

Research Article

Efficacy of intrathecal bupivacaine alone, with clonidine and neostigmine in lower abdominal surgeries – A comparative study

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Abstract: Background: A small dose of drug through spinal anaesthesia is enough to produce sufficient sensory analgesia and motor blockade. Ideal intrathecal adjuvants can prolong post-operative analgesia and maintain intra and post-operative conditions. This study was conducted to assess the efficacy of intrathecal bupivacaine alone, intrathecal bupivacaine with clonidine and intrathecal bupivacaine with neostigmine in lower abdominal surgeries. **Materials and methods: The Present** prospective randomized double blinded has 120 cases posted for lower abdominal surgeries belongs to ASA grade I and II and between age group 21 to 62 years. Cases were randomly divided to three groups i.e. group 1 (0.5% hyperbaric bupivacaine), group 2 (0.5% hyperbaric bupivacaine with 50µ neostigmine) and group 3 (0.5% hyperbaric bupivacaine with 50µ clonidine). **Results:** The mean age was statistically not significant. The mean time for onset of sensory block was statistically significant ($p=0.002$). The mean total duration of analgesia in group 1 was 2.64 ± 1.01 , in group 2 was 2.96 ± 1.28 and in group 3 was 3.68 ± 0.92 . The mean time for onset of motor block in group 1 was 139.4 ± 9.98 , in group 2 was 99.52 ± 13.21 and in group 3 was 108.3 ± 15.12 . The mean total duration of motor block in group 1 was 3.15 ± 0.24 , in group 2 was 3.56 ± 0.34 and in group 3 was 3.62 ± 0.38 . Haemodynamic changes till 10 minutes was statistically not significant, later at various time intervals changes was statistically significant. **Conclusion:** Clonidine 50µ along with 0.5% hyperbaric bupivacaine in lower abdominal surgeries has major advantages in prolonged and early onset of sensory and motor blockade duration and has better post-operative analgesia when compared to Bupivacaine with neostigmine.

Keywords: Intrathecal Bupivacaine, neostigmine, clonidine, Lower abdominal surgeries, Analgesia.

INTRODUCTION

Ideal anaesthesia is meant to provide comfortable analgesia with adequate muscle relaxation and pain management during pre and post-operative period. Post-operative pain management decrease morbidity and mortality (Akinwale, M.O. *et al.*, 2012). Spinal anaesthesia is most preferable technique for lower abdominal surgeries, caesarean sections etc (Bhar, D. *et al.*, 2016).

Hyperbaric bupivacaine is an effective local anaesthetic agent for subarachnoid block, but has minimal duration of action. Hence, bupivacaine with adjuvants is ideal to prolong post-operative analgesia and maintain intra and post-operative conditions (Filos, K.S. *et al.*, 1994). Clonidine, acts on the postsynaptic α_2 agonist commonly decreases the requirement of

analgesics by inhibiting the activity of wide dynamic range neurons (Elia, N. *et al.*, 2008; Sethi, B.S. *et al.*, 2007). Neostigmine is an anticholinesterase agent activates descending pain inhibitory system and effective in decreasing somatic pain (A Srikanth, R. *et al.*, 2017).

This study was designed to assess the efficacy of intrathecal bupivacaine alone, intrathecal bupivacaine with clonidine and intrathecal bupivacaine with neostigmine in lower abdominal surgeries.

MATERIALS AND METHODS

The present prospective randomized double blinded study was conducted in Department of Anaesthesiology, Maheshwara Medical College & Hospital and MNR Medical College & Hospital,

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Sangareddy in association with Department of surgery & Department of OBG, MNR Medical College and Maheshwara Medical College during April 2017 to December 2018. A total of 120 cases posted for lower abdominal surgeries between age group 21 to 62 years were recruited. Informed consent was obtained from all the participants and study protocol was approved by institutional ethics committee. Cases belongs to ASA grade I and II, willing to participate and fit for spinal anaesthesia were included. Cases had hypersensitive to study drugs, with cardiovascular, respiratory complications and with hemodynamic instability were excluded.

Study cases were randomly divided to three groups i.e. group 1 administered with 0.5% hyperbaric bupivacaine, group 2 administered with 0.5% hyperbaric bupivacaine with 50µ neostigmine and

group 3 administered 0.5% hyperbaric bupivacaine with 50µ clonidine. Vital signs were monitored at beginning and then every 5 minutes till 15 minutes and then every 15 minutes till 60 minutes. The surgery was started after obtaining adequate sensory block and adequate analgesia and surgical anaesthesia till T6 level assessed by pinprick test. Vitals were monitored in the postoperative period. Pain was assessed using VAS (visual analogue scale) at the end of surgery during the recovery period when patient was awake. At the end of the surgery, motor block was assessed using modified Bromage scale for both lower limbs. The outcomes measured were onset of sensory block, duration of the block, level of block achieved, haemodynamic status of the patient intra-operatively, duration and quality of motor block, Rescue analgesia, VAS score and complications. Motor block was evaluated by using modified Bromage scale.

| | |
|------------------|--|
| Grade 0 | No motor block |
| Grade I | Able to move knees and feet, unable to raise extended leg, |
| Grade II | Able to move feet, unable to raise extended leg and move knee, |
| Grade III | Complete motor block |

RESULTS

A total of 120 cases posted for lower abdominal surgeries were randomly divided to three groups i.e. group 1 administered with 0.5% hyperbaric bupivacaine, group 2 administered with 0.5% hyperbaric bupivacaine with 50µ neostigmine and group 3 administered 0.5% hyperbaric bupivacaine with 50µ clonidine.

Table 1: Demographic features of the present study groups

| Descriptive | Group A | Group B | Group C | p-Value |
|---------------------|-------------|--------------|-------------|---------|
| | Mean±SD | Mean±SD | Mean±SD | |
| Age (In years) | 42.2±10.5 | 42.7±9.92 | 41.08±10.33 | 0.568 |
| Weight (In kg) | 62.4± 8.37 | 61.58±9.10 | 61.88±8.22 | 0.644 |
| Duration of surgery | 57.2± 10.04 | 64.12± 12.36 | 64.58±11.54 | 0.005* |

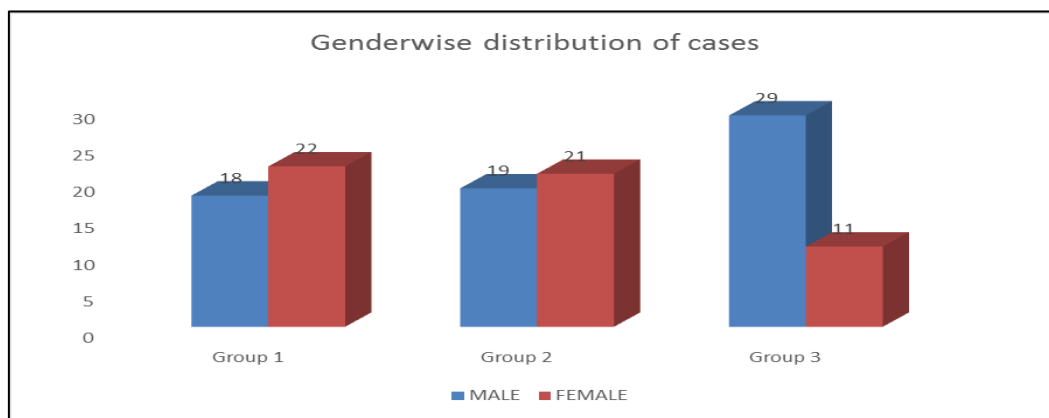


Figure 1: Gender wise distribution of study cases.

Table 2: Details of motor and sensory blockade among three drug groups

| Descriptive | Group 1 | Group b | Group c | p-Value |
|-------------------------|--------------|-------------|--------------|---------|
| | Mean±SD | Mean±SD | Mean±SD | |
| Sensory blockade | | | | |
| Onset | 148.25± 8.56 | 100.2±14.23 | 121.28±12.22 | 0.002* |
| Peak level | 5.81±3.34 | 5.98±3.45 | 6.24±1.29 | 0.255 |
| Motor blockade | | | | |
| Onset | 139.4± 9.98 | 99.52±13.21 | 108.3±15.12 | - |

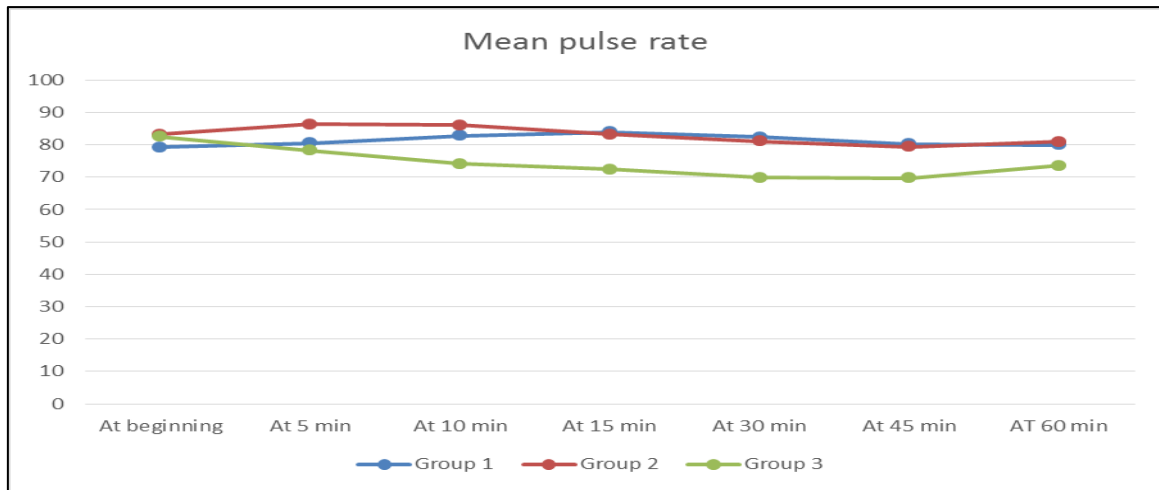


Figure 2: Mean values of pulse rate.

Table 3: Mean values of systolic blood pressure (SBP), Diastolic blood pressure (DBP) among three drug groups.

| Variables | Systolic blood pressure (SBP) | | | p-Value | Diastolic blood pressure (DBP) | | | p-value |
|------------------|-------------------------------|------------|------------|---------|--------------------------------|-----------|-----------|---------|
| | Group A | Group B | Group C | | Group A | Group B | Group C | |
| | Mean±SD | Mean±SD | Mean±SD | | Mean±SD | Mean±SD | Mean±SD | |
| At the beginning | 125.1±9.8 | 126.1±10.2 | 124.5±10.5 | 0.328 | 81.2±7.52 | 80.1±6.98 | 79.8±9.23 | 0.612 |
| At 5 min | 121.8±8.6 | 122.4±10.2 | 116.5±11.2 | 0.062 | 78.5±6.38 | 72.8±6.57 | 75.4±9.78 | 0.235 |
| At 10 min | 116.4±8.2 | 119.2±11.1 | 110.2±9.7 | 0.088 | 75.3±7.61 | 76.4±6.08 | 72.8±8.24 | 0.011 |
| At 15 min | 110.5±8.5 | 118.7±11.6 | 108.3±9.8 | 0.005 | 72.4±6.54 | 76.8±5.73 | 69.2±7.16 | 0.003 |
| At 30 min | 111.3±9.7 | 120.2±11.5 | 106.8±8.6 | 0.002 | 71.9±6.22 | 74.6±5.82 | 68.8±6.53 | 0.001 |
| At 45 min | 116.8±9.4 | 121.8±11.4 | 108.9±8.2 | 0.001 | 74.8±5.88 | 75.3±6.25 | 68.6±7.48 | 0.005 |
| AT 60 min | 122.4±8.8 | 123.4±10.8 | 114.2±7.9 | 0.002 | 78.4±5.26 | 76.9±6.21 | 73.4±6.56 | 0.001 |

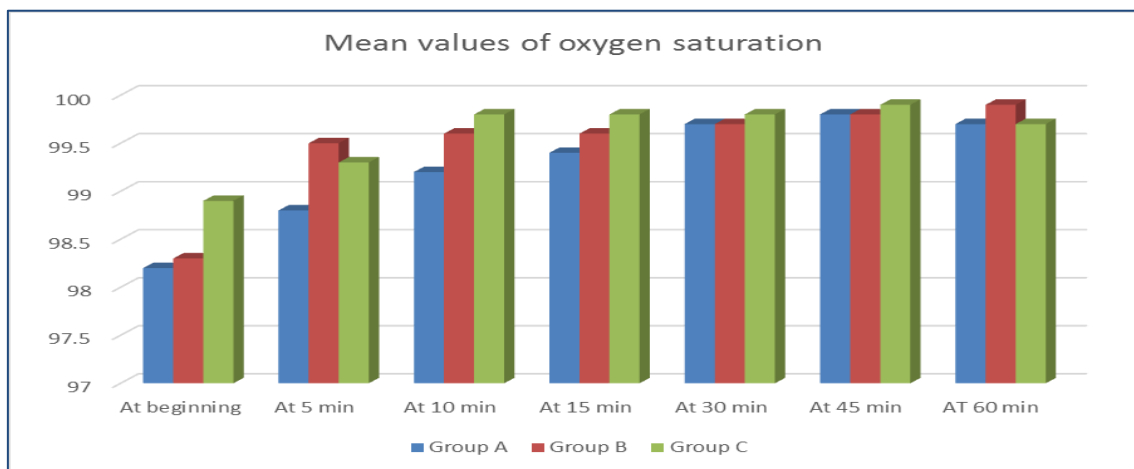


Figure 3: Mean values of oxygen saturation in three drug groups.

Table 4: Details of duration of analgesia, VAS score and duration of motor block.

| Descriptive | Group 1 | Group 2 | Group 3 |
|-------------------------------|-----------|-----------|-----------|
| | Mean±SD | Mean±SD | Mean±SD |
| Total duration of analgesia | 2.64±1.01 | 2.96±1.28 | 3.68±0.92 |
| Total duration of motor block | 3.15±0.24 | 3.56±0.34 | 3.62±0.38 |
| VAS score | 4.81±0.50 | 4.98±0.86 | 4.66±0.59 |

Table 5: Details of clinical symptoms associated with three study groups.

| Side effect | Group 1 | Group 2 | Group 3 |
|-----------------|---------|---------|---------|
| No side effects | 37 | 24 | 28 |
| Vomiting | - | 7 | - |
| Cough | - | 3 | - |
| Nausea | 1 | 6 | 3 |
| Bradycardia | - | - | 4 |
| Hypotension | - | - | 5 |
| Chest pain | 2 | - | - |

DISCUSSION

Lower abdominal surgeries are performed under spinal anaesthesia is feasible but it has limited period of postoperative analgesia (Liu, S.S. *et al.*, 1999). Intrathecal bupivacaine alone has minimal duration of post-operative analgesia, with intrathecal adjuvants the duration of analgesia will prolong (Nakayama, M. *et al.*, 2001). This study was designed to assess the efficacy of 0.5% hyperbaric bupivacaine alone, 0.5% hyperbaric bupivacaine with 50µ neostigmine and 0.5% hyperbaric bupivacaine with 50µ clonidine. The mean age in group 1 was 42.2±10.5, group 2 was 42.7±9.92, and group 3 was 41.08±10.33. The mean age was not statistically significant. The mean body weight of all the groups were comparable and was statistically not significant. The mean duration of surgery was statistically significant (p=0.005) (Table 1).

In this study, the mean time for onset of sensory block was statistically significant (p=0.002). The mean total duration of analgesia in group 1 was 2.64±1.01, in group 2 was 2.96±1.28 and in group 3 was 3.68±0.92. Study by Reddy *et al.*, on intrathecal clonidine 75µg or neostigmine 50µg added to intrathecal hyperbaric bupivacaine, found onset of sensory block in group A was 101± 12 seconds compared to group B 165±18 which was statistically significant (P < 0.001). The mean duration of analgesia was statistically significant (A Srikanth, R. *et al.*, 2017). Pan *et al.*, on caesarean section cases found that onset of sensory block was rapid in neostigmine group than the clonidine group (Pan, P. M. *et al.*, 1998). Study by N Yoganarasimha *et al.*, also found that the onset of sensory and motor block neostigmine was high when compared to clonidine (Yoganarasimha, N. *et al.*, 2014). Study by Balasubramaniam Solaiappan *et al.*, found that onset of sensory block is faster in the neostigmine group than other drug groups which was statistically significant (p<0.0001) (Solaiappan, B., & Jeevarathnam, R. 2016).

The mean time for onset of motor block in group 1 was 139.4± 9.98, in group 2 was 99.52±13.21 and in group 3 was 108.3±15.12. The mean total duration of motor block in group 1 was 3.15± 0.24, in group 2 was 3.56±0.34 and in group 3 was 3.62±0.38 (Table 2 & 4). Study by Reddy *et al.*, found that mean onset of motor block was 165 ±12 seconds in group A, whereas it was 216±36 seconds in group B (P < 0.001) (9). Study by N Yoganarasimha *et al.*, found that the mean total duration of analgesia was prolonged in group BC (362 ± 32 min) compared to group BN (300 ± 25 min) (P < 0.05) (11).

The mean pulse rate was increased till 10 minutes in all the three groups later the values were decreased and stabilized among three groups. Study by Reddy *et al.*, found that heart rate was increased in both the study groups (A Srikanth, R. *et al.*, 2017). Study by N Yoganarasimha *et al.*, found Increase in

heart rate was noted in both groups (Yoganarasimha, N. *et al.*, 2014).

Haemodynamic changes till 10 minutes was statistically not significant, later at various time intervals changes was statistically significant. Intraoperative blood pressure was well maintained in the neostigmine group than clonidine. The study results were similar with the study by (Solaiappan, B., & Jeevarathnam, R. 2016). In this study, the mean VAS score in group 1 was 4.81±0.50, in group 2 was 4.98±0.86 and in group 3 was 4.66±0.59. Study by Balasubramaniam Solaiappan *et al.*, stated that there was no statistical significance in VAS score between three study groups (Solaiappan, B., & Jeevarathnam, R. 2016). In group 1, nausea and chest pain was seen in 3 cases. Whereas in group 2 & 3 Vomiting, Cough, nausea, bradycardia and chest pain was observed. Study by Balasubramaniam Solaiappan *et al.*, observed chest pain, cough and nausea, vomiting, bradycardia and hypotension in the study groups (Solaiappan, B., & Jeevarathnam, R. 2016).

CONCLUSION

The study outcome concludes that neostigmine has rapid onset of sensory and motor blockade whereas clonidine has prolonged sensory and motor blockade with impressive post-operative analgesia. Clonidine 50µ along with 0.5% hyperbaric bupivacaine in lower abdominal surgeries has major advantages in prolonged and early onset of sensory and motor blockage duration and has better post-operative analgesia when compared to Bupivacaine with neostigmine.

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