Original Research Article

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Comparison of Two Different doses of Clonidine Hydrochloride as an Adjuvant to Epidural Bupivacaine for Postoperative Analgesia

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Abstract

Context: The study was planned to assess the comparative efficacy, duration of analgesia block characteristics and hemodynamic or any adverse events on combining clonidine in two different doses with epidural Bupivacaine as adjuvant. *Settings and Design:* This study was an interventional, prospective, double blind, parallel group, randomised clinical study conducted on patients undergoing elective lower abdominal and lower limb surgeries. *Methods and Material:* This study was conducted on 80 patients of the American Society of Anesthesiologists (ASA) grade I or II, age 18 to 59 years and included both genders. In Study group A (n =40) 5ml (75µg) of the clonidine hydrochloride-bupivacaine solution added to 10 ml of 0.5% Bupivacaine to make a volume of 15 ml and given via epidural route. Study group B (n =40) 4ml (60µg) of clonidine hydrochloride-bupivacaine solution added to 11 ml of 0.5% Bupivacaine to make a volume of 15 ml and given via epidural route. Our aim was to compare the following factors in two groups – Onset of sensory and motor block, Level of sensory block, Duration of motor blockade and sensory analgesia, hemodynamic changes and adverse events if any. *Statistical analysis used:* The statistical analysis was done using the sample "t" test and chi-square test. The cleaned and checked data was entered in the computer through software Graph Pad Instat 3.1 and output was assessed. $P < 0.05$ was considered significant. *Results:* Onset of anesthesia was shorter in group B as compared to group A. The mean time for onset of sensory block and motor block in group A were 8.17±1.15 and 19.55±1.5 minutes respectively and in group B were 7.42±1.01 and17.17±1.37 minutes respectively and they were statically very highly significant ($p < 0.001$). The establishment of complete motor blockade was earlier in B group which was statistically highly significant ($p < 0.001$). There was no significant difference in respiratory depression, systolic and diastolic blood pressure in both the groups ($p>0.05$). *Conclusions:* both the doses of clonidine (60µg and 75µg) when administered through the epidural route with 0.5% Bupivacaine provide effective analgesia during intraoperative period. But in postoperative period, 75µg clonidine with 0.5% Bupivacaine provide prolonged analgesia as compared to 60µg clonidine without any significant increase in side effects and change in hemodynamic profile.

Keywords: Clonidine; Epidural; Bupivacaine; Postoperative Analgesia; Haemodynamics.

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Introduction

Pain is defined as an unpleasant sensory and emotional experience associated with actual or potential tissue damage or described in terms of such damage [1]. In pursuit of relief of pain, particularly pain during and after surgery, many attempts have been made since time immemorial. Pain is a natural protective gift but postoperative pain or its abnormal

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persistence, has a lot of disadvantageous effects. Postoperative pain is associated with delayed recovery from surgery, hypoventilation and its consequences, delayed ambulation with increased thromboembolic phenomenon, increases sympathetic stimulation and increased cardiac work load. Poorly relieved and prolonged pain may produce negative physical and psychological effects leading to sleeplessness, depression and psychosomatic changes [2].

Regional anaesthesia is noted for its simplicity, safety, and effectiveness. Anaesthesia with an efficient block, having least onset time and which can be prolonged with least complications is one of the challenges faced by the anaesthesiologist. A recent meta-analysis of multiple comparisons of neuraxial blockade to general anaesthesia has shown a significant reduction in mortality and morbidity with regional techniques [3]. Despite many advances in pain management, postoperative pain still remains an important cause of suffering [4].

Lower abdominal and lower limb surgeries may be performed under local, regional (spinal or epidural) or general anaesthesia, but neuraxial blockade is preferred mode of anaesthesia [5]. Major advantage of epidural anaesthesia over spinal anaesthesia is the ability to titrate the extent and duration of anaesthesia. Epidural analgesia provides better postoperative analgesia than parenteral opioids [6]. Also there is no limitation for the duration of surgery if an epidural catheter is in place. It can also be used as a modality for post-operative pain relief.

Local anaesthetics alone have been used for many years for central neuraxial blockade. In recent years, use of intrathecal and epidural adjuvant to local anaesthetics has gained popularity with the aim of prolonging the duration of block, better success rate and patient satisfaction, decreased resource utilization compared with general and faster recovery. Adequate pain management is essential to facilitate rehabilitation and accelerate functional recovery, enabling patients to return to their normal activity more quickly. Addition of an adjuvant has further enhanced the effectiveness of local anaesthetics as they not only help in intensifying and prolonging the blockade effect but also help in reduction of the doses of local anaesthetics and thus eliminating a few side effects [7,8]. Adjuvant like morphine, fentanyl, ketamine, neostigmine, midazolam, clonidine etc. have been used for this purpose.

Here, we have evaluated the block characteristics and hemodynamic or any adverse events on combining clonidine in two different doses with epidural Bupivacaine as adjuvant and comparing it for infra-umbilical surgeries.

Materials and Methods

This study was an interventional, prospective, double blind, parallel group, randomised clinical study conducted on patients undergoing elective lower abdominal and lower limb surgeries. The study conformed to the Helsinki declaration (World Medical Association, 1995) and the applicable guidelines for good clinical practices were looked into consideration. After approval of institutional ethical committee written informed consent were obtained from all the patients before the enrolment in the study. The exclusion criteria were patients refusal, ASA grade III and IV, infection at the site of injection, coagulopathy or on anti-coagulation therapy, congenital abnormalities of lower spine and meninges, active disease of central nervous system, history of alcohol abuse, history of allergy to local anaesthetics, any history of cardiopulmonary, renal, hepatic, neurological and psychiatric disorders, morbid obesity (BMI > 30 Kg/m2). This study was conducted on 80 patients of the American Society of Anesthesiologists (ASA) grade I or II, age 18 to 59 years and included both genders. Each patient fulfilling eligibility criteria was randomly allocated in two different groups (Group A & Group B) and were given a computer generated code in random way so that each patient is assigned to a group by chance not by choice. The codes were kept under sealed envelope by a person not involved in study.

A prospective sample size calculation indicated that 35 patients were required in each group to have a 80% power to detect a 25% difference at an Type I (α) error of 0.05 for the duration of analgesia and assuming a drop out of 10%, 40 patients was included in each study group.

Clonidine hydrochloride 150 µg (1 ml) diluted with 0.5% bupivacaine 9ml to make a concentration of 15µg/ml, then it will be mixed to 0.5% bupivacaine to make equivalence strength of 15 ml. Based on this, the study group will be divided into -

In Study group A (n =40) 5ml (75µg) of clonidine hydrochloride-bupivacaine solution added to 10 ml of 0.5% Bupivacaine to make a volume of 15 ml and given via epidural route.

In Study group B (n =40) 4ml (60µg) of clonidine hydrochloride-bupivacaine solution added to 11 ml of 0.5% Bupivacaine to make a volume of 15 ml and given via epidural route.

Preparation included an overnight fast of 8 hours before the surgery, premedication with a night before and on the morning of surgery with oral tablet alprazolam 0.25mg and tab ranitidine 150 mg. Time of epidural injection of the study drug was noted as "zero time". The onset of sensory block was tested by pin prick method using a 27 gauge hypodermic needle. The time of onset was taken from zero time to loss of bilateral pin prick sensation. The time interval between zero times to the patient inability to lift the straight extended leg (Modified Bromage scale 1) was recorded as onset time for motor block. The highest level of sensory blockade was assessed by pin prick method using a hypodermic needle. The highest dermatome level blocked was noted and recorded after the onset of motor block. Degree of motor block was assessed by Modified Bromage scale.

Modified Bromage Scale

0 - Able to raise leg straight, full flexion of knee and feet (Full movement)

1- Inability to raise leg, just able to flex knees, full flexion of feet

2- Unable to flex knees, but some flexion of feet possible

3-Unable to move leg or feet (No movement)

The duration of motor block was taken from zero time to complete regression of motor block (Ability to lift the extended leg i.e. Modified Bromage scale 0).

Duration of sensory analgesia was noted and recorded from the time when epidural drug was given to postoperative follow up till the patients complained of pain. Patients were asked to point out the intensity of their pain on visual analogue scale. Time at which patients complained of pain more than 5cm on the visual analogue scale was noted. That point was taken as the end point off air analgesia and was managed by the top-up doses of 8ml of 0.125% Bupivacaine for relief of postoperative pain. Time of first rescue analgesic required and VAS score at that time was noted.

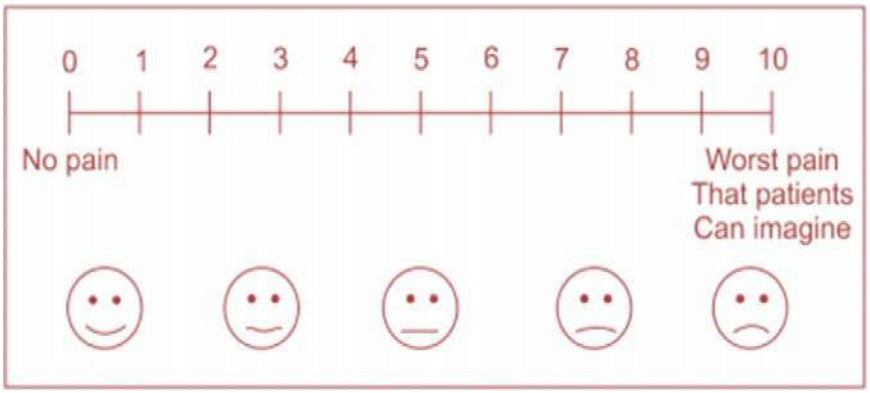
Patients were monitored for heart rate, blood pressure and respiratory rate at 0, 5, 10, 15, 20, 25, 30, 45, 60, 90, 120 and 180 minutes after administration of epidural block. Side effects such as nausea, vomiting, hypotension, bradycardia, sedation, respiratory depression and retention of urine observed for, recorded and treated accordingly. The nature of the procedure was explained and the patients were taught to assess the intensity of pain using the visual analogue scale (VAS). In the visual analogue scale the patients were shown a scale of 10 cm length. Zero end of the scale was taken as "No Pain" and 10 cm marked as "Maximum Pain". Intensity of pain increases gradually from "0" to "10". Patients were instructed to point the intensity of pain on scale.

For the purpose of assessing the pain: 0-2.5 cm taken as no pain, 2.5-5 cm taken as mild pain, 5-7.5 cm taken as moderate pain, 7.5-10 cm taken as severe pain.

Predesigned patients record form (PRF), case record form (CRF) and other required formats were used for collecting and recording the data obtained at the time of intervention inside operation theatre. PRF was served the purpose of source data verification document. The data checked manually for correction of some minor errors like digit mistake, wrong unit measurement, data format mistakes etc. The statistical analysis was done using sample "t" test and chi square test. The cleaned and checked data was entered in computer through software Graph Pad Instat 3.1 and output was assessed. $P < 0.05$ was considered significant.

Results

Results are presented as Mean±SD for parametric data and as percentage for non-parametric data. Table 1 compares demographic profile among both groups. Both groups were



comparable with respect to their demographic profile. There was no significant difference in age, sex and weight.

Onset of anesthesia was shorter in group B as compared to group A. The mean time for onset of sensory block and motor block in group A were 8.17±1.15 and 19.55±1.5 minutes respectively and in group B were 7.42±1.01 and17.17±1.37 minutes respectively and they were statically very highly significant ($p < 0.001$). However, once sensory level was established at T6-T7 level, there was no noticeable

Table 1: Demographic characteristics

Characteristics	0.5%Bupivacaine + Clonidine 60µg (Group A)	0.5%Bupivacaine + Clonidine 75µg (Group B)	Remarks
Age	39.3±11.35	40.2±10.46	t=0.34 p=0.74 Not Significant (NS) P > 0.05
Sex	25:15	27:13	$\chi 2 = 0.055$, df = 1 p = 0.81 Not Significant p > 0.05
Weight	55.18±5.12	56.32±4.91	t=1.02 p=0.31 Not Significant P > 0.05

Table 2: Time of onset of sensory, motor block, duration of motor block and sensory analgesia

Parameter	0.5% Bupivacaine + Clonidine 60µg (Group A)	0.5% Bupivacaine + Clonidine 75µg (Group B)	Remarks
Onset of Sensory Block (Min)	8.175±1.15	7.42±1.01	t = 3.553, P < 0.001 Highly Significant
Onset of Motor Block (Min)	19.55±1.52	17.175±1.37	t = 7.384, p< 0.001 Highly Significant
Duration of Motor Block (Min)	241.40±15.72	257.23±15.53	t = 4.63, p< 0.001 Highly Significant
Duration Of Sensory Analgesia (Min)	351.10±20.38	372.32±21.54	t = 4.80, p < 0.001 Highly Significant

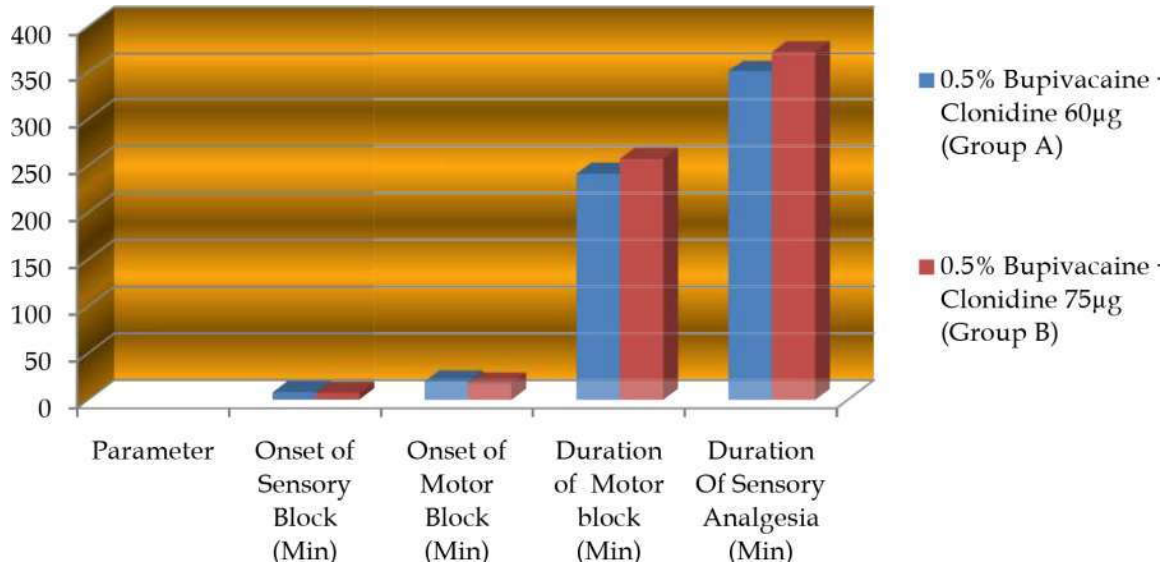


Fig. 1: Time of onset of sensory, motor block, duration of motor block and sensory analgesia

difference in sensory anaesthesia in either of the group throughout the surgical procedure. The establishment of complete motor blockade was earlier in B group which was statistically highly significant. ($p< 0.001$) as shown in Table 2.

Table 2 also shows that the mean duration of motor block and sensory analgesia in group A was 241.40±15.72 and 351.10±20.38 minutes respectively, whereas in group B it was 257.23±15.53 and 372.32±21.54 minutes respectively (Figure 1). The p value was <0.001, indicating that the difference was statistically highly significant. This implied that the duration of motor block and sensory analgesia in group B were significantly higher than group A.

Table 3 shows that there was no significant difference in heart rate and mean respiratory ratein both the group at any time during or after the procedure. However, there was equal incidence of fall in heart rate in both the group upto 45 minutes. Thereafter, heart rate remained almost stable without any significant fluctuation in both the group (Figure 2).

Table 3: Heart rate (HR)and respiratory rate (RR) comparison

Time interval(min)	0.5% Bupivacaine + Clonidine 60µg (Group A)	0.5% Bupivacaine + Clonidine 75µg (Group B)	Heart rate		0.5% Bupivacaine + Clonidine 60µg (Group A	0.5% Bupivacaine + Clonidine 75µg (Group B)	Respiratory rate		
	Mean±SD (HR)	Mean± SD (HR)	t value	P value	Mean±SD (RR)	Mean±SD (RR)	t value	P value	
0	82.90±4.46	82.80±4.31	0.10	0.91	13.95±0.96	13.70±1.16	0.91	0.37	NS
5	82.20±4.63	81.92±4.30	0.27	0.78	14.30±0.76	14.05±1.01	1.22	0.23	NS
10	81.68±3.98	81.65±3.98	0.02	0.98	14.52±0.93	14.40±0.70	0.87	0.39	NS
15	79.62±4.58	78.87±4.31	0.95	0.35	14.65±0.83	14.50±1.01	0.76	0.45	NS
20	78.72±3.98	78.40±3.93	0.42	0.67	15.07±1.23	14.82±1.30	0.89	0.37	NS
25	76.37±4.30	76.10±4.35	0.19	0.85	15.12±1.20	14.90±0.78	0.95	0.35	NS
30	75.05±4.24	74.80±4.31	0.30	0.76	14.75±1.28	14.62±0.84	0.51	0.61	NS
45	74.42±4.28	74.20±4.30	0.27	0.78	14.75±0.70	14.60±0.98	0.73	0.47	NS
60	75.30±4.51	74.90±4.28	0.45	0.65	14.45±0.96	14.32±0.94	0.56	0.57	NS
90	77.07±4.60	76.50±4.31	0.66	0.51	14.55±0.78	14.45±0.68	0.63	0.53	NS
120	78.67±4.44	78.10±4.10	0.70	0.49	14.40±0.74	14.35±0.95	0.25	0.80	NS
180	79.87±4.40	79.65±4.35	0.26	0.79	14.32±0.69	14.20±0.76	0.84	0.40	NS

Table 4: Systolic blood pressure (SBP) andDiastolic blood pressure (DBP) comparison

Time interval(min)	0.5% Bupivacaine + Clonidine 60µg (Group A)	0.5% Bupivacaine + Clonidine 75µg (Group B)	SBP		0.5% Bupivacaine + Clonidine 60µg (Group A	0.5% Bupivacaine + Clonidine 75µg (Group B)	DBP		
	Mean±SD (SBP)	Mean± SD (SBP)	t value	P value	Mean±SD (DBP)	Mean±SD (DBP)	t value	P value	
0	121.05±6.53	120.32±7.03	0.48	0.63	79.90±4.49	79.30±4.90	0.57	0.57	NS
5	115.60±6.30	114.25±6.68	0.93	0.35	76.78±4.68	76.57±4.84	0.19	0.84	NS
10	111.37±6.87	110.30±6.60	0.71	0.48	74.42±4.65	73.95±4.73	0.45	0.65	NS
15	107.60±6.57	106.80±6.40	0.55	0.58	72.32±4.45	72.00±4.52	0.32	0.74	NS
20	105.30±6.07	104.70±6.20	0.48	0.66	70.37±4.43	70.05±4.01	0.35	0.72	NS
25	105.05±4.73	104.67±4.97	0.35	0.73	68.87±4.10	68.60±3.61	0.34	0.74	NS
30	106.30±4.50	105.97±4.54	0.32	0.74	69.17±3.40	68.87±3.20	0.39	0.70	NS
45	108.37±4.80	108.35±4.99	0.02	0.98	71.17±3.15	70.70±3.11	0.66	0.51	NS
60	110.42±4.60	110.15±4.84	0.26	0.79	72.40±3.36	72.00±3.38	0.51	0.61	NS
90	111.87±4.90	111.42±4.97	0.40	0.68	73.80±3.36	73.12±3.46	0.92	0.36	NS
120	113.62±4.92	113.72±4.89	0.09	0.92	75.50±4.02	75.07±3.59	0.52	0.60	NS
180	115.32±4.96	115.15±5.16	0.15	0.87	77.15±3.74	76.35±3.68	0.98	0.33	NS

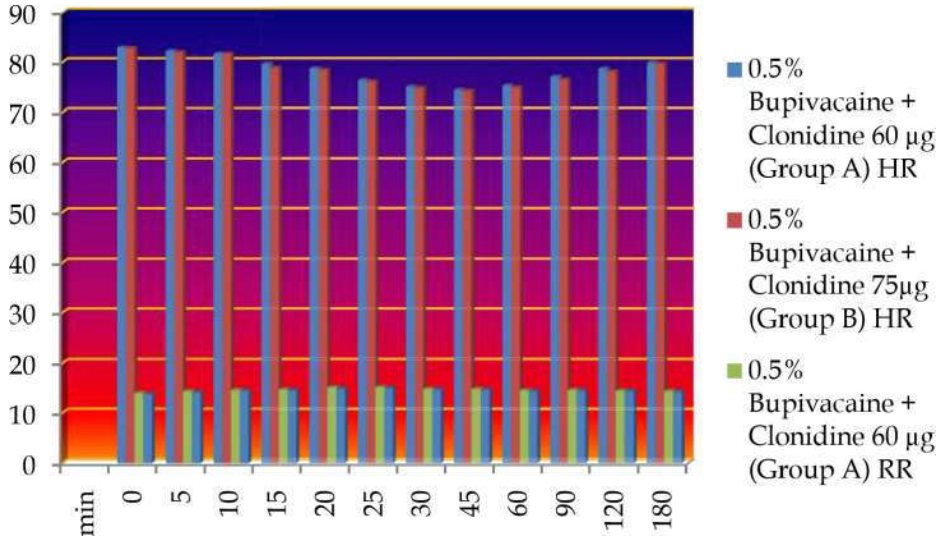


Fig. 2: Heart rate (HR)and respiratory rate (RR) comparison

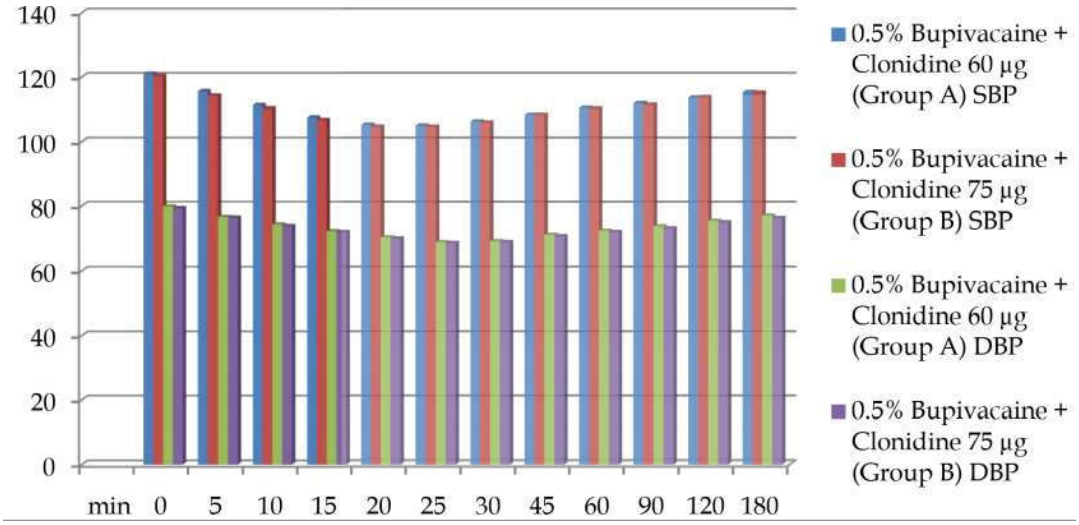


Fig. 3: Systolic blood pressure (SBP) andDiastolic blood pressure (DBP) comparison

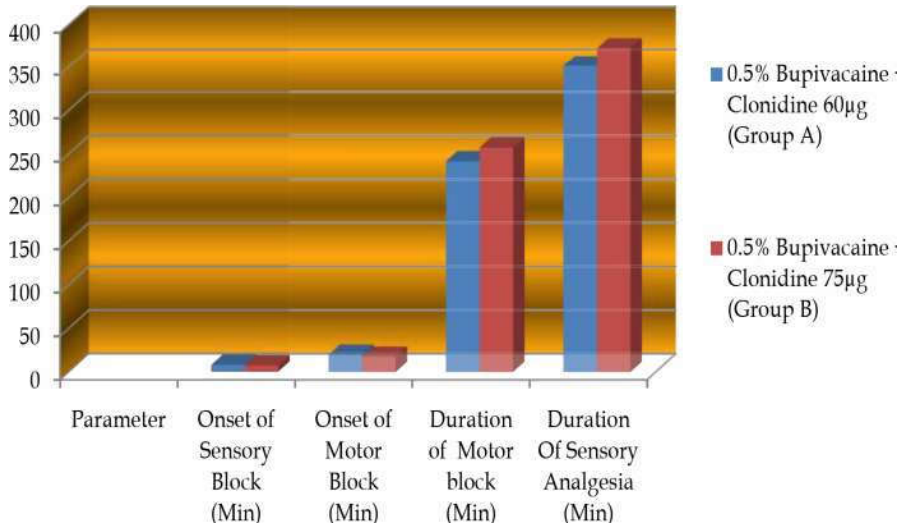


Fig. 4: Side effects

Table 5: Side effects

Side effects	0.5% Bupivacaine + Clonidine 60µg (Group A)		0.5% Bupivacaine + Clonidine 75µg (Group B)		Remarks
	No.	%	No.	%	P value
Hypotension	2	5	3	7.5	
Bradycardia	0	0	0	0	
Respiratory Depression	0	0	0	0	
Dry Mouth	2	5	2	5	
Sedation	1	2.5	2	5	>0.05
Nausea	2	5	1	2.5	
Vomiting	1	2.5	1	2.5	
Retention of urine	0	0	0	0	

There was equivalent decrease in systolic blood pressure in both the group which can be due to hypotensive action of clonidine.But no significant difference in systolic blood pressure was noted in both the groups (p>0.05). There was no significant difference in diastolic blood pressure in both the groups (p>0.05). However, equivalent fall in diastolic blood pressure was shown in both the group as shown in Table 4. Figure 3 shows the graphical representation of fall in systolic and diastolic blood pressure.

In group A 5% patients had hypotension, dry mouth, nausea and 2.5% had sedation and vomiting while in group B 7.5% had hypotension, 5% had dry mouth, sedation and 2.5% had nausea and vomiting (Figure 4). There was no significant difference between the two groups with regard to these side effects. (p> 0.05) as shown in Table 5.

Discussion

The incidence of postoperative pain varies with individual patients. The state of pain following a surgical procedure is a combination of pain as a specific sensation due to nociceptive response to tissue damage and pain as a suffering. Uncontrolled postoperative pain can result in several negative physiological effects that include disturbances of respiratory, cardiac, gastrointestinal, coagulation, renal, endocrine, autonomic and central nervous system function. Addition of adjuvant to local anaesthetic through epidural route increases the duration of analgesia and intensity of block with minimum stress response, thereby resulting in early ambulation and lesser postoperative morbidity.

In our study, the mean time for onset of sensory block and motor block in group A was 8.17±1.5 and 19.55±1.5 minutes respectively and 7.43±1.01 and and few minutes earlier in group B as 17.17±1.38 minutes in group B respectively. The difference was statistically highly significant. So it indicates that addition of clonidine as an adjuvant in dose of 75µg shortens the onset of sensory blockade in comparison to 60µg. (p<0.001). Previous studies [9, 10,11,12,13] concluded that that addition of clonidine as an adjuvant shortens the onset of sensory and motor blockade which is similar to our study. Highest level of sensory block was assessed by alcohol wick method after the onset of motor block. In our study, patients of group A attained the following level of sensory block: 65% attained T6 level, 25% attained T7 level, 5% attained T8 level, 2.5% attained T9 and T10 level each. In group B , 55% attained T6 level followed by 30% attaining T7 level, 2.5% attaining T8 level, 7.5% attained T9 level and 5% attained T10 level. This implied that the highest level of sensory block achieved in both groups were similar (p=0.49). Brockway MS et al. [14] conducted a study comparing 0.5% and 0.75% Bupivacaine with 0.5%, 0.75% and 1% Ropivacaine. They found the mean upper limit of sensory block to be T6. Duration of motor blockade was assessed from the time of administration of the drug to complete motor recovery (Bromage scale 0). In our study, the mean duration of motor block in group A was 241.40±15.72 minutes whereas in group B it was 257.23±15.53 minutes. This difference was statistically highly significant (t value = 6.91) (p < 0.001). Karki G et al. [11] concluded that that addition of clonidine prolongs the duration of motor block which is comparable to our study. Malinovsky JM et al. [15] concluded that the intensity and duration of motor block of intrathecal ropivacaine were similar with bupivacaine. Parikh TJ et al. [16] in their study found that first rescue analgesia required after 7.45 ±0.44 hours in clonidine group as compared to 8.35± 0.42 h in morphine group. They concluded that epidural morphine plus bupivacaine has a longer duration of analgesia as compared to epidural clonidine plus bupivacaine for postoperative analgesia. Krishnamoorthy K et al. [17][7] in their

study used low dose of clonidine and found that addition of clonidine prolongs the duration of analgesia which is comparable to our study.

In our study, Baseline systolic BP, diastolic BP and heart rate were comparable. After epidural anaesthesia, there was fall in systolic, diastolic BP and HR in each group. However, there was equal incidence of fall in heart rate in both the group upto 45 minutes .Thereafter, heart rate remained almost stable without any significant fluctuation in both the group. This can be possibly due to the effect of clonidine. There was no significant difference in heart rate in both group in peri or postoperative period. However Gupta S et al. [9] studied that a comparison of homodynamic effects of the drug shows statistically highly significant fall in MAP at 30 minute and decrease in heart rate at 60 minute intraoperatively in the Clonidine group as compared to control group. Karki G et al. [11] found that there was fall in systolic, diastolic BP and HR but after 45 minutes they returned to baseline value. Studies conducted by Hayashi Y et al. [18] and Eisenach et al. [19] concluded the fact that central mediated hypotensive effect of clonidine is mainly due to inhibition of sympathetic outflow and the potentiating effect of parasympathetic nervous system activity. In contrast, adding 150µg clonidine to a smaller dose of bupivacaine (5mg) cause a greater decrease in blood pressure. Sia AT et al. [20] concluded the fact that clonidine does not produce an additional hypotensive effect when combined with local anaesthetics, there is a potential for exacerbating hemodynamic depression from the combination of intrathecal clonidine with opioids. In the study conducted by Brockway MS et al. [21] the systolic and diastolic blood pressure decreased by about 20% from the baseline values over the first 20 minutes whereas heart rate tended to increase over first 15 minutes and thereafter decrease to slightly less than the baseline. This was comparable to our study.

In our study use of either 60µg or 75µg of clonidine with bupivacaine resulted in slight fall in blood pressure which is similar to above studies and requiring injection mephentermine in some patients of both groups after epidural anaesthesia. There was no significant variation in blood pressure in both the group. None of our patients experienced respiratory depression and no changes in mean respiratory rate between both groups and differences were statically non-significant which was corroborated with other studies [9,11,21,22,23,24].

In group A 5% patients had hypotension, dry mouth, nausea and 2.5% had sedation and vomiting while in group B 7.5% had hypotension, 5% had dry mouth, sedation and 2.5% had nausea and vomiting indicating no significant difference between the two groups with regard to these side effects ($p > 0.05$). Few patients developed moderate hypotension in both groups and were treated by injection mephentermine upto a maximum dose of 18mg. Hemodynamic side effects like hypotension and bradycardia neither had any major impact nor any squeal on the intraoperative or postoperative period in our study groups. Any side effects like hypotension, bradycardia and transient sedation are mainly depend upon doses and routes of administration of clonidine such as intrathecal or epidural route [18,19]. Previous studies [18,25,26] concluded that 150µg intrathecal clonidine produces notable side effects including hypotension, sedation and dry mouth, although no delayed hypotension or bradycardia in women undergoing caesarean section operations. We found fewer studies [18,27,28] concluded the fact that interaction of clonidine with central $\alpha 2$ receptors causes sedation similar to our study while augmentation of parasympathetic system and inhibition of sympathetic outflow activity are mainly responsible for centrally mediated hemodynamic effects. These effect become more pronounced with larger intrathecal doses (>450µg) of clonidine.

Klimscha W et al. [29] compared epidural clonidine and bupivacaine with intrathecal clonidine and bupivacaine. They reported that the spinal route led to a significantly greater reduction in blood pressure with no additional analgesia. In contrast to above studies our study concluded that epidural clonidine and bupivacaine led to a moderate reduction in blood pressure in few patients but they are clinically not significant with increase in duration of postoperative analgesia.

Conclusion

Based on this clinical comparative study, we concluded that both the doses of clonidine (60µg and 75µg) when administered through epidural route with 0.5% bupivacaine provide effective analgesia during intraoperative period. But in postoperative period, 75µg clonidine with 0.5% Bupivacaine provide prolonged analgesia as compared to 60µg clonidine without any significant increase in side effects and change in hemodynamic profile. Hence, 75µg clonidine is more effective as an adjuvant to local anaesthetics when used through epidural route for postoperative analgesia.

Key Messages

75µg clonidine is more effective as an adjuvant to local anaesthetics in comparison to 60 µg when used through epidural route for postoperative analgesia.

Conflict of Interest: NIL

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