



STUDY TO COMPARE THE EFFECTIVENESS OF POSTOPERATIVE ANALGESIA USING INTRATHECAL CLONIDINE WITH BUPIVACAINE IN INGUINAL HERNIA SURGERIES

Anaesthesiology

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ABSTRACT

Background: For lower limb and lower abdominal surgeries, the standard anaesthetic technique is subarachnoid block. Adrenaline being the first spinal adjuvant used to increase the duration and to reduce the toxicity of spinal anaesthesia in 1903. Many drugs have been tried in search for an ideal adjuvant. Recently it was found that use of clonidine in combination with local anaesthetic prolongs the local anaesthetic effect. **Aim:** To evaluate the duration of post-operative analgesia provided by two varying doses of clonidine with bupivacaine against bupivacaine alone in inguinal hernia surgeries. **Materials and Method:** It was a double blinded study in which patients were randomly allocated into 3. Group I received only intrathecal bupivacaine 2.5mg. Group II received bupivacaine 2.5mg + clonidine 30µg. Group III received bupivacaine 2.5mg + clonidine 45µg. Age of patient, Pulse rate, mean arterial pressure, Sensory and motor parameters and duration of analgesia were assessed. Results were analysed using SPSS 20.0 version and the association was tested using Chi square test. **Results:** The study was conducted in 90 patients with 30 patients each in Group A, B and C. Mean age was 51.6, 53.1 and 56.5 in Group A, B and C respectively. Fall in pulse rate was more in Group III. Time taken for onset of sensory block and motor blockage was high for group C when compared to other groups with a mean period of 8.9 and 9.4 minutes respectively. The duration of motor blockade and duration of postoperative analgesia was prolonged in groups II and III compared to group I patients. On comparison with 3 groups the p value was statistically significant for duration of motor blockage and postoperative analgesia (p value 0.001). **Conclusion:** Increasing the dosage of clonidine will decrease the pulse rate significantly but Intrathecal clonidine along with bupivacaine significantly and prolongs the duration of post-operative analgesia.

KEYWORDS

Bupivacaine, Clonidine, Motor block, Postoperative analgesia, Sensory loss.

INTRODUCTION:

The standard anaesthetic technique for inguinal hernia surgery is subarachnoid block. Adrenaline being the first spinal adjuvant used to increase the duration and to reduce the toxicity of spinal anaesthesia in 1903. From then many drugs have been tried in search for an ideal adjuvant. They are opioids, soda bicarbonate, ketamine, neostigmine, midazolam and the latest inclusion is clonidine.¹

Initially opioids have been the standard choice as spinal adjuvants. But since there occurs many side effects and complications like early and late depression of ventilation, pruritus, nausea, vomiting, urinary retention, central nervous system excitation, viral reactivation, sexual dysfunction, delayed gastric emptying, ocular dysfunction, there is an active search for an alternative ideal adjuvant which is devoid of these side effects and complications.²

Bupivacaine like most local anaesthetic agents is relatively free of side effects if it is administered in an appropriate dosage and in the appropriate anatomical location. Systemic toxic reactions to Bupivacaine usually only occur after unintentional intravascular injection or in excessive doses. It blocks nerve conduction by decreasing the entry of Na⁺ ions during upstroke of action potential.³

Clonidine is widely used during antihypertensive therapy and as a co-analgesic during chronic pain therapy. In addition, it has been given as adjuvant during spinal, epidural anaesthesia and peripheral nerve blocks preferentially in combination with local anaesthetic where clonidine amplifies and prolongs the local anaesthetic effect.⁴

Preservative free clonidine when administered into epidural or subarachnoid space produce dose dependent analgesia and unlike opioids does not produce any of its side effects. Activation of post synaptic alpha 2 receptors in the substantia gelatinosa of the spinal cord is the presumed mechanism by which it produces analgesia.⁵

Clonidine at appropriate doses when used as an adjuvant with bupivacaine in subarachnoid block seems to prolong the duration of surgical anaesthesia and postoperative analgesia without any of its side effects like dry mouth, hypotension, bradycardia, which is not usual in these doses with added advantages like sedation, anti-shivering.⁶

AIMS AND OBJECTIVES:

The aim of this study is to evaluate the duration of post-operative analgesia provided by two varying doses of clonidine with bupivacaine against bupivacaine alone in subarachnoid blockade in inguinal hernia surgeries.

MATERIALS AND METHODS:

Present study was conducted in 90 patients undergoing elective inguinal hernia surgeries. It was a double blinded study in which patients were randomly allocated into three groups A, B and C.

Group A: Inj. 0.5% Bupivacaine 2.4 cc + 0.2 cc Normal saline = 2.6 cc
Group B: Inj. 0.5% Bupivacaine 2.4 cc + Inj. Clonidine 15µg + normal saline 0.1cc = 2.6 cc
Group C: Inj. Bupivacaine 2.4 cc + Inj. Clonidine 30 µg = 2.6 cc

Patients belonging to physical status ASA I and II who were posted for Inguinal hernia surgeries were included in the study and patients who were not willing to participate in the study, physical status ASA III and IV, drug allergy and history bleeding disorders were excluded from the study.

After getting informed consent and explaining the procedure details to the patients, the anaesthetic technique was performed. Patients were premedicated on the night before surgery with tab ranitidine 150 mg and tab diazepam 10 mg. Before induction of spinal anaesthesia, all patients received I.V infusion of Ringer lactate 1000 ml. Standard intraoperative monitoring was used (ECG, Pulse Oximetry, and Non-invasive blood pressure). All Emergency drugs and equipment were kept ready. Under strict aseptic precautions, lumbar puncture was performed using 25 g Spinal needle with the patient in left lateral position in L3-L4 inter spinous space. After confirming free flow of CSF, either of the study drugs was injected into the subarachnoid space. Patients were turned supine immediately and were given supplemental oxygen and continued IV fluids.

Age distribution, time of highest level of sensory block, onset and duration of motor blockade assessed by using Bromage scale (Table 1), Pulse rate, Blood pressure, sedation score and duration of postoperative analgesia were recorded. Data entered in excel sheet. Statistical Analysis was carried out using SPSS 20.0 version. Chi square test was done to assess statistical significance.

Table 1: Bromage score

Grade 1	Free movement of legs and feet	Nil
Grade 2	Just able to flex knees with free movement of feet	33%
Grade 3	Unable to flex knees but with free movement of feet	66%
Grade 4	Unable to move legs or feet	100%

OBSERVATION AND RESULTS:

The study was conducted in 90 patients with 30 patients each in Group A, B and C. Age distribution in Group A ranges between 40 to 64 years, Group B ranges between 39 to 61 years and Group C ranges between 41 to 69 years. Mean age was 51.6, 53.1 and 56.5 in Group A, B and C respectively. No statistical significance was found between the 3 groups. ASA score was I in 22(73.3%), 25(83.3%) and 26(80%) in Group A, B and C respectively and ASA score was II in 8(26.7%), 5(16.7%) and 4(20%) in Group A, B and C respectively.

The average fall in PR in Group I and II are comparable. But the fall is profound in Group III. This suggests that increasing the dosage of clonidine will decrease the pulse rate significantly. The p value between 3 groups were statistically significant as the p value was 0.0148. (Table 2)

Table 2: Pulse rate

Pulse Rate	Group I (Mean)	Group II (Mean)	Group III (Mean)
Average PR	83.4	82.9	75.2
Fall in PR	12.6	12.9	18.3
% fall in PR	13.9	14.1	19.8

Average fall in BP was high in Group C. The fall in Mean Arterial Pressure was not significant in all 3 groups (p value 0.157). Adding Clonidine does not produce any change in Mean Arterial Pressure values (Table 3). No significant difference was noted in respiratory rate and SpO2 of patients in 3 groups.

Table 3: Mean Arterial Pressure

Mean Arterial Pressure	Group I (Mean)	Group II (Mean)	Group III (Mean)
Average MAP	87.5	88.9	82.7
Fall in MAP	6.3	7.5	12.4
% fall in MAP	6.9	7.4	12.3

Sedation score was 0 in all patients of Group 1 while sedation score was 0 in 27(90%) and 11(36.7%) of group B and C patients respectively. Sedation score was 1 in 3(10%) and 19(63.3%) of group B and C patients respectively.

Level of sensory loss was T9 in majority of the patients in all 3 groups and was followed by T10 level. Time of highest level of sensory block was described in table 4 and Comparison between 3 groups showed statistical significance (p value 0.003). Duration of onset of motor blockage was assessed by bromage scale. Time taken for onset of motor blockage was high for group C when compared to other groups (Table 4). Comparison between 3 groups found a p value of 0.014 which was statistically significant.

Total duration of analgesia is the time taken from the onset of analgesia to the point where the patient complained of pain at the operative site requiring analgesics. The duration of motor blockade was prolonged in groups II and III compared to group I patients (Table 4), but was very high in group III patients. Duration of postoperative analgesia was prolonged in group III patients (Table 4). On comparison with 3 groups the p value was statistically significant for duration of motor blockage and postoperative analgesia (p value 0.001).

Table 4: Mean onset of maximum sensory loss, motor blockage, duration of motor blockage and postoperative analgesia.

	Mean onset of maximum sensory loss (minutes)	Mean onset of motor blockage (minutes)	Mean duration of motor Blockage (minutes)	Mean postoperative Analgesia (minutes)
Group A	7.8	8.5	113.7	172.9
Group B	8.3	9.2	124.1	198.4
Group C	8.9	9.4	144.3	275.1

DISCUSSION:

The fall in pulse rate was significant in 3 groups, but not less than 60 per min in any group. The fall in mean arterial pressure was not significant

in 3 groups. Study conducted by Sethi BS et al⁷ found that there was there was significant fall in mean arterial pressure. The study concluded that clonidine does not produce any change in mean arterial pressure values and is hemodynamically stable. Studies conducted by Baj B et al⁸ and Thakur A et al⁹, found significant fall in mean arterial pressure with increasing doses of clonidine.

The onset of maximum sensory blockade and the onset of motor blockade was significantly prolonged in group III when compared to other 2 groups. This observation is in accordance with a study conducted by Sethi BS et al⁷ and Santhosh T et al¹⁰. In contrast to the present study, Vani et al.¹¹ found that intrathecal clonidine in the dose of 75 mcg in adults along with bupivacaine 0.5% heavy 3 ml, significantly decreases the onset time for sensory blockade.

In the present study maximum duration of motor blockage and postoperative analgesia was high in Group III patients, 144.3 minutes and 275.1 minutes respectively. This was comparable to study done by Sethi BS et al.⁷ found that the duration of motor blockade was 205 minutes in clonidine group while use 12.5 mg of 0.5% bupivacaine with 1µg per kg dose of clonidine prolongs the duration of postoperative analgesia by 614 minutes in clonidine group.

Santhosh T et al.¹⁰ found that adding clonidine 30µg and 45µg to bupivacaine significantly prolongs the duration of postoperative analgesia when compared to bupivacaine alone in inguinal hernia surgeries. Subrahmaneyswari KV et al.¹¹ found that intrathecal clonidine along with bupivacaine in lower abdominal surgeries prolonged the duration of post-operative analgesia. This was comparable to the present study. This was also in accordance with a study conducted by Dobrydnjov I et al.¹² using 6mg of 0.5% heavy bupivacaine with 15µg vs 30µg of clonidine for unilateral spinal anaesthesia in unilateral inguinal hernia surgeries.

Bonnet F et al.¹³ found that using 150 mg of spinal clonidine as an adjuvant with 2.5 mg of bupivacaine prevented tourniquet discomfort and successfully prolonged postoperative analgesia without causing any adverse effects.

Fogarty DJ et al.¹⁴ conducted a study in patients undergoing total hip replacement procedures. The patients were given either spinal clonidine or morphine with bupivacaine. In the clonidine group, postoperative analgesia lasted 278 minutes, but it took 498 minutes in the morphine group. They came to the conclusion that intrathecal clonidine was noticeably less effective than intrathecal morphine at delivering later postoperative analgesia.

Tuijl IV et al.¹⁵ research on the effects of hyperbaric bupivacaine and intrathecal clonidine on post-operative pain following caesarean delivery. They came to the conclusion that adding 75 g of clonidine to 2.2 ml of hyperbaric bupivacaine prolonged the postcaesarean spinal analgesia and motor block and enhanced early analgesia without any clinically significant adverse effects on the mother or the new born.

CONCLUSION:

This study demonstrates that the duration of postoperative analgesia is dramatically reduced when clonidine 15 and 30 mg is added along with bupivacaine compared to bupivacaine when used alone during inguinal hernia procedures. When compared to adding 15g of clonidine to bupivacaine, adding 30g dramatically lengthens the duration of postoperative analgesia.

Financial Support And Sponsorship:

Nil.

Conflicts Of Interest:

There are no conflicts of interest

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