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ROPIVACAINE AND ROPIVACAINE WITH CLONIDINE IN EPIDURAL BLOCK FOR UROLOGICAL SURGERIES - A COMPARATIVE STUDY

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ABSTRACT

Background: Epidural anaesthetic techniques are commonly used for various operative procedures, obstetric analgesia, postoperative pain and chronic pain management. Due to similar analgesic properties, lesser motor blockade and decreased cardiotoxic tendency ropivacaine is increasingly used instead of bupivacaine now a days. Clonidine has been frequently used as an adjunct to local anesthetics because it improves the quality of anesthesia, reduces the dose requirement of the anesthetic agent and provides a more stable cardiovascular course. In this study we included 60 patients undergoing various endoscopic urological surgeries like TURP, URS, OIU and cystoscopy procedures. **Material and Methods:** Patients were randomly divided in two groups. R-Group: 30 patients received 0.5% ropivacaine 18 ml. RC-Group: 30 patients received 0.5% ropivacaine 18 ml with clonidine 60 µg. Pre-op and intra-op, haemodynamic parameters, onset of block, duration of sensory block and side effects was observed and recorded. **Results:** Onset of block was faster along with duration of analgesia was significantly longer in RC-group. The objective evidence of block like mean arterial pressure, heart rate, also showed significant change in RC-group. The quality of analgesia was better in RC-group. Level of sedation, side effects were not statistically significant. **Conclusion:** Clonidine as an adjunct to Ropivacaine by epidural injection improves and augments the onset of block, reduces heart rate and blood pressure. It also prolong the duration and the quality of analgesia, with no more side effects like nausea vomiting and sedation.

Keywords: Clonidine, Epidural block, Ropivacaine, Urological Surgeries

INTRODUCTION:

Epidural anesthesia and analgesia is widely regarded as a boon for patients as it can provide a relief from pain for a longer duration. Epidural administration of various analgesics gained increasing popularity. An epidural block can be performed at the lumbar, thoracic, or cervical level. Epidural techniques are widely used for operative anesthesia, obstetric analgesia, postoperative pain control, and chronic pain management. It can be used as a single shot technique or with a catheter that allows intermittent boluses and/or continuous infusion. The motor block can range from none to complete. All these variables are controlled by the choice of drug, concentration, dosage, level of injection and addition of adjuvants.**(1)**

Due to similar analgesic properties, lesser motor blockade and decreased cardiotoxic tendency ropivacaine is increasingly used instead of bupivacaine now a days.

Ropivacaine is a well tolerated regional anaesthetic effective for surgical anaesthesia as well as the relief of postoperative and labour pain. The efficacy of ropivacaine is similar to that of bupivacaine and levobupivacaine for peripheral nerve blocks, although it may be slightly less potent than bupivacaine when administered epidurally or intrathecally, equi-effective doses have been established. Clinically adequate doses of ropivacaine appear to be associated with a lower incidence or grade of motor block than bupivacaine.**(2)**

The addition of an adjuvant decreases the dose of ropivacaine required to achieve the desired analgesic & anaesthetic results with a fewer side effects. The addition of an adjuvant has further enhanced the effectiveness of these local anesthetics as they not only help in intensifying and prolonging the blockade effect but also help in the reduction of the dose of local anesthetics.

Neuraxial opioids are associated with quite a few side effects so, clonidine is being extensively evaluated as an alternative option as far as opioid-related side effects such as respiratory depression, nausea and pruritis are concerned.

Clonidine is used only as an adjunct to local anaesthetics, because its effects are not adequate for anaesthesia during surgeries. At lesser dosages of epidural clonidine ,there is improved quality of anaesthesia, dose of anaesthetic agent reduces and a more stable cardiovascular course is achieved. In higher doses, analgesic duration can be further prolonged but at the cost of toxic effects, like profound hypertension, bradycardia and deep sedation.

Keeping all these pharmacological interactions in mind, we have tried to use clonidine as an adjuvant to ropivacaine.

Anesthesia for urology surgery poses special problems by way of patient factors and complexity of the procedure. Preoperative optimization of the patients with renal dysfunction and comorbidity; specific complications associated with the operative procedures, such as transurethral resection of prostate, laparoscopy surgery, percutaneous lithotripsy and renal transplantation.**(3,4)**

MATERIAL AND METHODS

Sixty patients undergoing endoscopic urological surgeries which included TURP, URS, OIU, Cystoscopy and Prossed procedures were randomly selected for the study. The study was approved by the Hospital Ethics Committee.

- Patients with ASA grade I, II, age between 20 to 75 years, height between 150 – 180 cm were included for surgery.
- Patients who denied consent, with bleeding disorders, spinal deformities, neurological deficit, local skin sepsis around the site of needle insertion, comorbid disease, history of allergy and ASA class III, IV were excluded.

After obtaining written informed consent, initial pre-operative counselling and reassurance was done to gain the confidence of the patient. The nature of the procedure was explained.

Procedure: In the operation theatre, the basal pulse rate, blood pressure and respiratory rate of the patient were recorded. An intravenous infusion was started and the patients were preloaded with 500 ml of Ringer lactate solution and connected with monitors like pulse oxymetry, ECG leads and noninvasive blood pressure monitor. They were put on lateral or

sitting position. Under all aseptic precautions 2% lignocaine plain injected locally in the desired area, epidural space was found with 18G tuohy needle at L3 – L4 space by loss of resistance using air injection technique.

In first group, 18 ml of 0.5% ropivacaine was injected slowly after the aspiration of syringe & in the second group 18 ml of 0.5% ropivacaine with 60mcg of clonidine mixture was injected slowly after aspiration of syringe. After injecting the drug the tuohy needle was taken out & dressing applied over that area.

All the patients were continuously monitored for heart rate, blood pressure, respiratory rate and oxygen saturation and recorded in the anaesthesia chart for every 5 min for first half an hour and every 10 min till the end of the surgery. Intra operative hypotension was treated with IV fluids, oxygen supplementation and titrated doses of mephentermine 3-6 mg intravenous. Bradycardia was treated with injection atropine. No sedatives or narcotics were administered intravenously preoperatively. Pre-op and intra-op, haemodynamic parameters and side effects was observed and recorded. When the effect of the local anaesthetic weaned off and the patient complains of pain, assessment of intensity of pain was done by visual analogue scale, and study drugs were given when the VAS score touched the 3 cm mark.

R-Group: 30 patients received 0.5% ropivacaine 18 ml.

RC-Group: 30 patients received 0.5% ropivacaine 18 ml with clonidine 60 µg .

A. Onset of block: It was time taken after giving epidural till achievement of surgical anaesthesia at T 10 level.

B. Duration of sensory block: assessed from time of epidural to regression of analgesic level to S2 dermatome.

C. Rescue analgesia : This was calculated from the time when the first dose was given, Patients were asked to point out the intensity of their pain on the visual analogue scale. VAS more than 3 cms on the scale was taken as the end of fair analgesia.

Visual analogue scale

In the visual analogue scale the patients were shown a scale of 10 cm length.[5] Zero end of the scale was taken as 'No pain' and 10 cm mark as 'Maximum pain'. Patients were instructed to point the intensity of pain on the scale.

Side effects: Like nausea, vomiting, hypotension were recorded.

Sedation score:

The sedation levels of the patients was defined in accordance with the Ramsay Sedation Scale,[6] Graded from 1 to 6

1. Deep sleep – Does not respond to verbal commands.
2. Sleepy – Responds to verbal commands.
3. No complaint or body movement – Calm.
4. Complaints with body movement – but Calm.
5. Substantial complaining and body movement – not Calm.
6. A great degree of complaining and body movement, accompanied by some excitement.

RESULT

The datas were tabulated and subjected to statistical analysis for comparison and correlation. Datas expressed as Mean ±SD only where indicated otherwise proportions are calculated. Chi-square test used for testing the significance of difference between two proportions. P value <0.05 is considered statistically significant.

We observed in our study that onset of block in R- Group (0.5% Ropivacaine) was 14.93min. When compared with RC-Group (0.5% Ropivacaine + 60 microgram Clonidine) in which it was 14.27min, which is statistically significant (P<0.0108) (Table no-1& Fig.no1). It shows that addition of clonidine to ropivacaine results in faster onset of block when compared to Ropivacaine alone.

Table – 1: Onset of block

No. of patients		Mean onset of block(in min)	SD	Significance
R-Group	30	14.93	1.08	0.0108 S
RC-Group	30	14.27	0.87	

sd: standard deviation, s: significant

It was observed in our study that duration of block in R-Group (0.5% Ropivacaine) was 3.20 hours where as in RC-Group (0. 5% Ropivacaine+60µg Clonidine) it was 4.53 hours. The difference was statistically significant (P<0.000) (Table no-2 & Fig.no.2). It showed that addition of clonidine to ropivacaine results in prolongation of duration of blockade.

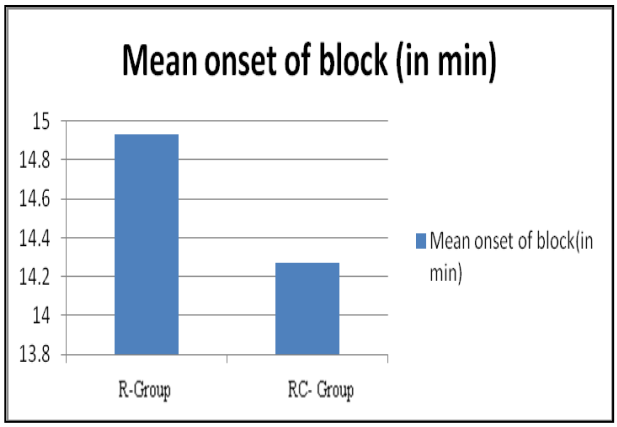

Figure 1

Table – 2 : Duration of block

No. of patients		Mean duration of block (in hrs)	SD	Significance
R-Group	30	3.20	0.28	0.0000 HS
RC-Group	30	4.53	0.29	

sd : standard deviation, hs : highly significant, s : significant

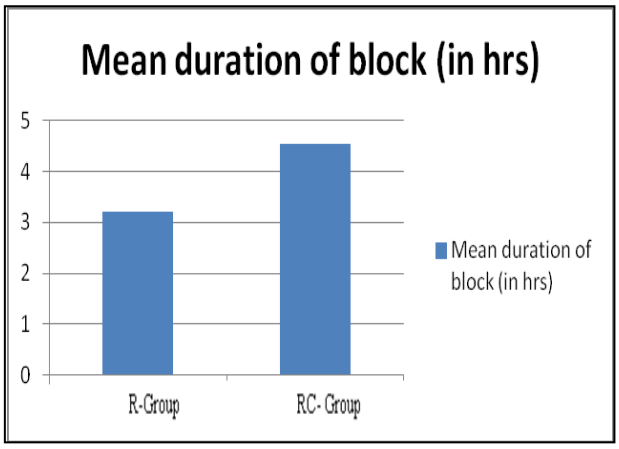

Figure 2

Pain score (VAS) was compared between the two groups at different time. There was reduced VAS in RC-Group when compared to R-Group. The demand for rescue analgesic was more in R-Group then in RC-Group. This was statistically significant .The results of our study compared favorably with the previous studies.

Variation of heart rate was studied at different time intervals up to 0 to 60 min. There was significant change in the heart rate at 10 min to 40 min in compare to R-Group which is statistically significant (P<0.000) (Table no – 3). It shows Ropivacaine with Clonidine has decrease the heart rate more when compared to Ropivacaine alone.

Variation of MAP in both groups was compared at different time intervals up to 0 to 50 min. There was significant change in the MAP at 10 min to 30 min which is statistically significant (Table no – 4). It shows ropivacaine with clonidine has decrease the MAP more compared to ropivacaine alone. Variation of MAP in both groups was studied at different time intervals up to 0 to 50 min. There was significant change in the MAP at 10 min to 30 min in RC group as compared to R group . This was statistically significant (Table no-4).

It shows ropivacaine with clonidine has decrease the MAP more when compared to ropivacaine alone.

Table –3 : Mean of mean heart rate in between R-Group and RC-Group

Time interval in min	HR				Significance
	R-Group		RC-Group		
	Mean	SD	Mean	SD	
0	76.67	7.29	77.73	7.44	0.5770 NS
5	74.77	6.75	73.37	7.02	0.4343 NS
10	74.53	6.22	70.00	6.17	0.0063 S
15	73.23	6.11	66.77	6.25	0.0002 HS
20	72.17	5.32	63.17	5.40	0.0000 HS
25	72.80	4.90	61.13	5.62	0.0000 HS
30	71.73	5	59.43	6.13	0.0000 HS
40	70.55	5.69	58.37	5.10	0.0000 HS
50	73	7.01	58.60	4.33	0.002 S

sd : standard deviation, ns : not significant, hs : highly significant, s : significant

Table –4: Mean of mean arterial pressure in between R-Group and RC-Group at different time intervals

Time interval IN MIN	MAP				Significance
	R-Group		RC-Group		
	Mean	SD	Mean	SD	
0	89.71	3.86	90.96	4.62	0.2623NS
5	87.28	3.55	86.78	4.60	0.6390NS
10	85.88	3.70	84.02	4.47	0.0851NS
15	85.42	3.74	81.71	4.35	0.0008S
20	85.52	3.29	81.13	4.29	0.0000HS
25	85.82	3.53	80.42	3.85	0.0000HS
30	85.82	3.21	79.91	3.49	0.0000HS
40	83.04	16.12	79.78	3.20	0.2807NS
50	88.39	4.64	71.45	2.4	0.1123NS

sd: standard deviation, ns: not significant, hs: highly significant, s:significant

DISCUSSION

Clonidine is being extensively evaluated as an alternative option as far as opioid-related side effects for combination with local anesthetics for analgesia during surgery.[7]

Dusanka Zaric, et al,[8] conducted study to compare the sensory and motor blockade with three different doses of ropivacaine namely 1%, 0.75%, and 0.5%. Ropivacaine 1% causes profound motor block, than with the 0.5% solution. M. Concepcion et al,[4] it was shown that degree of motor blockade using the bromage scale varied with the concentration of ropivacaine. As the concentration of ropivacaine increased from 0.5% to 1 .0%, the time to onset of sensory anesthesia decreased from 6.4 ±1.7 (SD) min to 2.4±0.6 min. Similarly In our study we found that 0.5% ropivacaine caused modest motor block (bormage scale 1).

In our study we found that addition of clonidine to ropivacaine results in faster onset of block when compared to Ropivacaine alone as shown in table no.1 & fig.no.1

Ruth Landau et al in 2002,[9] showed that onset of analgesia was significantly shorter among women receiving clonidine with the larger dose of ropivacaine 0.2% (8 mL). Similarly in our study we also found early onset of block in RC group.

Sukhminder Jit Singh Bajwa et al in 2010,[1] concluded that combination of 75 µg of clonidine with ropivacaine provided shorter onset with longer sensory analgesia when compared to plain ropivacaine.

In our study we found that addition of clonidine to ropivacaine results in prolongation of duration of blockade as shown in table no.2 & fig.no. 2

A. M. El-Hennawy et al in 2009,[10] reviewing the use of clonidine as a neuraxial adjuvant drug, Roelants F et al,[11] concluded that the most interesting aspect of this is its epidural use. Epidural clonidine would produce prolonged analgesia from local anesthetics and opioids and would allow a local anesthetic sparing effect. The optimal epidural dose would lie between 60 µg to 75 µg: a dose lower than 60 µg is ineffective, whereas a dose larger than 100 µg induces sedation and hypotension.

G. Forster et al in 2004, found that clonidine augmented analgesia after TKA when added to a continuous low-dose epidural infusion of ropivacaine and fentanyl.**[12]** Compared with the control group, patients in the clonidine group received, on an average, smaller doses of epidural infused drugs. At the same time, they required significantly less rescue medication.

Sukhminder Jit Singh Bajwa et al In 2010,**[1]** showed that RC group required lesser doses of local anesthetic top-up doses as compared to that required by R group patients. The frequency of top-up doses increased, duration of analgesic period decreased while total dose consumption of ropivacaine increased in the R group as compared to RC group. In our study we also found similar result.

Variation of heart rate and MAP in both groups were compared at different time intervals which shows ropivacaine with clonidine has decrease the heart rate and MAP more when compared to ropivacaine alone.

Epidural clonidine decreases blood pressure at a brainstem level and by inhibiting sympathetic spinal cord outflow.[13,14] Sympathetic reflexes are diminished, while baroreceptor responses are unaltered. Hypotension results primarily from a reduction in systemic vascular resistance, with little change in cardiac output.

Clonidine reduces heart rate by direct and central mechanisms,[15] and in some human studies, epidural administration has significantly reduced heart rate.[13,15,16,17]

Michael g, et al in 1995,[18] Groups C and CM, HR, CO, and MAP were reduced significantly compared to baseline within the first 15-90min, while stroke volume and systemic vascular resistance remained stable.

We observed that nausea, vomiting hypotension was not significant in both the groups. The groups did not differ statistically concerning PONV and antiemetic drug consumption. Sedation is a side effect frequently associated with the use of clonidine but the low dose of clonidine used here does not contribute to much sedation. Ruth Landau et al in 2002,[9] found that sedation has been reported to occur as soon as 15 to 60 minutes after doses of 120 µg of clonidine and 60 to 120 minutes after 150 µg of clonidine

or 75 µg of clonidine with 50 µg of fentanyl.[19] In our study we got less side effect with low dose of clonidine.

We were unable to assess the onset of motor block because of low concentration (0.5 %) of ropivacaine used, which resulted in motor block of Bromage grade-1. It may also be related to the timing of position of patient for the procedure, that was earlier then the time taken for complete motor block to be achieved.

CONCLUSION

Thus addition of Clonidine to Ropivacaine by epidural injection improves and augments the onset of block, reduces heart rate and blood pressure more in comparison to ropivacaine alone. It also prolongs the duration and the quality of analgesia, with no more side effects like nausea vomiting and sedation.

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Conflicts of interest

There are no conflicts of interest.

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