COMPARISON OF THE ANALGESIC EFFECTS OF INTRATHecal CLONIDINE AND MORPHINE WITH 0.5% BUPivACaine AFTER SPINAL ANESTHESIA IN PATIENT UNDERGOING LOWERLIMBORTHOPAEDIC SURGERIES

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ABSTRACT

This study was designed to compare analgesic effects of clonidine and morphine administered intrathecally with 0.5%Bupivacaine in patients undergoing lower limb orthopedic surgeries. prospective randomized clinical study was carried out on 90 patients belonging to ASA grade I and II, posted for elective lower limb orthopaedic surgeries under spinal anaesthesia aged between 20 to 60yrs. Group A received 2.75ml of 0.5% bupivacaine + 1ml of 0.9%normal saline. Group B received 2.75ml of 0.5% bupivacaine + Injection morphine 0.25mg diluted to 1 ml with 0.9% normal saline.Group C received 2.75ml of 0.5% bupivacaine + Injection clonidine 50µg diluted to 1 ml with 0.9% normal saline.Vital parameters, onset, level, duration and regression of sensory& motor block,duration of effective analgesia were recorded and compared. Paired ‘t’– test, Analysis of variance(ANOVA) and chi-square test was used. The duration of motor block and analgesia was significantly prolonged with addition of either clonidine or morphine when compared with control. When compared between clonidine and morphine, morphine had significantly prolonged duration of motor block and analgesia. addition of morphine 0.25mg to bupivacaine significantly increases the duration of spinal analgesia when compared to adding 50µg of clonidine

KEYWORDS: Hyperbaric Bupivacaine, Morphine, Clonidine, Subarachnoid Block, Postoperative Analgesia

INTRODUCTION

Regional anaesthesia is the preferred technique for most of the surgeries involving the lower abdomen and lower extremities as it allows the patient to remain awake, minimize or completely avoid problems associated with airway management1.
The technique is easy to perform and provides fast onset and effective sensory and motor block. Many additives have been added to local anesthetics in an attempt to improve the duration and quality of spinal analgesia but have been limited by their side effects\textsuperscript{2}.

It has been shown that addition of neuraxial opioids like morphine to local anaesthetic provides prolonged postoperative analgesia without any risk of hemodynamic instability\textsuperscript{3}.

After discovery of adrenergic pain modulating system in spinal cord $\alpha_2$ adrenergic agonists like clonidine has been used neuraxially. It has been shown to result in prolongation of sensory and motor blockade and reduction in the amount of concentration of local anesthetic required to produce postoperative analgesia\textsuperscript{4}.

This study was designed to compare analgesic effects of clonidine and morphine administered intrathecally with 0.5% Bupivacaine in patients undergoing lower limb orthopedic surgeries.

MATERIALS AND METHODS

After obtaining approval from ethical committee and written informed consent from the patients, the prospective randomized clinical study was carried out on 90 patients belonging to ASA grade I and II, posted for elective lower limb orthopaedic surgeries under spinal anaesthesia.

**Inclusion criteria**
- Patients belonging to ASA I and ASA II
  - Aged between 20 to 60yrs
  - Height between 150 to 170cms
  - Surgery duration not exceeding 180 min

**Exclusion criteria**
- Patients belonging to ASA III and IV
- Patients posted for emergency procedures
- Patients with coagulopathies and increased intra cranial tension
- Patients allergic to drugs used in study

A detailed pre anaesthetic evaluation was done. All patients were explained about the visual analogue scale for pain. Patients were kept nil per orally for 8 hours prior to surgery. The patients were pre-medicated with injection pethidine 1mg/kg and promethazine 0.5mg/kg intramuscularly 30 minutes before the start of the procedure. The patients were randomly allocated to one of the 3 groups of 30 each. [Group A, Group B and Group C]
Group A received 2.75ml of 0.5% bupivacaine + 1ml of 0.9% normal saline.
Group B received 2.75 ml of 0.5% bupivacaine + Injection morphine 0.25 mg diluted to 1 ml with 0.9% normal saline.
Group C received 2.75ml of 0.5% bupivacaine + Injection clonidine 50µg diluted to 1 ml with 0.9% normal saline.

Upon arrival to the pre anaesthesia room 18G intravenous line was established and patients were preloaded with 10ml/kg of crystalloid solution.

Drugs were prepared and procedure was performed by two independent investigators (anesthesiologist) who did not take part in the study.

Under strict aseptic precaution subarachnoid block was performed at L₃-L₄ intravertebral space using midline approach with 23 Gauge Quincke Babcock’s spinal needle.

Monitoring consist of non invasive blood pressure, pulseoximetry, electrocardiography and respiratory rate. All patients received oxygen by face mask. Patients blood pressure, heart rate and oxygen saturation were measured every five minutes intervals for the first 30 minutes and there after every 15 minutes till end of surgery. Time of onset of sensory block and maximum level achieved was assessed by pin prick method and attainment of complete motor blockade was assessed using Bromage scale.

A fall in mean arterial pressure to more than 20% from the baseline value was treated with 5mg of injection mephentermine. Fall in heart rate to more than 20% of baseline value was considered significant and was treated if less than 50 beats/min with injection atropine 0.6mg intravenously.

After the surgery patient was shifted to the post operative ward and monitored

Sensory level was monitored at 15 minutes interval until they have regressed two segments below assessed by pin prick method. Duration of analgesia was taken as the time taken for two segment regression of sensory analgesia as assessed by pin prick method. Duration of motor block was considered as time interval between completion of injection of local anesthetic to patients ability to raise the extended leg as assessed by Bromage scale. Visual analogue scale was used to assess post operative pain every 30 minutes. A rescue analgesic, diclofenac 75mg i.m was given with a VAS score ≥4 and the timing was recorded.

Patients will be assessed for urinary retention, nausea, vomiting, pruritis, headache and respiratory depression.

The collected data was summarized by calculating the mean and standard deviation and presented in the form tables and diagrams. Paired ‘t’ - test and analysis of variance for
repeated measures were used. For the analysis of significance chi-square test was used to obtain other possible association.

**OBSERVATION AND RESULTS**

90 patients of ASA – physical status I and II were selected for the study. They were randomly allotted to 3 groups of 30 patients each. Group A (Control), Group B (Morphine) and Group C (Clonidine) The three groups were compared with regards to age, height and duration of surgery. There were no difference in the demographical profile i.e. age, sex, height, ASA grade, duration of surgery between three groups were comparable and statistically not significant.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Group A</th>
<th>Group B</th>
<th>Group C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age(years)</td>
<td>42.8±4.766</td>
<td>45.10±2.758</td>
<td>46.4±4.022</td>
</tr>
<tr>
<td>Height(cms)</td>
<td>160.36±6.08</td>
<td>161.03±5.14</td>
<td>160.23±6.00</td>
</tr>
<tr>
<td>Weight(kgs)</td>
<td>60.56±5.88</td>
<td>61.40±6.38</td>
<td>61.56±6.43</td>
</tr>
<tr>
<td>Duration of Surgery(mins)</td>
<td>130.0±6.158</td>
<td>130.0±6.158</td>
<td>127.50±5.373</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Control (A)</th>
<th>Morphine (B)</th>
<th>Clonidine (C)</th>
<th>P* Value, signif</th>
</tr>
</thead>
<tbody>
<tr>
<td>Onset time to sensory blockade(secs)</td>
<td>148.96</td>
<td>146.33</td>
<td>143.36</td>
<td>0.294 NS</td>
</tr>
<tr>
<td>Onset time to complete motor blockade(secs)</td>
<td>380.43</td>
<td>375.10</td>
<td>351.36</td>
<td>&lt;0.001 HS</td>
</tr>
<tr>
<td>2 segment regression time(mins)</td>
<td>78.93</td>
<td>113.20</td>
<td>102.80</td>
<td>P&lt;0.001 HS</td>
</tr>
<tr>
<td>Duration of motor blockade(mins)</td>
<td>158.73</td>
<td>197.83</td>
<td>186.6</td>
<td>&lt;0.001 HS</td>
</tr>
<tr>
<td>Duration of effective analgesia(mins)</td>
<td>191.8</td>
<td>272.8</td>
<td>270.0</td>
<td>P&lt;0.001 HS</td>
</tr>
</tbody>
</table>

- The time of onset of sensory blockade was not statistically significant between groups.
- The time of onset of motor block was hastened with addition of clonidine (351.3 sec) when compared to addition of either saline (380 sec) or morphine (375.1 sec). However statistically significant difference was found only between Group A and C and between Groups B and C.
• The duration of motor block was significantly prolonged with addition of either clonidine or morphine when compared with control, which was statistically very highly significant. When compared between clonidine and morphine, morphine had significantly prolonged duration of motor block.

• The duration of analgesia was significantly prolonged with addition of either clonidine or morphine when compared with control which was statistically very highly significant but when compared between clonidine and morphine, morphine significantly prolonged the duration of Analgesia.

DISCUSSION

Spinal anaesthesia has been used abundantly for various surgeries involving the lower abdomen and lower extremities. Studies have shown associated hemodynamic instability with higher volumes of 0.5% bupivacaine. In order to minimize this side effect and to maximize analgesia many adjuvants like opioids eg. morphine, fentanyl and non opioids like ketamine and clonidine has been used. This prospective study was conducted to compare the analgesic effects of intrathecal clonidine and intrathecal morphine in patients undergoing lower limb orthopaedic surgeries. The patients were selected at random, to avoid any kind of bias and to allow comparability of results obtained. This was a double blind study where neither the patient nor the observer who recorded the parameters was aware of the group allocation and the drug received. The mean age, weight and height of the patients were statistically insignificant between three groups. These parameters were kept identical in all groups to avoid variation in intra and post operative outcome of the patients.

In our study the mean onset time of sensory block was comparable in all three groups. Most of the patients attained a sensory level of T₅ to T₆ which was statistically not significant. However the mean time duration for the two segment regression of sensory level in group A was 78.93min compared to 113.20min in group B and 102.80min in group C which was statistically highly significant. Our results were in accordance to the study conducted by Eisenach et al, B.S. Sethi et al, Filos K.S et al & Grace D. et al. in their study showed that intrathecal morphine 1mg provided sensory block of prolonged duration compared to 75 µg of clonidine given intrathecally. The motor block was complete and none of the patients had incomplete motor block. The mean time taken for onset of motor block in Group A was 380.43sec and Group B was 375.10sec compared to 351.37sec in Group C which was statistically highly significant (p<0.001). Our study showed that addition of both
clonidine and morphine potentiates the motor blockade provided by Bupivacaine when compared with control group which was statistically significant. Our results were in accordance to the study conducted by Eisenach et al\textsuperscript{7}, Strebel S. et al\textsuperscript{12}, B.S. Sethi et al\textsuperscript{8} The haemodynamic parameters like heart rate and mean arterial pressure was monitored peri-operatively. There was statistically significant reduction in heart rate & mean arterial pressure in Clonidine group from 30 minutes to 3 hours, although this reduction was not clinically significant. After 3 hours heart rate & mean arterial pressure was comparable between the three groups. Duration of effective analgesia ie. time for the first rescue analgesic when $\text{VAS} \geq 4$, was significantly prolonged in group B and group C compared to group A $(p<0.001)$. Results obtained was comparable to previous studies Incidence of side effects like pruritis, respiratory depression, Nausea and vomiting & Sedation were statistically not significant across groups.

CONCLUSION

We concluded from our study that addition of morphine 0.25mg to bupivacaine significantly increases the duration of spinal analgesia when compared to adding 50µg of clonidine with clinically insignificant influence on haemodynamic parameters and without any risk of respiratory depression in patients undergoing lower limb orthopaedic surgeries.

References


