20±8.07	83.50±12.48	P>0.05
300	83.6±8.76	83.50±8.02	83.60±11.38	P>0.05
360	84.4±7.67	83.80±10.83	83.90±8.25	P>0.05

Table: 8 Comparison Of Systolic Blood Pressures (mean±sd) In Both Groups (n=90)

TIME IN MINUTES	GROUP 1(n=30)	GROUP 2(n=30)	GROUP 3(n=30)	P - VALUE
Baseline	123±4.56	125±6.82	124.97±10.90	P>0.05
SAB	124±10.98	125.36±11.47	125.7±12.36	P>0.05
10	117.3±8.95	117.85±8.93	117.32±10.64	P>0.05
20	116.3±10.9	117.3±6.88	117.26±7.82	P>0.05
30	115.3±12.4	116.28±10.90	116±9.02	P>0.05
60	114.3±8.78	115.32±12.36	115.38±9.92	P>0.05
90	115.2±7.5	114.1±8.78	115.16±8.76	P>0.05
120	114.4±12.4	114.86±11.47	114.66±12.56	P>0.05
150	116.4±6.56	116.66±9.02	116.83±13.54	P>0.05
180	116.5±8.45	118.43±7.8	119±12.65	P>0.05
240	118.6±9.93	118.96±9.92	119.93±45.76	P>0.05
300	120±7.57	120.9±8.61	120.66±34.76	P>0.05
360	122.3±6.78	122.2±9.88	122.56±12.78	P>0.05

Table: 9 Comparison Of Diastolic Blood Pressures Mean±sd) In Both Groups (n=90)

TIME IN MINUTES	GROUP 1(n=30)	GROUP 2(n=30)	GROUP 3(n=30)	P-Value
Baseline	78.2±12.4	78.10±11.88	79.2±8.63	P>0.05
SAB	77.56±10.6	77.86±10.77	77.03±8.41	P>0.05
10	76.5±7.60	76.34±7.55	75.78±6.09	P>0.05
20	75.78±8.96	75.96±8.71	75.46±6.86	P>0.05
30	74.93±8.54	74.94±8.63	75.10±11.88	P>0.05
60	73.64±8.67	73.93±8.41	74.45±10.77	P>0.05
90	73.98±7.15	73.93±7.15	73.26±7.52	P>0.05
120	72.80±7.14	72.80±7.14	72.60±7.80	P>0.05
150	73.86±6.13	72.86±6.63	72.00±8.86	P>0.05
180	73.33±8.66	73.33±9.33	73.46±7.98	P>0.05
240	75.3±6.98	75.56±6.09	75.40±7.55	P>0.05
300	76.67±7.67	76.66±6.86	76.10±8.71	P>0.05
360	76.88±6.32	76.86±6.21	76.63±8.86	P>0.05

DISCUSSION:

Clonidine is a selective partial α2 adrenergic agonist. It is known to potentiate both sensory and motor block of local anesthetic. The analgesic effect of clonidine is mediated spinally through activation of post synaptic α2 receptors in substantia gelantinosa of spinal cord. It also activates the descending inhibitory pathways (medullo-spinal pathways) and there by decreases the release of nociceptive substances from substantia gelatinosa. It blocks the conduction of Aδ and C fibers, increases potassium conductance in isolated neurons in vitro and intensifies conduction block of local anaesthetic agents. Most commonly used adjuvants to local anesthetics for spinal anaesthesia are opioids and they have formed a cornerstone option for the treatment of post operative pain. These agents exert their analgesic effects through µ-receptors at spinal and supraspinal level. Spinal opiates prolong the duration of analgesia, but they do have drawbacks of late and unpredictable respiratory depression, pruritus, nausea, vomiting and urinary retention, which requires constant postoperative monitoring and urinary catheterization. Hence opioids are not ideally suited for all patients and for ambulant surgeries.

Hence there is a requirement of an adjuvant to be used along with local anesthetics which can produce prolonged analgesia without the above said side effects of opioids Various authors have studied clonidine for its analgesic action when it is used as an adjuvant along with local anaesthetic without the side effects of opioids. Oral clonidine has been used to prolong the duration of intrathecal bupivacaine analgesia. In India after clonidine was introduced in parenteral form various studies were conducted. Hence present study was undertaken to evaluate the effectiveness of clonidine as an adjuvant in spinal anaesthesia with 0.5% bupivacaine (heavy) for prolonging duration of analgesia during prolonged surgeries and in post operative period as post operative analgesia. Uncontrolled post operative pain may produce a range of detrimental acute and chronic effects.

The attenuation of peri operative pathophysiology that occurs during surgery through reduction of nociceptive input to the central nervous systems and optimization of perioperative analgesia may decrease complications and facilitate recovery during the immediate post-operative period.

Table: 9 Comparison of maximum height of sensory blockade with other studies

		O.Kaabac hi et al[55] (2007)	Grandh e et al[57] (2008)	H.Saxen a et al[59] (2010)	Prese nt study
	Group	**(N=83)**	**(N=45)**	**(N=80)**	**(N=90)**
Maximum height of sensory Blockade	Clonidine 60mcg	T6-T10	T4-T7		T4-T6
	Clonidine 30mcg			T6-T8	T6-T8
	Control	T6-T10	T4-T7	T6-T10	T6-T8

In the present study the maximum height of sensory blockade in clonidine group was (T6-T8) compared to (T6-T8) level in control group, which were comparable. The maximum height of sensory blockade of present study is in accordance with O.Kaabachi et al55 (2007) (T6-T10) in clonidine and (T6-T10) control group respectively, Grandhe et al57 (2008) (T4-T7) in clonidine and (T4-T7) in control group respectively, and with H.Saxena et al59 (2010) (T6-T8) in clonidine and T6-T10 in control groups

Table: 11 comparison of mean duration of two segment regression in present study with other studies

TWO SEGMENT REGRESSION IN MINUTES		O.Kaaba chi et al55 (2007)	B.S.Set h et al[56] (2007) (N=60)	Zahoor Ahmad et al61 (2012)	H.Saxena et al59 (2010)	Present study (N=90)
		(N=83)		**(N=60)**	**(N=80)**	
	Group					
	Clonidine60mcg	136±56	218	190±39.		210.5±6
				65		0.8
						6
	Clonidine30mcg				192±14.4	209.50±
					2	22.94
	Control	107±42	136	121.96±2	89±14.4	125±5.0
				7.8	8	8

In present study, mean duration of two segment regression in clonidine 1,2 and control groups was 210.5±6.86, 209.50±22.94 and 125±5.08 minutes respectively and it is prolonged in clonidine group which is statistically significant (P<0.05).

Mean duration of two segment regression in present study is in accordance with O. Kaabachi et al[55] (2007)(136±56 and 107±42), B.S.Sethi et al[56](2007) (218 and 136) and Zahoor Ahmad et al[61] (2012) (190±39.65 and 121.96±27. H.Saxena et al[59](2010) 192±14.42 and 89±14.48minutes in clonidine and control groups respectively). Thus it is seen that duration of two segment regression is prolonged in clonidine group as compared to control group

CONCLUSION:

From the present study it is concluded that the addition of clonidine as an adjuvant to bupivacaine in subarachnoid block intrathecally for spinal anaesthesia for infraumbilical surgeries has the following advantages.

- It prolongs the duration of motor blockade and analgesia and produces sedation in which patients were asleep but easily arousable.
- It is hemodynamically stable and not associated with side effects like pruritus and respiratory depression and hence can be an attractive alternative for opioids for prolonging spinal analgesia.

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