A COMPARATIVE EVALUATION OF EFFICACY OF DEXMEDETOMIDINE VERSUS FENTANYL AS AN ADJUVANT WITH EPIDURAL ROPIVACAINE FOR LOWER ABDOMINAL SURGERY

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ABSTRACT

BACKGROUND
Dexmedetomidine is a centrally acting selective α2A agonist is used as an adjuvant to anaesthesia, because it produces analgesia with little respiratory depression and amnesia, sympathetic response to stress is also blunted. Present study is conducted with an aim to compare the efficacy of dexmedetomidine as an adjuvant to local anaesthetic agent in comparison with fentanyl.

MATERIALS AND METHODS
Patients were randomised and separated into group D and group F. Group D is dexmedetomidine 1 mg/kg with 0.75% ropivacaine 15 mL. Group F is fentanyl 1 mg/kg with 0.75% ropivacaine 15 mL.

RESULTS
Time required to reach T10 level was 2.33 mins. in group D and 4.28 mins. in group F. Peak sensory level reach in group D was T5, and in group F, it was T4. Time to reach peak sensory level was 9.86 mins. in group D and 11.40 mins. in group F. Time for regress to L5 was 412.6 mins. in group D and 360.40 mins. in group F. Onset of motor block in group D was 4.65 mins. and group F was 6.68 mins. Duration of block was 358 mins. in group D and 286 mins. in group F. Time required for first dose of required oranges was 8 hrs. in group D and 5 hours in group F. Similarly, 26 patients in group D required analgesics that are 48 in group F.

CONCLUSION
We conclude that dexmedetomidine is a better adjuvant than fentanyl along with ropivacaine. It produces early sensory and motor block and duration of block is also prolonged. It is a better analgesic, than fentanyl in postoperative period.

KEYWORDS
Adjuvant, Dexmedetomidine, Fentanyl, Ropivacaine.


BACKGROUND
Surgical process is a kind of stress and body used to respond to this stress. It leads to a range of derangement in metabolic and physiological process. In this process, various stress hormone are secreted, sympathetic nervous system get activated and immunological and haematological changes occurs in the form of neutrophil leucocytosis, cytokine secretion, lymphocytic proliferation and acute phase relation.¹,² If this stress response gets prolonged, then it leads to delayed ambulation and increased morbidity and mortality.

With the development in the field of local and regional anaesthesia and with the availability of very effective anaesthetic agent with good pharmacokinetic profile along with adjuvant use of opioids, it is possible to control postoperative pain and decrease the duration of study of patient in the hospital.³

Spinal anaesthesia is one of the good anaesthesia techniques, which is used to decrease stress response of surgery and decrease the postoperative mortality and morbidity. For this process, various local anaesthetic agents are used. Ropivacaine is less cardiotoxic, alternative of bupivacaine, for epidural and regional anaesthesia, it is more motor sparing than bupivacaine. Various drugs are used as adjuvant to local anaesthesia and opioids are most common among them. Fentanyl is an opioid, which is traditionally used, but is associated with side effect like nausea, vomiting, pruritus or respiratory depression.

Dexmedetomidine is a centrally-acting selective α2A agonist is used as an adjuvant to anaesthesia, because it produces analgesia with little respiratory depression and amnesia, sympathetic response to stress is also blunted.⁵

Present study is conducted with an aim to compare the efficacy of dexmedetomidine as an adjuvant to local anaesthetic agent in comparison with fentanyl.

MATERIALS AND METHODS
Present study has been conducted in the Department of Anaesthesia, Andhra Medical College, during August 2015 to
July 2017. During this period, 160 patients were enrolled in the study as per exclusion and inclusion criteria.

Exclusion Criteria
• Cardiovascular disorder.
• Hepatic and renal disorder.
• Pregnant women.
• Contraindication for spinal anaesthesia.

Inclusion Criteria
• Age 20 to 50 yrs.
• Both sex.
• Belong to ASA I and ASA II.

Prior approval has been taken from institutional ethics committee. A written informed consent has been taken from all the patients. All the patients included in this study were divided in two groups. Each group have 80 patients. Preanaesthetic evaluation was done one day before and entire patients were given same preanaesthetic medications. On the day of operation, patient were reassessed and basal vials was recorded like HR, BP, SpO2, respiratory rate and ECG recorded. Patients were randomised and separated into group D and group F. Group D- Dexmedetomidine 1 mcg/kg with 0.75% ropivacaine 15 mL. Group F - Fentanyl 1 mcg/kg with 0.75% ropivacaine 15 mL.

The patient were shifted to the operation room and IV access was secured with 18G needle and patients were loaded with 10 mL/kg of crystalloid. Patient was connected with standard monitoring device and monitoring of all parameter was done. A decrease in SBP by 25% from baseline and HR below 50% was considered hypotension and bradycardia.

Under aseptic condition, subarachnoid block was given and sterile drug solution was injected. The time at which the drug is injected completely is taken as zero.

• Sensory Block- It was assessed by pinprick method, time taken to reach T10 level was recorded, time to achieve higher sensory level maximum, level of sensory block and duration of sensory block was recorded in both groups.6,7
• Motor Block- In this study, motor block was assessed by modified Bromage scale. Total duration of motor block and time to reach maximum block was noted. Haemodynamic parameters were recorded every 5 mins. for first 45 mins., after that every 15 mins. till the end of surgery.
• Analgesia- Postoperative VAS score was used to assess the requirement of rescue analgesic. Rescue analgesic was given when VAS was 5 or more. Time required to first rescue analgesic and number of patients required rescue analgesic was also noted.

RESULTS

<table>
<thead>
<tr>
<th>Variables</th>
<th>Group D (Mean)</th>
<th>Group F (Mean)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (yrs.)</td>
<td>46.42</td>
<td>45.16</td>
<td>0.412</td>
</tr>
<tr>
<td>BMI (kg/m2)</td>
<td>26.24</td>
<td>27.18</td>
<td>0.212</td>
</tr>
<tr>
<td>Sex M/F</td>
<td>5.6/24</td>
<td>62/18</td>
<td></td>
</tr>
<tr>
<td>ASA grade I</td>
<td>64 (80%)</td>
<td>58 (73%)</td>
<td></td>
</tr>
<tr>
<td>ASA grade II</td>
<td>16 (20%)</td>
<td>22 (27%)</td>
<td></td>
</tr>
<tr>
<td>Total duration of surgery in mins.</td>
<td>118.46</td>
<td>112.36</td>
<td></td>
</tr>
</tbody>
</table>

Table 1. Demographic Profile of Patients

As per table 1, mean age of the patient in Group D was 46.42 yrs. and Group F was 45.16 yrs. BMI in Group D was 26.24 kg/m2, and Group F, it was 27.18 kg/m2. As there is no significant difference, so they are comparable to each other. ASA score also in both the group was comparable to each other. Total duration of surgery in group D was 118.46 mins. and group F was 112.36 mins.

<table>
<thead>
<tr>
<th>Onset of Block</th>
<th>Group D (Mean)</th>
<th>Group F (Mean)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time to reach T10 level in mins.</td>
<td>2.33</td>
<td>4.28</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Peak sensory level</td>
<td>T5</td>
<td>T4</td>
<td></td>
</tr>
<tr>
<td>Time to reach peak sensory level (mins.)</td>
<td>9.86</td>
<td>11.40</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Time for two dermatome regression (mins.)</td>
<td>306.4</td>
<td>126.6</td>
<td>P=0.001</td>
</tr>
<tr>
<td>Time for regression (mins.)</td>
<td>412.6</td>
<td>360.40</td>
<td>P=0.007</td>
</tr>
</tbody>
</table>

Table 2. Sensory Block Characteristics

As per Table 2, time required to reach T10 level was 2.33 mins. in group D and 4.28 mins. in group F. Peak sensory level reach in group D was T5, and in group F, it was T4. Time to reach peak sensory level was 9.86 mins. in group D and 11.40 mins. in group F. Time for refresh to L5 was 412.6 mins. in group D and 360.40 mins. in group F. Onset of motor block in group D was 4.65 mins. and group F was 6.68 mins. Duration of block was 358 mins. in group D and 286 mins. group F.

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<th>Group D (Mean)</th>
<th>Group F (Mean)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Onset of motor block (mins.)</td>
<td>4.65</td>
<td>6.68</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Duration of block</td>
<td>358 mins.</td>
<td>286 mins.</td>
<td>&lt;0.05</td>
</tr>
</tbody>
</table>

Table 3. Motor Block Characteristics

As per Table 2, time required for first dose of rescue analgesics was 8 hours in group D and 5 hours in group F. Similarly, 26 patients in group D required analgesics that are 48 in group F.

<table>
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<tr>
<th>Variables</th>
<th>Group D (Mean)</th>
<th>Group F (Mean)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time for first dose</td>
<td>8 hrs.</td>
<td>5 hrs.</td>
</tr>
<tr>
<td>Number of patients required rescue analgesics</td>
<td>26</td>
<td>48</td>
</tr>
</tbody>
</table>

Table 4. For First Dose of Rescue Analgesics
DISCUSSION
In present study, we have compared dexmedetomidine with fentanyl as an adjuvant to ropivacaine. We have also evaluated the analgesic efficacy of dexmedetomidine.

In our study, we have found that both sensory and motor block was prolonged with the use of dexmedetomidine in comparison with fentanyl. Demographic profile of both the group was similar to each other. Time required to reach T10 level was significantly less in group D than group F. Peak sensory level reached in group D was T5 in comparison to T4 in group F. Time to reach peak sensory level was also low in group D than group F. Duration of sensory block is longer in group D. These findings are similar to the finding of Bajwa et al and Pratibha Jain et al.6,9

The onset of motor block was early in group D than group F and duration of motor block was also long and was statistically significant. Dexmedetomidine is an α2A selective agonist use frequently as an adjuvant to prolong duration of spinal and peripheral block. Abdullah, Dwyer et al10 Rutkowska, et al,11 as per the metaanalysis of Abdallah and Abrishami, it is associated with prolongation of motor block by 17%, which is similar to our study.13

The time required for first rescue analgesia was prolonged in group D and also the number of patients required rescue analgesia was less than group F. It has been found that dexmedetomidine used to suppress pain by hyperpolarisation of interneurons and reduction of release of pronociceptive transmitter such as substance P and glutamate, Vuyk, Sitsen et al,13 similar observation was made by Rabie et al.14

CONCLUSION
We conclude that dexmedetomidine is a better adjuvant than fentanyl along with ropivacaine. It produces early sensory and motor block and duration of block is also prolonged. It is a better analgesic than fentanyl in postoperative period.

REFERENCES