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A Study to Compare the Effect of Dexmedetomidine and Clonidine as an Adjuvant to Ropivacaine for Epidural Anesthesia in Infraumbilical Sugeries

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Abstract

Background: The quality and duration of analgesia is improved when a local anesthetic is combined with alpha 2 adrenergic agonist. Alpha-2 adrenergic agonists have both analgesic and sedative properties and can be used as an effective adjuvant in epidural anaesthesia.

Methods: This Hospital Based, double blind, randomized, comparative, interventional Study was carried out in 60 patients undergoing infra umbilical surgeries. All patients randomly allocated in two groups of 30 patients in each group. Group A patient received 15 ml 0.75 % ropivacaine + 1 microgram/kg dexmedetomidine, Group B received 15 ml 0.75 % ropivacaine + 1 microgram/kg clonidine.

Results: The difference was highly significant between two groups for sensory onset that is p<0.001.Onset time is more in B group as compared to A group. There was statistically significant difference in highest level of sensory block among both study groups (p <0.001). Mean time was more in B group as compare to A group. There was statistically significant difference in mean duration of sensory block among both study groups (p <0.001). Duration of sensory block was more in A group as compare to B group.Difference was highly significant between two groups for mean time to 2 segment regression that is p<0.001. Two segment regressions is fast in group B as compare to group A. There was statistically no significant difference in mean time to motor onset in both groups (p value is >0.05). Both groups are comparable in motor onset. There was statistically significant difference in mean duration of motor block in both groups (p <0.001). Duration of block is more in group A as compare to group B.Difference was significant between two groups for mean total duration of analgesia that is p value is < 0.001. There was no significant difference in VAS score till half an hour and after one hour we got significant difference in both groups.

Conclusion: Ropivacaine (0.75%) as an adjuvant dexmedetomidine (1microgram/kg) and clonidine (1microgram/kg) shortens the onset of sensory block, prolongs the duration of sensory and motor blockade and provides the effective and prolonged post operative analgesia with adequate sedation and without major adverse effects and hemodynamic changes.

Keywords: Clonidine, dexmedetomidine, epidural, ropivacaine.

Introduction

Epidural anaesthesia is commonly used technique for providing surgical anaesthesia with post-operative analgesia in lower abdominal and limb surgeries.

The newer amide local anaesthetic ropivacaine, shares many physiochemical properties with Bupivacaine but with less systemic toxicity and greater margin of safety than other local anaesthetic agents of similar duration of action. The safety of ropivacaine is due to its availability in pure S- enantiomer form. It has less neurotoxic and cardiotoxic potential and preferentially blocks sensory fibres to greater degree than the motor fibers.

Recent clinical data have shown that ropivacaine is safe and effective for regional anaesthetic techniques. Early recovery of motor function in comparison to Bupivacaine is associated with decreased venous thromboembolism and shorter hospitalization. It has always been a matter of research to find out drugs or techniques to potentiate the quality of central neuraxial blocks.[1-2]

With this background information, after the approval of ethical committee we have done a prospective clinical study at our institute with the aim to compare the efficacy and clinical profile of α-2 adrenergic agonists dexmedetomidine and clonidine, when used as adjuvants in epidural anaesthesia in patients undergoing infraumbilical surgeries with special emphasis on their sedative properties and ability to provide smooth intra-operative and post- operative analgesia.

Materials and Methods

This Hospital Based, double blind, randomized, comparative, interventional Study was carried out in 60 patients undergoing infra umbilical surgeries in Department of Anaesthesiology, R V R S. Medical College and Attached Group of Hospitals, Bhilwara.

Inclusion Criteria

- ASA grade I, II
- Age 18- 60 years.
- Patient Ht.>145cm
- Patients undergoing infra umbilical surgeries
- Patient wt 45 – 85 Kg

Exclusion Criteria

Patient refusal

- Patient having contraindications for epidural anaesthesia (infection at the site of injection, spine deformity, patient receiving antiplatelet drugs such as aspirin, clopidogrel, patient receiving heparin,
- Pre-existing neurological defects, bleeding disorders, coagulation diathasis), endocrinal disease.
- Patient with chronic history of headache & backache.
- Any contraindication to study drug.
- Known hepatic, renal, cardiac, neurological, psychiatric, metabolic or respiratory disease.
- Evidence of gross radiological and anatomical abnormality in lumbar region.
- Surgery extended to more than 2 hrs.

Data Collection: The present study titled “A study to compare the effect of dexmedetomidine and clonidine as an adjuvant to ropivacaine for epidural anaesthesia in infraumbilical surgeries” included sixty patients of 20-60 year age with ASA grade I, II and weighing 45 -85 kg undergoing infraumbilical surgeries under epidural anaesthesia in SMS medical college and attached hospital, Jaipur after written and informed consent.

All patients randomly allocated in two groups of 30 patients in each group by computer generated random number table and procedure also blinded to study drugs by constant volume of drug in both groups. Group A patient received 15 ml 0.75 % ropivacaine + 1

microgram/kg dexmedetomidine, Group B received 15 ml 0.75 % ropivacaine + 1 microgram/kg clonidine.

Observations regarding the demographic data ,preoperative vitals, sensory blockade(onset, level and duration),motor blockade(onset, duration),two segment regression time, duration of analgesia, sedation, VAS score effect on vitals and intraoperative & postoperative adverse effects have been recorded.

Statistical Analysis: Statistical analysis was performed with the SPSS, version 21 for Windows statistical software package (SPSS inc., Chicago, IL, USA). The Categorical data was presented as numbers (percent) and were compared among groups using Chi square test. The quantitative data was presented as mean and standard deviation and were compared by student t-test. Probability was considered to be significant if less than 0.05.

Results

The two groups were comparable as there was no significant difference between the two groups in respect to age and sex distribution, height and weight characteristics. The distribution of the type of surgery and the duration of surgery were also found to be comparable.

Table 1. Study variable

Variable	Group A	Group B	P Value
Mean time to sensory onset (min)	8.2±1.2	11.5±1.7	0.001
Mean time to attain highest sensory level (min)	13.1±1.4	17.4±1.7	0.001
Mean duration of sensory block (min)	350.4±8.12	284.6±17.04	0.001
Mean time to 2 segment regression (min)	158.24±11.4	138.4±11.8	0.001
Mean time to motor onset (min)	17.23±3.01	18.6±2.97	>0.05
Mean duration of motor block (min)	240.2±4.78	214.6±7.14	0.001
Mean total duration of analgesia (min)	316.1±30.8	280.2±31.2	0.001

The difference was highly significant between two groups for sensory onset that is p<0.001.Onset time is more in B group as compared to A group. There was statistically significant difference in highest level of sensory block among both study groups (p <0.001). Mean time was more in B group as compare to A group. There was statistically significant difference in mean duration of sensory block among both study groups (p <0.001). Duration of sensory block was more in A group as compare to B group.Difference was highly significant between two groups for mean time to 2 segment regression that is p<0.001. Two segment regressions is fast in group B as compare to group A. There was statistically no significant difference in mean time to motor onset in both groups (p value is >0.05). Both groups are comparable in motor onset. There was statistically significant difference in mean duration of motor block in both groups (p <0.001). Duration of block is more in group A as compare to group B.Difference was significant between two groups for mean total duration of analgesia that is p value is < 0.001.

Table 2: Comparison of VAS score among study groups

Time	Group A	Group B	P value
0 hour	1.52 ± 0.53	1.60 ± 0.52	>0.05
1/2 hour	1.63 ± 0.52	1.51 ± 0.51	>0.05
1 hour	2.01± 0.49	2.48 ± 0.53	<0.001 (HS)
3 hour	3.02 ± 0.51	2.74 ± 0.63	<0.05 (S)
6 hour	3.79 ± 0.88	3.14 ± 0.61	<0.001 (HS)
12 hour	4.58 ± 0.84	3.88 ± 0.64	<0.001 (HS)
18 hour	4.52 ± 0.92	3.68 ± 0.81	<0.001 (HS)
24 hour	4.04 ± 0.51	3.52 ± 0.51	<0.001 (HS)

There was no significant difference in VAS score in both groups at 0 hr and ½ hr whereas it was significant at 1 hr, 3 hr, 6hr, 12 hr, 18 hr and 24.

Table 3: Comparison of Sedation score among study groups

Time	Group A	Group B	P value
30 min	3.42 ± 2.2	2.46 ± 1.78	<0.001 (S)
End of Sx	3.20 ± 1.48	2.10 ± 1.42	<0.001 (S)

Significant difference was observed in sedation score at 10 minutes and end of surgery among both study groups (p value <0.001).

There was no significant difference in frequency of complications among both groups.

Discussion

In recent years there is wide use of the epidural technique not only during surgery to provide anaesthesia and analgesia but also for obstetric and trauma as well as acute, chronic and cancer pain states. Epidural nerve block is central neuraxial anaesthesia and analgesia technique. Retrospective, prospective and metaanalysis studies have demonstrated an improvement in surgical outcome through beneficial effect on perioperative pulmonary function, blunting surgical stress response and improved analgesia.

The procedure is commonly performed as a sole anaesthetic or in combination with spinal or general anaesthetic. The duration of anaesthesia or analgesia is prolonged with use of catheter. Because of lidocaine induced transient neurological symptoms and cauda equina syndrome, it was replaced by bupivacaine in last few years. It was noted that bupivacaine is cardiotoxic and neurotoxic so ropivacaine, a new local anaesthetic got attention. It is considered to be less cardiotoxic. DA McNamee et al[3]compared plain ropivacaine with bupivacaine (17.5mg) for major orthopaedic surgeries.

They considered that ropivacaine offered a reliable motor block with predictable and rapid return of motor function after surgery.

For control of pain, patient controlled epidural analgesia (PCEA) used in similar manner to that of intravenous patient controlled analgesia (IV PCA) by its actions on spinal cord and reduction in NMDA mediated effect.

Epidural block do not alter the course of underlying process, but may offer effective pain relief, performed in the spinal region including cervical, thoracic, lumbar and sacral regions.

Variety of drugs used with local anaesthetic agents, to improve the speed of the onset and duration of analgesia and counteract the disadvantage of the local anaesthetic.

By adding of these adjuvants, dose of local anaesthetics like bupivaine can be reduced and its side effects also reduced like myocardial depression, hypotension, bradycardia, heart block and ventricular arrhythmias.

The difference was highly significant between two groups for sensory onset that is p<0.001.Onset time is more in B group as compared to A group. There was statistically significant difference in highest level of sensory block among both study groups (p <0.001). Mean time was more in B group as compare to A group. There was statistically significant difference in mean duration of sensory block among both study groups (p <0.001). Duration of sensory block was more in A group as compare to B group.Difference was highly significant between two groups for mean time to 2 segment regression that is p<0.001. Two segment regressions is fast in group B as compare to group A. There was statistically no significant difference in mean time to motor onset in both groups (p value is >0.05). Both groups are comparable in motor onset. There was statistically significant difference in mean duration of motor block in both groups (p <0.001). Duration of block is more in group A as compare to group B.Difference was significant between two groups for mean total duration of

analgesia that is p value is < 0.001in our study. Result of our study was supported by VR Hemant Kumar et al[4] and Bajwa et al[5], they concluded that duration of sensory blockage were found to be significantly better in dexmetomidine group.

Results of our study were consistent with Pramila Soni et al[9] who concluded that duration of motor and sensory block was prolonged in dexmetomidine group.

VAS score was used to assess the analgesia in patient post operatively. The addition of alpha 2 agonist to local anaesthetic improves the post operative analgesia.

Post operative VAS score at different time interval were non-significant before 1 hour and significant after 1 hour.

Our result were in accordance with study conducted by Safiya et al[7] who conclude that time to rescue analgesia was prolonged in dexmetomidine group compare to clonidine with bupivacaine .

In our study, there was highly significant difference in sedation score at 30 minutes and at the end of surgery between the groups. Sedation score was 3.4 ± 2.1 in A and 2.4 ± 1.8 in B group at 30 minutes, while sedation score was 3.1 ± 1.5 in A group and 2.1 ± 1.5 B in group at end of surgery.

Similar study was done by Shobna Gupta et al[8] with low dose 0.2 % Ropivacaine and higher alpha 2 agonist doses in caudal anaesthesia and found no statistically significant difference post operatively in sedation score.

Conclusion

Ropivacaine (0.75%) as an adjuvant dexmedetomidine (1microgram/kg) and clonidine (1microgram/kg) shortens the onset of sensory block, prolongs the duration of sensory and motor blockade and provides the effective and prolonged post operative analgesia with adequate sedation and without major adverse effects and hemodynamic changes. Dexmedetomidine is more potent adjuvant as compare to clonidine in all above respects.

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