

Comparison of Clonidine versus Dexmedetomidine as Adjuvant to 0.2% Ropivacaine in Ultrasound Guided Caudal Epidural Analgesia for Lumbosacral Spine Surgery - An Observational Study

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Abstract:

Introduction: Regional nerve blocks always proven to be best methods for intraop and postop analgesia. Spine surgeries are among one of those surgeries regional blockade should not cause motor blockade. In this study we compared analgesic efficacy of clonidine versus dexmedetomidine added to 0.2% ropivacaine administered caudally using ultrasound.

Methods: 32 patients in RC group received 1microgram/kg clonidine plus 0.2% ropivacaine total 20 ml other group received 1microgram/kg dexmedetomidine plus same concentration and volume ropivacaine as RC group pulse rate, MAP at incision time post op VAS score monitored at 1, 2, 4, 8, 12, 24 hr postoperatively.

Results: Dexmedetomidine prolonged postop analgesia compared to clonidine. Fentanyl requirement was significantly less in dexmedetomidine group. Both the groups no reports of motor blockade.

Conclusion: Compared to clonidine adding dexmedetomidine to 0.2% ropivacaine significantly lower VAS score and prolonged duration of analgesia.

Keywords: Spine Surgery, Caudal Epidural, Ultrasound Guided, Ropivacaine, Clonidine, Dexmedetomidine, VAS. Rescue Analgesia.

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Introduction

The central nervous system is considered plastic or modifiable.[1,2] Pain perception is pronounced and prolonged even after the cessation of painful stimuli because of the plasticity of the central nervous system.[1,2] Neuronal hyperexcitability mediated by upregulation of sensory neuron- specific sodium channels and vanilloid receptors, phenotypic switching of large myelinated axons, dorsal horn neuron sprouting, and loss of inhibitory neurons play a pivotal role in originating pain.[3] Epidural block before surgery acts by blocking sensory input at the spinal cord level.[3,4,5] So, providing pre-emptive analgesia considered in preventing the development of plasticity and in offering effective analgesia after lumbosacral spine surgeries.[1,3,4,6] Local anaesthetic agents alone in caudal block provides good analgesia, use of adjuvants improves the quality as well as prolongs the duration of analgesia.

Ropivacaine is a newer, long acting, amide local anaesthetic agent, less lipophilic than bupivacaine. Ropivacaine has more affinity towards sensory nerve fibers than motor fibers.[4,5] Differential blockade of sensory and motor fibers makes it ideal local anesthetic in caudal block for spine surgeries where motor blockade is unacceptable.[3] Clonidine is an alpha 2 agonist being used more commonly as an adjuvant in spinal anesthesias.[7,8] Dexmedetomidine is also an alpha 2 agonist but more selective than clonidine.[7,8] Landmark technique is difficult in adults, use of ultrasound machine makes the procedure easy, safe and successful.[9,10]

At present study we evaluated the efficacy of 0.2% ropivacaine 20 ml along with clonidine and dexmedetomidine in group C and group D

respectively. Among patients posted for lumbosacral spine surgery.

Materials and Methods

This observational study was conducted at Kanachur Institute of Medical Science, after the institutional ethical committee approval. Total sample size was 64. Patients of either sex, age group between 18-60 years, ASA1 & ASA2 posted for lumbar spine dissection and instrumentation were selected for study. Based on chit method patients were divided into ropivacaine and clonidine group (RC) or ropivacaine and dexmedetomidine group. Each group had 32 patients. Patients with sinus bradycardia, on B-Blockers, sacral anomaly and hypersensitivity to local anesthetics were excluded from study. Surgeries more than 4-5 hours duration also were excluded from study.

Informed consent from all the patients enrolled for the study was obtained. Patients had kept nil by mouth for 6-8 hours. All the ASA standard monitors were connected. Anaesthesia was induced with inj fentanyl 2µg/kg, inj propofol 2mg/kg and endotracheal intubation facilitated by inj vecuronium 0.1 mg/kg and then turned prone for surgery. Ultrasonography guided caudal epidural injection was performed in the prone position under all aseptic precautions. Anesthetist blinded to the contents of the syringe will be injecting the same into the epidural space. Patients in the RD group was given 20ml of 0.2% ropivacaine with 1µg/kg of dexmedetomidine and patients in RC group 20 ml of 0.2% ropivacaine with 1µg/kg of clonidine. Surgical incision was taken atleast 20 minutes after the block giving sufficient time for the drug to get fixed.

Haemodynamic parameters like Heart Rate (HR), Systolic Blood Pressure (SBP), Mean arterial blood pressure (MBP) and Diastolic Blood Pressure (DBP)

were recorded before the block which was considered as the baseline and at regular intervals intraoperative and postoperatively. Hypotension is defined as 20% reduction in the systolic blood pressure from the baseline value and was treated with 6mg of inj mephentermine. Inj atropine 0.6mg IV was administered when the heart rate drops to less than 20% of baseline or less than 50 beats/min. Anaesthesia was maintained using isoflurane (minimum alveolar concentration) MAC 1 to 1.2 and oxygen with air at 50:50 ratio along with intermittent boluses of vecuronium 1mg and inj fentanyl 25 µg every hour. Intravenous paracetamol 1gm was given to all patients intraoperatively and the same will be continued eight hourly for the first 24hrs. Half an hour before extubation inj emset 0.1 mg/kg was given. Residual neuromuscular blockade was reversed with inj neostigmine 0.05mg/kg and inj glycopyrrate 10µg/kg. Once all the extubation criteria were met patient was extubated. Post operatively at 30 min and hourly there after pain was monitored using visual analogue scale VAS > 3 was given rescue analgesics inj tramadol 2mg/kg as first line inj diclofenac 1mg/kg was given in second line. Patients were post operatively monitored for motor blockade, urinary retention nausea and vomiting.

Statistical Analysis

Data was entered into Microsoft excel and analysed using Jamovi 2.4.8 categorical data was presented as frequency and percentage. And continuous data as mean and SD and median and IQR. Independent sample t test/ Mann Whitney test was used to compare between two groups. P value <0.05 was considered statistically significant.

Results

Table 1: Shows distribution of sex among group RC and group RD

Sex	Group RC	Group RD	Total	Test statistic	P value
Female	12(37.5)	18(56.3)	30(46.9.0)	2.259	0.133
Male	20(62.5)	14(43.8)	34(53.1)		
Total	32(100.0)	32(100.0)	64(100.0)		

Table no 1 shows equal distribution of sex among group C and group D.

Table 2: Shows distribution of age among group RC and RD

	Group C (n=32)	Group D (n=32)	Test statistic	P value
Age	41.875 ± 6.656	41.656 ± 7.677	0.122	0.903

Table no 2 shows distribution of age group among RC and RD were similar with no significant p value.

Table 3: Shows distribution of pulse rate (PR) and MAP among group RC and RD at surgical incision

	Group C (n=32)	Group D (n=32)	Test statistic	P value
Incision PR	97.594 ± 7.025	94.969 ± 10.645	1.164	0.249
Incision MAP	75.063 ± 5.978	80.344 ± 7.765	-3.049	0.003*

Statistical test used: Independent sample t test

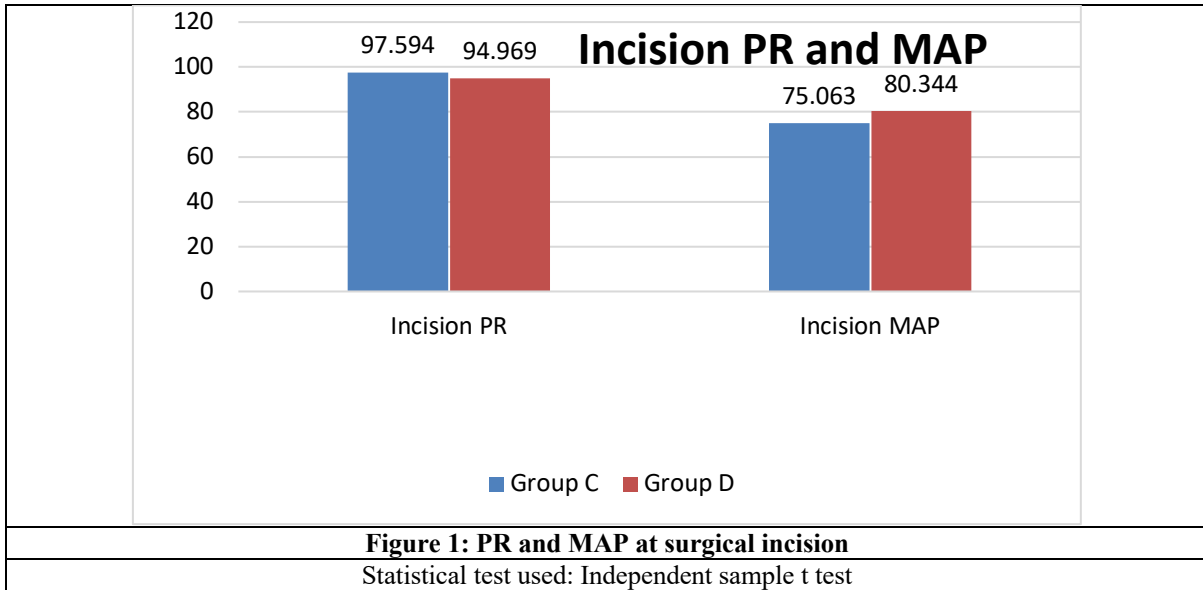


Table 3 shows pulse rate and mean arterial pressure at the time of surgical incision both the parameters were within 20% of baseline. so the caudal block was

acted in both the groups providing sufficient analgesia. There was no significant difference in the pulse rate and MAP between group RC and RD.

Table 4: Shows distribution of VAS scores among RC and RD

VAS Score	Group RC (n=32)	Group RD (n=32)	Test statistic	P value
1 hour	2 (2,2)	1 (1,1.25)	0.501	0.618
2 hours	2 (2,3)	1.5 (1,2.25)	1.957	0.055
4 hours	3 (3,4)	2 (1, 2.25)	2.803	0.007
8 hours	6 (5,6)	2 (2, 3.25)	8.602	0.0001*
12 hours	6 (5,6)	3 (2, 3.25)	8.685	0.0001*
24 hours	6(5.75, 6)	3.5(3, 4.25)	7.686	0.0001*

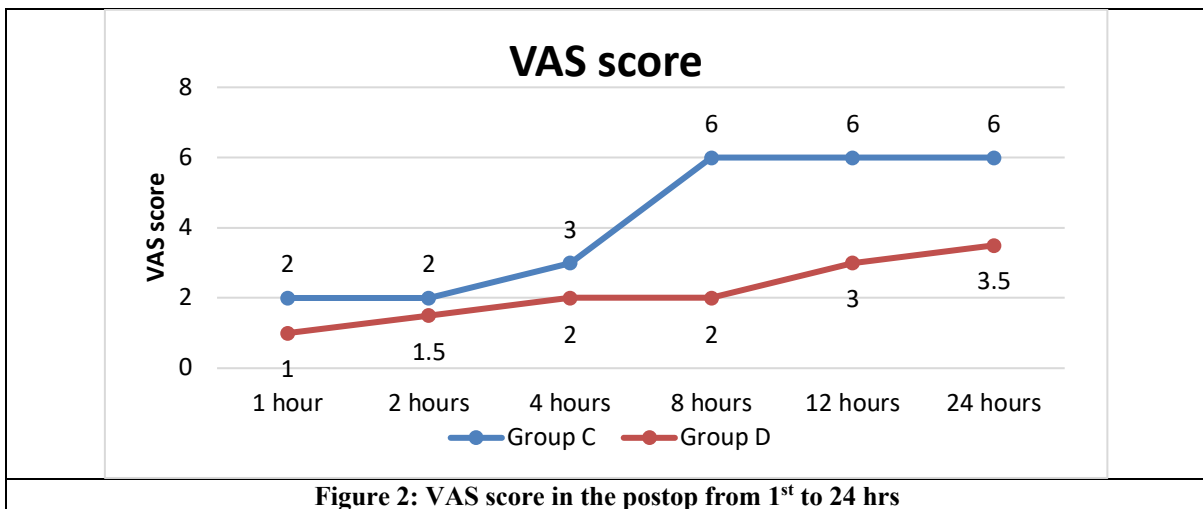


Table 4 shows distribution of VAS score among RC and RD. VAS at 1st hour RC 2, RD 1 at 2nd hour VAS was 2 and 1, 4th hr VAS was 3 and 2 respectively. First 4 hrs in both the groups patients had lower VAS scores so good pain relief but VAS score was less in RD group compared to group RC with insignificant p value. At 8th hr VAS score was 6 in RC and RD 2 patients in RC group received rescue analgesia. At

12 and 24 hr VAS score was 3 in RD group despite the rescue analgesia VAS score was 6 in RC group. There was significant difference in the VAS score with p value 0.001 from 8th hr onwards.

Table 5: Shows requirement of total fentanyl among RC and RD

	Group C (n=32)	Group D (n=32)	Test statistic	P value
Total dose fentanyl	150 (150,180)	120 (120,130)	7.302	0.0001*

Table 5 shows total dose of fentanyl used in both the groups RC 150 microgram and RD 120 microgram. The requirement of fentanyl was less in RD

compared to RC so the quality of analgesia was better in RD>RC. The difference was significant with p value 0.0001.

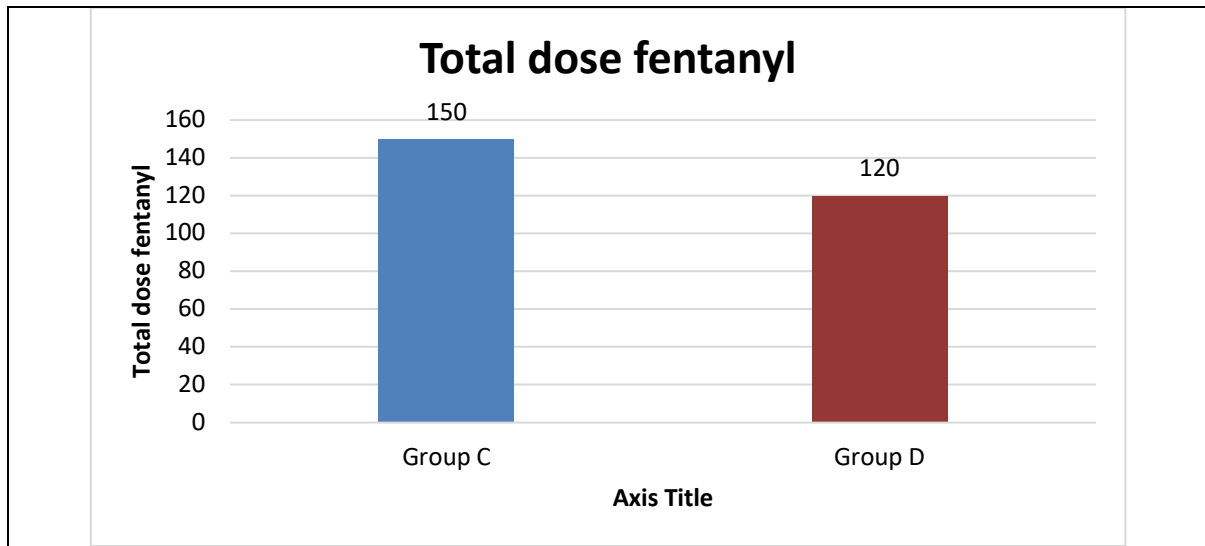


Figure 3: Total fentanyl dose in the intra operative period

Discussion

Patients operated on lumbar spine with or without posterior instrumentation, goes through severe pain in the postoperative phase. Which leads to prolonged postoperative morbidity. Sufficient pain relief hastens rehabilitation and reduces the incidence of chronic pain. [1,11]

Shashwat et al concluded that compared to patients not receiving caudal analgesia, a single preemptive epidural injection of ropivacaine is safe, simple, and effective approach to provide postoperative pain relief upto 24 hrs.

Samagh et al also concluded that pre-emptive analgesia using a single injection of ropivacaine in caudal epidural space is a simple, safe and effective technique for decreasing perioperative opioid requirement as well as providing postoperative analgesia up to 24hrs.

In our study patients from both the groups had lower VAS scores between 1 to 3 till 8th hour and lower heart rate and mean arterial blood pressure at the time of incision. Administering pre-emptive caudal epidural with local anesthetics provides effective intraop and postoperative analgesia. Shashwat et al study also showed in significant changes in heart rate and blood pressure during the perioperative and postoperative periods.

Sandhya Kallapa et al found use of dexmedetomidine 1µg/kg along with 20 ml of 0.2% ropivacaine prolongs the duration of analgesia in the

postoperative period. Fawzi et al also found use of dexmedetomidine at same dose prolongs duration of analgesia. In our study 32 patients received 20 ml of 0.2% ropivacaine with 1µg/kg dexmedetomidine. Patient has mean VAS score of 1, 1.5, 2, 3 at 1st 2nd 4th 8th 12th 24th hour respectively. Patients had good and prolonged analgesia till 24 hours in the postoperative period.

Dave et al study conducted on 72 patients, 36 patients received 20 ml of 0.2% ropivacaine caudally n other 36 patients received 0.2% ropivacaine plus 1µg/kg clonidine total 20 ml caudally in pre-emptive analgesia. Patients those received clonidine with ropivacaine had longer mean duration of analgesia (23.69 ± 2.01hrs) compared to ropivacaine alone.

In our study patients at RC group had VAS 2, 2, 3, 6 at 1st 2nd 4th 8th hr respectively. Patients received rescue analgesia at 8th hour. RD group no rescue analgesia was required upto 24 hrs. So, in our present study we observed lower VAS score till first 8hrs in the RD group compared to RC group which is statistically not significant p>.001. Mean duration of analgesia longer in RD group compared to RC group i.e statistically significant p< 0.001. We also observed requirement of fentanyl was more in RC compared to RD group, difference was statistically significant p<0.001.

Postoperative bromage scale was similar and it was zero in both the groups. Use of 0.2% ropivacaine spares motor blockade. Shashwath et al, Samagh et

al, Sandhya Kallappa et al, Dave et al studies found postoperative bromage scale zero.

Both the groups were comparable for post op sedation, heart rate and MAP. Shashwath et al, Samagh et al, Sandhya Kallappa et al, Dave et al studies found same results.

Conclusion

Compared to patients receiving clonidine as adjuvant to ropivacaine 0.2% in pre-emptive caudal analgesia, patients who received dexmedetomidine 1µg/kg. With 0.2% ropivacaine in preemptive caudal epidural analgesia had longer duration of postoperative analgesia, lower VAS score and less intraoperative requirements for opioids. Caudal epidural analgesia is safe, simple and effective approach to provide postoperative pain relief among patients undergoing lumbosacral spine surgery. Use of 0.2 % ropivacaine and adding alpha 2 agonists unlikely to cause any significant motor block.

No conflicts of interest relevant to this article was reported.

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