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A COMPARATIVE STUDY BETWEEN THORACIC EPIDURAL BLOCK AND PARAVERTEBRAL BLOCK USING SINGLE DOSE ROPIVACAINE FOR INTRA-OPERATIVE HEMODYNAMIC PARAMETERS AND POST-OPERATIVE ANALGESIA IN PATIENTS UNDERGOING RENAL SURGERY UNDER GENERAL ANAESTHESIA

Anaesthesiology

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ABSTRACT

Background: Pain remains a widespread trouble for many patients after renal surgeries . In addition to improving patient satisfaction and decreasing pain scores, enhanced perioperative pain control can improve clinical outcomes.Various regional anaesthesia techniques have been described for renal surgeries. We have included thoracic epidural anaesthesia (TEA) and thoracic paravertebral (PVB) block in our study. **Materials and Methods:** Total of Sixty patients (30 patients in each groups) belonging to American Society of Anaesthesiologists (ASA) physical status I – II in the age group of 15-60 years of either sex posted for Elective unilateral Renal Surgeries were recruited in the study. Group P-(Paravertebral Block) Each patient was given Thoracic Paravertebral Block with 0.2% Ropivacaine 15ml ,5ml in each paravertebral space T9-T12. Group E-(Epidural Block) Each patient was given Thoracic Epidural Block with 0.2% Ropivacaine 15ml at T10 intervertebral space. Intraoperative hemodynamic stability was assessed by using HR, MAP and postoperative pain scores were assessed using VAS Score up to 2 hours. **Result:** Regarding demographic data, HR, Sp02 & VAS Score , Mean duration of analgesia, there was no significant difference between both groups (P > 0.05). Fall in mean MAP was more in thoracic epidural block group as compared to paravertebral block group. Mean MAP was statistically significant from 5 minutes to 45 minutes after the block (p value <0.05). The fall in MAP in thoracic epidural block patients was statistically significant as compared to paravertebral block(p value <0.05).**Conclusion:** In our study it was found that mean arterial pressure was decreasing more in Group E as compared to Group P, whereas other parameters were comparable with no significant change. We conclude that Thoracic paravertebral block is better than Thoracic epidural block in patients undergoing renal surgery under general anesthesia.

KEYWORDS

INTRODUCTION

Pain remains a widespread trouble for many patients after renal surgery. Renal surgeries are commonly associated with significant postoperative pain. Postoperative analgesia following Renal surgeries is essential to allow early mobilization, and to reduce the incidence of postoperative complications.[1] We have included thoracic epidural anaesthesia (TEA) and thoracic paravertebral (PVB) block in our study.

Thoracic epidural techniques are associated with improved operative outcome and postoperative analgesia[2]. Clinical benefits associated with epidural anaesthesia include an effective postoperative analgesia, lower incidence of pulmonary complications, stabilization of endothelial coronary function, earlier return of bowel function. During combined general epidural anaesthesia (CGEA) the noxious stimulus originating from the surgical site is blocked at the spinal level, reducing the requirements of general anaesthetics [3].

Paravertebral block is a method developing unilateral somatic and sympathetic nerve block as a result of Local Anaesthetic (LA) injection close to the spinal nerves along the columna vertebralis. For Renal surgery, the blocks are performed at T9-12 interspace with single shot/ technique that can be performed in sitting, lateral or prone positions [4-5].In our study, an attempt was made to compare single shot thoracic epidural ropivacine(0.2%) versus paravertebral ropivacaine (0.2%) for intra operative hemodynamics and post operative analgesia in patients undergoing Renal surgery under general anaesthesia.

METHODOLOGY:

The study was conducted after obtaining approval from the ethical committee of Moti Lal Nehru Medical College, Prayagraj. After written informed consent from the patient's parent/guardians. The study was conducted from July 2021 to June 2022. Total of 60 patients, belonging to ASA I and II, in age group 15-60 years, of either gender, who underwent Renal surgery, were enrolled.

Inclusion Criteria:

- Age :15-60 years
- Sex: both male and female
- ASA grade: I and II
- Patients undergoing elective unilateral renal surgeries.
- BMI < 35

Exclusion Criteria:

- Patient's refusal.
- ASA Class >II
- If surgery duration exceeds >90 minutes
- Cardiovascular diseases
- Pulmonary diseases
- Coagulation disorder
- Any anatomical deformity of vertebrae
- Contraindications to central neuraxial Blocks or peripheral neuraxial Blocks

Group Allocation

The study was carried out in 60 patients who were divided into two groups - Group P(Paravertebral group) and Group E(Epidural group).

Group P (Paravertebral Block)	30 patients	Each patient was given Thoracic Paravertebral Block with 0.2% Ropivacaine 15ml
Group E (Epidural Block)	30 patients	Each patient was given Thoracic Epidural Block with 0.2% Ropivacaine15ml

All patients kept N.P.O. according to the standard guideline, All the monitors attached including ECG electrode, NIBP, Pulse oximetry, and temperature probe, baseline parameters were observed and recorded.

After informed and written consent was obtained from each patient after the procedures were fully explained to patients in their own language. Tab. Ranitidine 150 mg and tab. Alprazolam 0.25 mg were given orally night before the surgery.

Visual analogue score was explained to the patients. The patients were shown a 10cm Horizontal scale marked 0-10 on a blank paper and told that 0 represented ―no pain‖ and 10 represented ―worst possible pain‖

In Group P,before the start of surgery, under strict aseptic precautions,Thoracic Paravertebral Block was performed at T9-T12 Paravertebral spaces unilaterally on the side of surgery with 18G Tuohy needle by loss of resistance technique. The Epidural needle was introduced through the skin approximately 3 cm lateral to the midline and corresponding to the cephaled end of the spinous process. The needle was advanced till it contacted the transverse process and the needle was walked over it. At this point, the loss of resistance syringe was attached to the Epidural needle and further advancements were made in small increments and the Paravertebral space was identified using the loss of resistance technique..0.2% Ropivacaine 15ml was given (5ml in each interspaces).

In Group E, before the start of surgery, the patient's back was prepared with proper aseptic precautions. After local infiltration in skin using 2.5 ml 2% Lignocaine, Thoracic Epidural Block was performed at T10-11 intervertebral space with 18G Tuohy needle by loss of resistance technique. Space was confirmed using negative aspiration technique and hanging drop technique. After confirmation of space 15ml 0.2% Ropivacaine was given.

After giving Block, all 60 patients were given general anaesthesia, patients premedicated with injection Glycopyrrolate 0.2mg, Midazolam (0.02mg /kg).Preoxygenation was done with 100% oxygen for 3 minutes. Induction was done with injection. Propofol 2 mg/kg.

Patients were intubated with appropriate size cuffed Polyvinyl chloride endotracheal tube using injection succinylcholine 1.5mg/kg. Muscle relaxant vecuronium was given (0.04mg /kg) followed by 3 ml /hour via infusion pump for maintainence. Anaesthesia was maintained with N_2O and O_2 in a ratio of 2:1 and Isoflurane. Proper surgical positioning was maintained.

Blood loss, hypotension or any other complication was managed appropriately intra operatively.

Hypotension was defined as 20% fall in mean arterial pressure from the baseline and was treated with injection. Mephentermine Sulphate and fluids.

Bradycardia was defined as pulse rate less than 60 beats / minute and was managed with Injection. Atropine 0.6mg.

After the surgery was over, patients were turned supine and ventilation was assisted. Once adequate spontaneous respiratory attempts had come, the patients were reversed with Injection. Neostigmine 50µg/kg and Glycopyrrolate 10 µg/kg. Patients were extubated after thorough oral suctioning.

Post-operative Visual Analogue Score was noted from the time of extubation upto 120 min after extubation or first breakthrough pain, whichever is early.

All the patients were shifted to post operative ward for next 2 hours and were observed. Rescue analgesia was given when VAS more than 4. Injection. Pentazocine 0.5 mg/kg was given intravenously when the VAS exceeded 4. Bedside chest X ray was done to rule out pneumothorax.

Other complications like local anaesthetic toxicity were also noted.

1. Baseline vital signs- Mean Arterial Pressure, pulse rate and ECG, EtCO2, SPO_2
   Mean Arterial Pressure was calculated using formula double the diastolic blood pressure and add the sum to the systolic blood pressure. Then divide by 3. {MAP = SBP + 2 (DBP)}3
2. Intraoperative haemodynamics at interval of 1 min, 5min,15min, 30 mins,45 mins,60 mins,75 mins and 90 mins following parameters were noted- Mean Arterial Pressure, Heart Rate, SPO_2.
3. Postoperative analgesia was analysed by Analgesic effect will be measured by Visual Analog Scale. It is an imaginary straight line of 10 cm from 1 to 10. Patients were asked to point out the scale after test drug was given. 0 indicates no pain while 10 denotes worst pain imaginable.

OBSERVATION AND RESULT:

Table No. 1 : Comparison of mean MAP between the two groups at different time intervals

MAP	GROUP P [Mean ± SD]	GROUP E [Mean ± SD]	't' value	P value
Preoperative	87.37 ± 4.90	83.97 ± 8.24	1.943, df=58	0.057, NS
1 minute	83.43 ± 9.43	78.3 ± 9.72	2.076, df=58	0.042*
5 minutes	82.5 ± 9.21	77.23 ± 8.35	2.321, df=58	0.024*
15 minutes	82.53 ± 6.22	78.90 ± 7.45	2.054, df=58	0.045*
30 minutes	83.77 ± 6.21	79.10 ± 8.0	2.515, df=58	0.015*
45 minutes	83.23 ± 5.03	79.53 ± 7.49	2.246, df=58	0.029*
60 minutes	82.86 ± 8.93	80.30 ± 6.53	-1.229, df=54	0.112, NS
75 minutes	84.5 ± 8.81	81.13 ± 6.28	-1.117, df=27	0.136, NS
90 minutes	86.33 ± 8.31	82.03 ± 5.29	0.833, df=10	0.211, NS

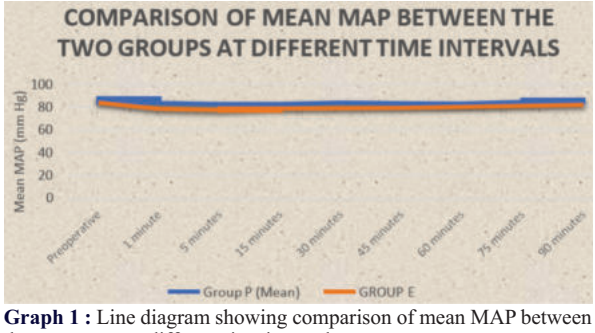
Unpaired 't' test applied. P value < 0.05 was taken as statistically significant.

The above table shows the comparison of mean MAP between GROUP P and GROUP E at different time intervals.

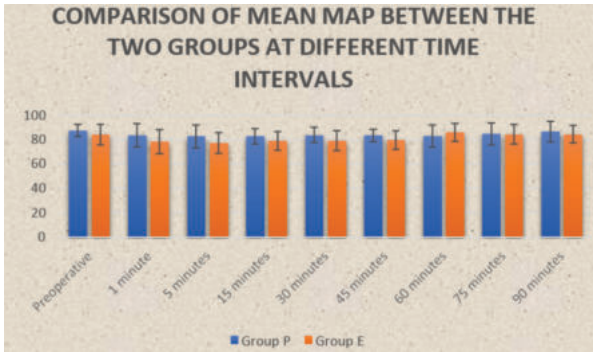
In **GROUP P,** the mean MAP preoperatively was 87.37 ± 4.90 mm Hg, which fell at 1 minute and this fall continued till 5 minutes. Then rise at 15 minutes and this rise continued till 30 minutes, then a slight fall at 45 minutes, then this fall continued till 60 minutes. Then a slight rise at 75 minutes and then this rise continued till 90 minutes. The mean MAP at 90 minutes was lower than the preoperative mean MAP.

In **GROUP E,** the mean MAP preoperatively was 83.97 ± 8.24 mm Hg, which fell at 1 minute and this fall continued till 5 minutes. Then rose at 15 minutes, which continued till 30 minutes and then again rose at 45 minutes. This rise continued till 90 minutes. The mean MAP at 90 minutes was lower than the preoperative mean MAP.

The mean MAP was comparable at preoperative level (p>0.05). It was significantly lower at preoperative, 1 minute, 5 minutes, 30 minutes and 45 minutes in GROUP E in comparison to GROUP P (p<0.05), while at 15 minutes, 60 minutes, 75 minutes and at 90 minutes, the mean MAP was comparable between the two groups (p>0.05).



Graph 1 : Line diagram showing comparison of mean MAP between the two groups at different time intervals



Graph 2 : Line diagram showing comparison of mean MAP between the two groups at different time. intervals

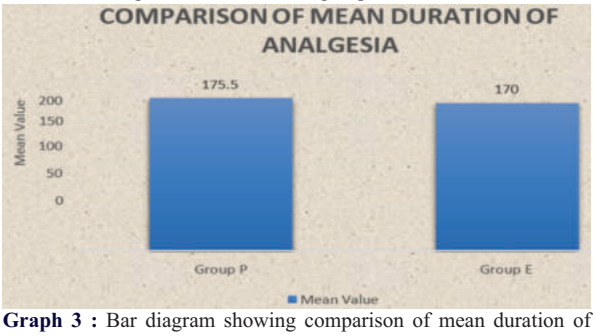
Table No. 2 : Comparison of mean duration of analgesia between the two groups……..

Group	No.	Mean ± SD	't' value	P value
GROUP P	30	175.50 ± 14.82	1.233, df=58	0.223, NS
GROUP E	30	170.00 ± 19.43		

Unpaired 't' test applied. P value = 0.223, Not Significant

The above table shows the comparison of mean duration of analgesia between the two groups.

The mean duration of analgesia in GROUP P was 175.50 ± 14.82 min and in GROUP E was 170.00 ± 19.43 min. The difference was found to be statistically not significant (p=0.223), showing a comparable mean duration of analgesia between the two groups.Mean Value



Graph 3 : Bar diagram showing comparison of mean duration of analgesia

Keeping in view, the observations obtained in the present study, the following results were drawn :

1. Demographically age, sex, weight, ASA grading was comparable in both the groups.
1. The mean MAP preoperatively was statistically not significant in both groups. After giving block fall in mean MAP was more in thoracic epidural block group as compared to paravertebral block group. Mean MAP was statistically significant from 5 minutes to 45 minutes after the block (p value <0.05).
2. The mean heart rate was comparable in both the groups.
3. The mean oxygen saturation was comparable in both the groups.
4. The mean VAS score was comparable between the two groups at all the time intervals (p>0.05).

DISCUSSION

In our study we found out that the mean MAP preoperatively was 87.37 ± 4.90 mm Hg in paravertebral group, which fell at 1 minute and this fall continued, to increase the blood pressure fluids were given and we noticed a slight rise at 75 minutes and then this rise continued till 90 minutes. The mean MAP at 90 minutes was lower than the preoperative mean MAP in paravertebral group and in thoracic epidural group the mean MAP preoperatively was 83.97 ± 8.24 mm Hg, which fell at 1 minute and this fall continued till 5 minutes. The mean MAP at 90 minutes was lower than the preoperative mean MAP. The fall in MAP in thoracic epidural block patients was statistically significant as compared to paravertebral block.

Helal et al. [6] found similar result in the study conducted by them and found out that the mean MAP in paravertebral block group was 86.47±2.64 and in the thoracic epidural block group it was 85.97±3.56. In another study conducted by Moawad et al[7] they found the mean MAP of 94.60 + 5.17 in epidural block and 94.80+ 5.82 in paravertebral block. In our study,the mean MAP was comparable at preoperative level (p=0.057). It was significantly lower at 1 minute, 5 minutes,15 minutes, 30 minutes and 45 minutes in GROUP E in comparison to GROUP P (p<0.05), while at 60 minutes, 75 minutes and at 90 minutes, the mean MAP was comparable between the two groups (p>0.05).

All patients were given rescue analgesia when VAS score was more than 4 and after giving rescue analgesia our study for that patient was complete. The mean duration of analgesia in GROUP P was 175.50 ± 14.82 min and in GROUP E was 170.00 ± 19.43 min. The difference was found to be statistically not significant (p=0.223), showing a comparable mean duration of analgesia between the two groups.

In our study we did not have any complications. There was no incidence of hypotension, bradycardia and pulmonary complications in any of our patients.

CONCLUSION:

In our study it was found that mean arterial pressure was decreasing more in Thoracic epidural group (Group E) as compared to paravertebral group (Group P), whereas pulse rate, VAS score, mean time between block and extubation ,and mean duration of analgesia between both groups were comparable with no significant change.

Thus Thoracic paravertebral block was advantageous over Thoracic epidural block as it provide comparable analgesic effect with greater hemodynamic stability, improved respiratory function and reduction in complications.We finally conclude that Thoracic paravertebral block is better than Thoracic epidural block in patients undergoing renal surgery under general anesthesia.

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