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To Compare The Efficacy of Epidural Ropivacaine With Ropivacaine Plus Dexmedetomidine For Postoperative Analgesia in Thoracic Surgeries.

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ABSTRACT

Background: A prospective randomized study was carried out to compare the efficacy of epidural ropivacaine with ropivacaine plus dexmedetomidine for post-operative analgesia in thoracic surgeries. **Methods**: 60 patients of either sex, between 18-75yrs of age of ASA Grade 1&2 undergoing thoracic surgery under general anaesthesia with thoracic epidural were enrolled in this study. Patient in Group A received Drug A (Ropivacaine 0.2% 12 cc + 0.25 ml distilled water (n=30)).Patients in Group B received Drug B (Ropivacaine 0.2%12 cc + 0.5 µg/kg Dexmedetomidine (n=30)). Quality and duration of postoperative analgesia, sedation and hemodynamic changes in each group was studied. **Results:** Adding Dexmedetomidine as an adjuvant to Ropivacaine (as in group B) for epidural anesthesia increased the duration and quality of postoperative analgesia when compared with plain Ropivacaine (as in group A). **Conclusion**: The hemodynamic parameters were more stable and the patients were comfortable and moderately sedated in Group B as compared to Group A.

Keywords: Ropivacaine, Dexmedetomidine, Epidural route, Postoperative analgesia

INTRODUCTION

Thoracic surgeries are amongst one of the most painful surgeries. General anaesthesia commonly used to conduct thoracic surgeries produce the desired state of unconsciousness but do not eliminate the surgical stress response, and do not provide adequate postoperative incisional pain. Also after thoracic surgeries patient may experience severe pain that prevents deep breathing and effective coughing, leading to pulmonary atelectasis. Thus postoperative analgesia is a challenging component of aesthetic management.

Relieving post-operative pain has become an indispensable component in anaesthesiology. Various methods have been tried for management of postoperative pain out of which the use of thoracic epidural analgesia has proven to be superior to many other methods of pain relief including intravenous patient control analgesia.[1] Ropivacaine may be preferred over Bupivacaine because of its reduced central nervous system and cardiotoxic potential.[3,4] It also has a decreased propensity for motor block which is useful for rapid patient mobilization in postoperative period thereby improving respiration.[5]

Alpha-2 adrenergic agonists have both analgesic and sedative properties when used as an adjunct in regional anaesthesia. Dexmedetomidine is a highly selective alpha -2 adrenergic agonists.[6,7] It has been frequently used due to its hemodynamic, sedative, analgesic, neuroprotective and aesthetic sparing effects. Other claimed advantages include minimal respiratory depression with cardioprotection, neuroprotection and renoprotection. Other adjuvants like opioids and benzodiazepines can cause respiratory depression so in this study Dexmedetomidine has been used as an adjuvant to Ropivacaine via epidural route.

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MATERIALS AND METHODS

Study approval was obtained by Institutional Medical Ethical Committee and after detailed explanation of the procedure, a written informed consent was obtained from all patients participating in the study. 60 patients of either sex, between 18-

75yrs of age of ASA Grade 1&2 undergoing thoracic surgery under general anaesthesia with thoracic epidural were enrolled in this study. Exclusion criteria included patient refusal for procedure, patients belonging to ASA III or IV, patients belonging to age <18 years and >75 years, patients with significant cardio respiratory disease and uncontrolled diabetes or uncontrolled hypertension, patient with coagulation disorders, anticoagulation therapy, kidney disease, psychiatric disorder, drug abuse, allergy to amide Local Anaesthetics. Randomization was done by closed envelope method. Patients were divided in two equal groups of 30 each. GROUP A (R)- Patient received Drug A (Ropivacaine 0.2% 12 cc + 0.25 ml distilled water (n=30)). GROUP B(R+D)-Patient received Drug B (Ropivacaine 0.2% 12 cc + 0.5 µg/kg Dexmedetomidine (n=30)). Patient received ranitidine 150 mg tablet and tablet diazepam 0.2 mg/kg a night before surgery. Patient was kept nil by mouth for 6 hours prior to procedure.In the operating room, patient's basal parameters like blood pressure, heart rate ,ECG,SpO2 were monitored. Intravenous access was established and IV fluid Ringer lactate started at 8-10ml/kg. 18G epidural catheter was inserted in T3-4 or T4-5 intervertebral space using Touhy's needle under all aseptic precaution in sitting position. A test dose of 3ml of 2% lignocaine hydrochloride solution containing adrenaline 1:2,00,000 was injected epidurally. After confirmation, the epidural catheter was fixed.

All cases were then conducted under general anaesthesia. Patients were premedicated with Inj.Midazolam 0.02mg/kg + Inj.Pentazocine 0.6mg/kg. Patients were induced with Injection Propofol 2-2.5 mg/kg + Injection Succinylcholine 2mg/kg and an appropriate size and type of endotracheal tube was inserted. Patients were maintained on O2 + N2O + Sevoflurane and Inj. Vecuronium.

Patients received Injection Fentanyl 2µg/kg intravenously as an analgesic and blood /blood products as and when required intraoperatively. After the completion of the surgery and at the time of last suture, the patients of Group A(R) received Drug A and the patients of Group B (R+D) received Drug B respectively via epidural catheter. Patients were extubated, shifted to recovery room and monitored for 24 hours. Patients that could not be extubated or needed postoperative ventilatory support were excluded from the study. Postoperatively following parameters were observed:

1.The duration and quality of analgesia of the first dose of epidural top up was observed using VAS score which was recorded every 5 minutes for the first 15 minutes, then at 30 min and then every half hourly till the next dose of epidural top up was required.

2. Need of rescue analgesia within three hours of first dose was noted
3. The number of epidural top-ups required in 24 hours were noted
4. The hemodynamic changes were observed for 24 hours which included HR, NIBP (MAP), RR, and SpO2.
5. The sedation was observed for 24 hours using modified Ramsay sedation score.

Modified Ramsay Sedation Scale

a) Patient is anxious and agitated or restless, or both
b) Patient is co-operative, oriented, and tranquil
c) Patient responds to commands only
d) Patient exhibits brisk response to light glabellar tap or loud auditory stimulus
e) Patient exhibits a sluggish response to light glabellar tap or loud auditory stimulus
f) Patient exhibits no response

6. The side effects due to the drug administered epidurally which included Hypotension, Bradycardia, Nausea and Vomiting, Respiratory depression, Allergic reaction, Headache, Pruritis.

Statistical Analysis

The collected data was compiled in EXCEL sheet and Master sheet was prepared. For analysis of this data SPSS (Statistical Software for Social Sciences) software version 20th was used. For comparison of quantitative data of two groups unpaired t-test was used and for comparison within the group paired t-test was used. P-value was checked a 5% level of significance.

RESULTS

The male: female ratio in both the groups A and B is 1:2.The mean of age in GROUP A was 44.60±17.75 and group B (R+D) was 42.30± 14.19 and the difference in sex and age was statistically not significant in both the groups.

The type of surgery being performed were kept comparable in both the groups' i.e.

GROUP A: Superficial (MRM):17, Minimally invasive (VATS):10, Invasive (Thoracotomy/ sternotomy/ esophagectomy) :03

GROUP B: Superficial (MRM):16, Minimally invasive (VATS):09, Invasive (Thoracotomy/sternotomy/ esophagectomy):05

The mean duration of analgesia was prolonged in Group B(R+D) i.e. 472±56.67 min compared to

Group A (R): 273 ± 34.12 min. which is statistically highly significant (P< 0.001) [Table 1]

The average duration of analgesia in both the groups varied according to the type of surgery [highest in superficial surgeries (MRM), followed by minimally invasive (VATS) and least in invasive surgeries (Thoracotomy, Sternotomy, Esophagectomy) The average duration of analgesia in all types of surgery (superficial, minimally invasive and invasive) was prolonged in Group B as compared to Group A. [Table 2] The study also shows that the number of top ups required in group B (R+D) was less as compared to Group A (R) which proves that Group B is more efficacious as compared to Group A.[Table 3]

The average VAS scores in Group B (R+D) were lower when compared with Group A (R). [Table 4]

The VAS score of 0 was considered as completely pain free period. It was for a longer duration in group B(R+D) i.e 180 min as compared to group (R) i.e 90 min.

	Group A [Ropin 0.2]	Group B [Ropin 0.2 +Dexem]	t-value	p-value
MRM	301.7 ± 24.81	517.7 ± 17.32	12.45	P < 0.0001S
VATS	246.00 ± 27.57	440.00 ± 15.00	8.51	P < 0.0001S
Thoracotomy	210.00 ± 15.00	380.00 ± 17.32	21.40	P < 0.0001S
Sternotomy	180 ± 0.00	345.00 ± 21.21	23.21	P < 0.0001S

Table 1: Duration of analgesia:

	Mean	SD	t-value	P-value
Group A	273.00	34.12	9.53	P<0.0001
Group B	472.00	56.67		

Table 2: Average duration of analgesia according to the type of surgery

Table 3: Comparison of Mean Number of top ups required in 24 hours in Group A & Group B

	Mean	SD	t-value	P-value
Group A	5.50	1.01	9.67	P<0.0001 S
Group B	3.56	1.08		

Table 4: Comparison of VAS in the two groups.

VAS	Group A Mean ± SD	Group B Mean ± SD	t-value	P-value
O Min	2.0±0.0	1.9±0.35	2.11	P=0.039 S
5 Min	1.96±0.0	1.00±0.18	16.3	P<0.0001 S
10 Min	1.5±0.51	0.16±0.46	9.69	P<0.0001 S
15 Min	0.96±0.81	0.03±0.18	6.43	P<0.0001 S
30 Min	0.46±0.73	00	4.46	P<0.0001 S
60 Min	00	00	0.00	P=1.00 NS
90 Min	00	00	0.00	P=1.00 NS
120 Min	00	00	0.00	P=1.00 NS
150 Min	00	00	0.00	P=1.00 NS
180 Min	0.067±0.25	00	2.40	P=0.001 S
210 Min	0.33±0.75	00	1.20	P=0.001 S
240 Min	1.00±1.50	0.23±0.12	1.89	P=0.049 S
270 Min	1.23±1.85	0.13±0.73	2.27	P=0.028 S
300 Min	1.06±1.48	0.03±0.18	1.19	P=0.143 NS
330 Min	1.70±1.87	0.23±0.95	2.06	P=0.003 S
360 Min	0.77±1.65	0.23±0.91	1.96	P=0.058 NS
390 Min	0.20±0.76	0.43±1.07	1.64	P=0.106 NS
420 Min	0.16±0.53	1.03±1.73	1.64	P=0.025 S
450 Min	0.76±1.54	0.93±1.83	0.380	P=0.705 NS
480 Min	0.40±1.03	0.60±0.98	0.773	P=0.443 NS
510 Min	0.93±1.76	1.73±2.07	1.64	P=0.106 NS
540 Min	0.20±0.79	0.80±1.74	1.42	P=0.159 NS

The VAS scores were studied separately in the two groups according to the type of surgeries as well:

i.e Superficial surgeries- MRM (Modified Radical Mastectomy) Minimally Invasive- VATS (Video Assisted Thoracoscopy) Invasive Surgeries– Thoracotomy, Sternotomy, Esophagectomy.

Based on the nature of surgery, it was observed that patients undergoing superficial surgeries had comparatively the longest pain free period (VAS score of 0) followed by patients undergoing minimally invasive superficial surgeries and then invasive surgeries. Within each group of the above three groups, it was observed that average VAS scores in group B were lower for longer duration when compared with group A. Also,the completely pain free period (VAS score of 0) was for a longer duration in group B as compared to group A.

For MRM Surgeries: The VAS score was 0 for a longer duration in group B(R+D) i.e 420 min as compared to group (R) i.e 180 min [Figure 1]

For VATS Surgeries:The VAS score of 0 was for a longer duration in group B(R+D) i.e 290 min as compared to group (R) i.e 150 min [Figure 2]

For invasive surgeries

The VAS score of 0 was for a longer duration in group B(R+D) i.e 195 min as compared to group (R) i.e 135 min.

For invasive surgeries VAS scores were 0 for a shorter duration of time as compared to MRM (superficial) and VATS (minimally invasive) surgeries. The reason may be extensive tissue injury in these surgeries.

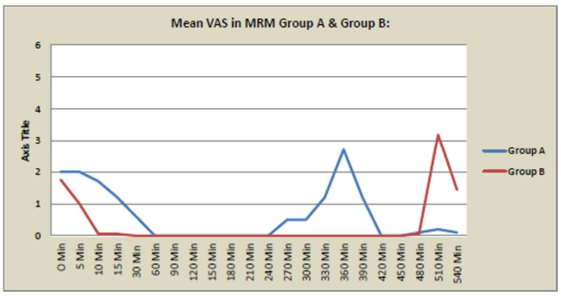

Figure 1: Mean VAS in MRM Group A & Group B.

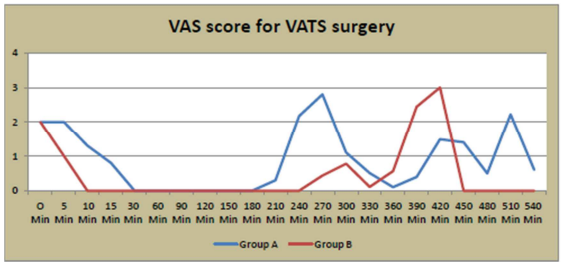

Figure 2: VAS Score for VATS Surgery.

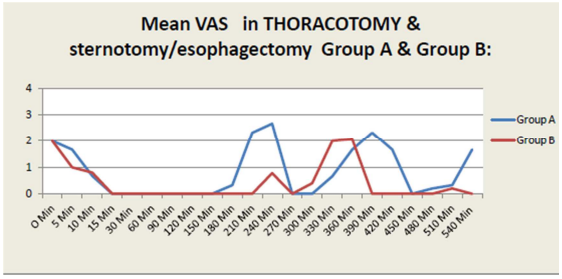

Figure 3: Mean VAS in Thoracotomy & Sternotomy/Esophagectomy.

In Group A baseline mean Heart Rate was 79.5±11.24 and Mean Arterial Pressure was 77.73±7.31 which increased at 0 min, 5 min,10 min,15 min due to extubation response and after that remained stable and using paired t-test was found statistically not significant.

In Group B baseline mean HR was 79.83±10.74 and baseline Mean Arterial Pressure was 80.63±8.06 which increased at 0 min, 5 min,10 min,15 min due to extubation response but increased less than group A and decreased gradually after that which may be due to Dexmedetomidine.

When compared with each other,using unpaired t-test the mean HR was more in group A than that of group B which was statistically highly significant (P<0.0001). [Figure 4]

Similarly, there was minor fall in mean arterial pressure in both groups which remained statistically insignificant till 150 min and after that decrease in MAP was more in group B than that of group A which was statistically significant. [Figure 5]

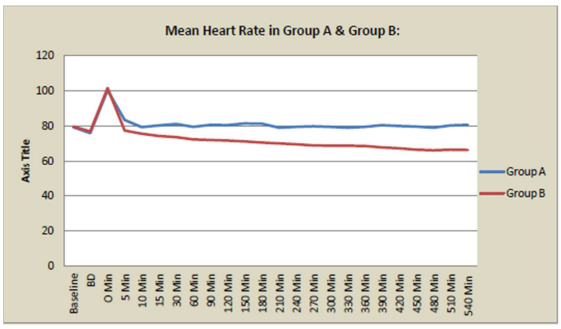

Figure 4: Mean Heart Rate.

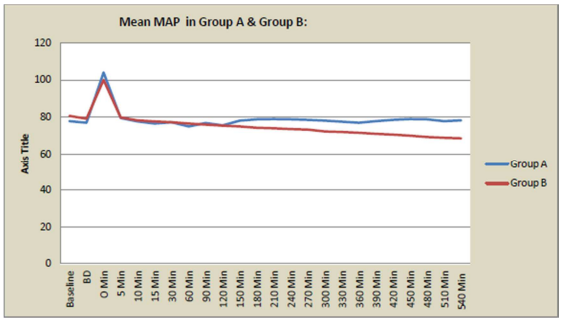

Figure 5: Mean MAP.

Rescue analgesics were required in Group A in 10% of patients and were not required in Group B. Sedation Score when monitored for 24 Hours postoperatively and were higher in Group B (R+D) as compared to Group A (R) .The patients were not deeply sedated and had no respiratory depression.

Side effects studied were Hypotension which was seen in 10% patients in Group A (R) and 30% patients in Group B (R+D). This incidence was statistically significant and the other side effects like Bradycardia, Nausea and vomiting, Pruritis and Respiratory depression were not seen in any of the patients.

DISCUSSION

Pain following thoracic surgery has been reported to be among the most intense clinical experiences. Patients experience painful wound incisions that alter chest wall mechanics and ineffective chest expansion may predispose to atelectasis, ventilation/ perfusion mismatching, hypoxemia and infection. The extent of tissue manipulation greatly contributes to the pain perceived by patients. This severe pain and morbidity postoperatively has driven the need of development of minimally-invasive operative modalities (e.g. VATS), which are now the accepted standard to perform a broad spectrum of thoracic operations. Meanwhile, the advances in anesthesiology practice have given a further contribution to the improvement of postoperative

care by widespread diffusion of regional and neuraxial techniques. The latter are usually adopted in combination with general anesthesia, with the purpose of achieving better postoperative pain control, attenuated response to surgical stress, and reduced dosage of intravenous or volatile anaesthetic drugs. General anaesthesia wherever possible must be combined with epidural anaesthesia to improve postoperative outcome. R.G.Wheately et al in 2001.[5] published a review which considers efficacy and safety of epidural analgesia in patients recovering from major surgery which was based on computerized search of literature from 1976 to 2000 (EMBASE/Medline). The review clearly stated the increased benefit: risk ratio by the use of postoperative epidural analgesia. All the studies on postoperative analgesia following thoracic surgeries till date have kept either the type of surgeries or the duration of surgeries comparable between the two groups. Maciasa, Monedero p. et al compared the duration of surgery while comparing postoperative analgesia postthoracotomy using epidural.[8] Belzarena et al in 2008 compared the duration of surgery while comparing the postoperative analgesia via TEA in MRM surgeries.[9]

In the present study though both extrathoracic and intrathoracic surgeries are included. However the type of surgeries performed in both the groups are comparable as it is expected that the severity of postoperative pain would depend on duration, type and nature of surgery (superficial like MRM, minimally invasive like VATS, invasive like thoracotomy, sternotomy, esophagectomy) The local anaesthetic drugs currently available for epidural anaesthesia offer a varied degree of efficacy,from drugs of low potency such as Lignocaine to more potent drugs such as Bupivacaine, Ropivacaine. Earliar Injection Bupivacaine 0.125% was being used for postoperative analgesia but Brown DL et al(10),Wolff A.P. et al and Katz et al found that there is no variation in onset,duration of sensory blockade,perioperative hemodyanmics and side effects between Ropivacaine and Bupivacaine.[11,12] Shen-Chih Wang et al,[13] Spencer. S. Lui et al,[14] David A. Scott et al, 1994 in their respective studies showed that Ropivacaine in the concentration of 0.2% is ideal for postoperative anaesthesia.[15]

There are multiple literature and studies that have described the use of Dexmedetomidine, an alpha-2 adrenergic receptor agonist sedation in ICU setting, postoperative pain either by I.V. or regional anesthesia. So for postoperative analgesia we preferred using Ropivacaine and comparing its efficacy with Ropivacaine plus Dexmedetomidine as an additive.

Duration of Analgesia

In the present study mean duration of post-operative analgesia in group A (R) was 273.00±34.12 min and in group B (R+D) was 472.00 ± 56.67 min. Thus the duration of analgesia was prolonged and highly significant(P<0.001) in Group B as compared to Group A. X. Z. zeng et al(16) studied that Low-dose epidural Dexmedetomidine as an additive to Bupivacaine postnephrectomy and clearly established that Dexmedetomidine when added to local anesthetic would prolong the duration of analgesia. Kumar Paswan A did a Comparative Study of Epidural Dexmedetomidine and Magnesium Sulphate used as an adjuvant to Ropivacaine for Post-Operative Analgesia in Thoracotomy.[17] Duration of analgesia was higher in group D as compare to group M. These result were similar to the results concluded by us in our study.

The patient was observed for 24 hours and the number of top ups required were documented. The number of top ups for group A was 5.50 ± 1.01 and Group B was 3.56 ± 1.08.This further adds to the conclusion that Dexmedetomidine prolongs the duration of postoperative analgesia of Ropivacaine 0.2%. In the present study, the duration of postoperative analgesia varied with kind of surgery being performed. Average duration of analgesia during MRM was 301.7±24.81 min in group A (R) and 517.7±17.32 min in group B (R+D).MRM being a superficial surgery in the thoracic region the duration of analgesia was the highest. The second highest average duration of analgesia was 246.00±27.57 min in Group A (R) and 440.00±15.00 min in group B (R+D) for VATS which is minimally invasive procedure. The duration of analgesia was comparatively less for invasive surgeries like lateral thoracotomy, esophagectomy and sternotomy. The average duration of analgesia during lateral thoracotomy in Group A (R) was 210.00±00 min and Group B was 380.00±17.32 min,during esophagectomy/sternotomy in Group A(R) is 180±0.00 and Group B(R+D) is 345.00±21.21. All the above given values consistently show a very significant (P<0.001) increase in duration of analgesia with Dexmedetomidine as an additive to Ropivacaine when given via epidural route. Asmaa Mohamed Hamza Sedky et al considered the type of surgery as a determinant of the duration of analgesia in the three study groups Group P (Bupivacaine + Fentanyl) group D (Bupivacaine + Dexmedetomidine) Group C (Bupivacaine + Clonidine). In our study,[18] at 0,5,10,15,30 min the mean VAS scores in Group A are 2.0±0.0, 1.96±0.0, 1.5±0.51, 0.96±0.81, 0.46±0.73 and in Group B are 1.9±0.35, 1.00±0.18, 0.16±0.46, 0.03±0.18, 00. These values are significantly lower in group B as compared to group A i.e P < 0.05 at 0min and P<0.001 at 5,10,15,30 min. At 60, 90, 120, 150 min VAS scores in group A and group B are 0.00 which indicates completely pain free period. At 180,210,240,270 min the VAS score of group A are 0.067±0.25, 0.33±0.75, 1.00±1.50 , 1.23±1.85 and group B are 00, 00, 0.23±0.12, 0.13±0.73. At all these intervals VAS score of group B is significantly

lower than group A P<0.05. After 300 min P value remains either not significant or shows better pain quality in group A than group B when recorded at 30 minutes time interval. This is inconsistent with our findings and may be because most of the patients in group A have already received an epidural top up while the patients in group B are reaching the end of the effect of their first top up, But overall it can be clearly concluded that VAS score of group B is considerably lower than VAS scores of Group A.

Quality of analgesia

The quality of analgesia in the two groups was compared by the average duration of analgesia for which the patient was completely pain free (i.e. With VAS score 0). The patients in group A (R) took significantly longer time to achieve a VAS score of 0 and the average duration of analgesia when the patient is completely pain free in group R was 90 min and in group B(R+D) was 180 min.

VAS scores when analyzed according to the type of surgery showed that irrespective of the group, VAS scores were lower for a longer duration of time in MRM(superficial surgeries) followed by VATS (minimally invasive) and finally in invasive surgeries. The VAS scores were 0 i.e. absolutely pain free for the longest duration in MRM. For Group A (R) VAS scores were 0 for 420 min and for Group B(R+D) VAS score was 0 for 180 min. For VATS, VAS score was 0 in Group A (R) for 150min and Group B(R+D) for 290 min.

For Invasive surgeries VAS score was 0 in Group A(R) for 135 min and Group B(R+D) for 195 min.

In all the Groups the VAS score improved by the addition of Dexmedetomidine with Ropivacaine.

The quality of analgesia can also be judged by the requirement of rescue analgesia. The rescue analgesia used was Injection Tramadol 100mg IV with Injection Diclofenac 75 mg IV. This rescue analgesic was given if the patient of Group A or Group B complained of pain within 3 hours of receiving the first dose of epidural drug. Patients complaining of pain even after rescue analgesia were dropped out of the study. The rescue analgesic was required only in 10% of the patients of group A undergoing invasive surgeries like thoracotomy/sternotomy. Our finding was similar to Asmaa Mohamed Hamza Sedky et al.[18]

In the entire study it is presumed that the 0, 5, 10 and 15 min heart rate and MAP may be biased due to extubation response.

Changes in heart rate

Trend of changes in Heart rate in group A (R) when compared at various time intervals showed no significant fall in heart rate during the study. The mean of baseline heart rate and mean of heart rate before dosage in group A was 79.5±11.24, 76.03±8.99 respectively. The mean heart rate increased significantly at 0 min i.e. 100.40±7.50 which was immediately post extubation and therefore this increase could be attributed to extubation response. At 5, 10, 15, 30, 60min and hence forth every 30 minutes heart rate was documented for all patients. The recorded mean heart rate are at various intervals shows no significant difference. The mean heart rate values at 30min, 60 min, 180 min, 300min, 420min, and 540min are 80.47±9.70, 76.76±6.93, 78.73±6.25, 78.56±6.20, 78.43±5.88, 78.13±5.63. All the values were compared with the baseline using paired t-test and showed no significant difference. David A. Scott,et al,1994,[15] Richard C. Etches,et al,1997,[19] Shen-Chih Wang showed that Ropivacaine does not cause any significant changes in heart rate.[13] These results were similar to our study results.

In our study, the mean heart rate in Group B(R+D) was decreasing in trend when compared at various intervals. The mean of baseline heart rate and mean of heart rate before dosage in group B(R+D) was 79.83±10.74, 77.00±11.09. The mean heart rate increased significantly at 0 min i.e. , 101.67±8.72. When compared using paired t–test the heart rate was significantly lower when compared with baseline at 5,10,15,30,60 min and every 30 min for the rest of the study. The decrease in heart rate was documented but bradycardia i.e HR <50 was not seen and thus Injection Atropine was not used in any patient. The mean of heart rate of group B(R+D) at 30min, 60min,180min,300min,420min,540min was 73.77±8.45, 72.47±7.75, 70.60±7.88, 68.83±8.03, 67.40±7.04, 66.43±8.23 respectively which when compared with mean of Group A (R) was significantly lower (P<0.001), and may be due to Dexmedetomidine given via epidural route.

Asmaa Mohamed Hamza Sedkyl et al Ashraf M.[18] Eskandr et al,[20] SA Oriol-López in their respective studies concluded that local anesthetic per se did not cause any change in heart rate and the additive alpha 2 agonist was responsible for bradycardia.[21]

Changes in MAP

The mean of baseline MAP and MAP before dosage was 78.00±7.39 and 77.00±7.59.The mean MAP at 0 min increased significantly i.e. 104.10±7.01 which is recorded immediately post extubation. Though we witnessed hypotension in three patients which was treated by Injection Mephenteramine and IV fluids but at all other interval the mean values of MAP shows no significant difference and the blood pressure was maintained throughout the study in this group. The mean values at 30 min, 60 min, 180 min, 300min, 420min, and 540 min were 77.20±7.73, 76.76±6.93, 78.73±6.25, 78.56±6.20, 78.43±5.88, 78.13±5.63.

Richard C. Etches,et al,1997,[19] João Florêncio de Abreu Baptista in their studies showed episodes of hypotension with Ropivacaine.[22]

In our study the changes in MAP in group B(R+D) were recorded at 0, 5, 10,15,30,60 min and henceforth every 30 min. The values of mean MAP

were compared and showed a decreasing trend with significantly low P value <0.001 when compared with the baseline. The mean of baseline MAP and MAP before dosage was 78.00±7.39 and 77.00±7.59.The mean MAP at 0 min increased significantly i.e. 104.10±7.01 which was recorded immediately post extubation and thus may be attributed to extubation response. The mean values at 30 min,60 min,180 min ,300min,420min,540 min are 77.10±7.82, 76.40±7.38, 74.13±7.26, 72.20±6.35, 70.47±5.88, 68.43±5.58.We witnessed hypotension in nine patients which was treated by Injection Mephenteramine and iv fluids.
Varaprasad Raghupatruni,[23]] Sukhminder Jit Singh Bajwa et al showed similar findings of hypotension with dexmedetomidine in their studies.[24] When the two groups are compared with each other, The mean values of MAP in Group B(R+D) is lower than Group A(R) at all times but the significant difference (P<0.05) is evident after 180 minutes. Thus we conclude the fall in blood pressure due to Ropivacaine plus Dexmedetomidine is more as compared to Ropivacaine alone. This may be due to synergistic effect of Ropivacaine and Dexmedetomidine as both Ropivacaine and Dexmedetomidine independently cause a decrease in blood pressure.

Respiratory rate and SpO2

The Respiratory rate and SpO2 of all the patients of Group A (R) and Group B(R+D) remained stable the values of both the groups when compared with each other did not show any significant difference.

Sedation score

All patients were closely watched over a period of 24 hours in the recovery room for all the known side effects. As Dexmedetomidine is known to cause sedation. The sedation score was monitored according to modified ramsay sedation score.
The mean sedation score at 10hrs, 12hrs, 14hrs, 16hrs, 18hrs, 20hrs, 22hrs, 24hrs in group A(R) was 1.97±0.18, 2.00±0.00, 2.00±0.00, 1.96±0.18, 2.00±0.00, 2.00±0.00, 2.00±0.00, 2.00±0.00 and in Group B(R+D) was 2.87±0.34, 2.93±0.25, 2.90±0.30, 2.76±0.43, 2.90±0.31, 2.90±0.31, 2.83±0.38, 2.86±0.34. and the P value <0.001 at all times depicting a highly significant difference. In group B (R+D) patients were comfortable and sedated postoperatively which added to patients comfort and the sedation score was always ≤ 3 Patients were never deeply sedated in any of the groups. This finding was comparable to the sedation scores in studies Asmaa Mohamed Hamza Sedky et al,[18] Oriol-López SA et al,[21] Ashraf M. Eskandr.[20]

Side effects

All the side effects of Ropivacaine and Dexmedetomidine known to date were monitored for 24 hours.

Hypotension

9 out of 30 i.e.30% of patients in group B(R+D) had an episode of hypotension which was treated with i.v fluids and Injection Mephenteramine 6mg iv. bolus dose compared with 3 out of 30 i.e. 10% of patients in group A(R) who experienced hypotension which was treated with iv fluids and Injection Mephenteramine.

Bradycardia

There was no episode of bradycardia in any group, i.e. HR< 50 and thus Injection Atropine was never used in any patient.

Nausea and Vomiting

All the patients were given Injection Ondensetron preoperatively and repeated 8 hourly in the postoperative period .No patient of any group complained of nausea or vomiting during the study.

CONCLUSION

Thoracic surgeries even though conducted in general anaesthesia, should be supplemented with thoracic epidural for postoperative analgesia. This helps to provide better mobilization, early recovery and decrease the dose of opioids required for analgesia and thus decrease the incidence of respiratory depression. Ropivacaine 0.2% is the ideal concentration for post-operative analgesia as it causes sensory block without causing motor block. If Dexemedetomidine is used as an additive to Ropivacaine it not only increases the duration of analgesia but also improves the quality of analgesia.
Both the groups provides effective analgesia for superficial thoracic surgeries like MRM and minimally invasive surgeries like VATS. The efficacy of analgesia decreases as the surgery becomes more invasive like lateral thoracotomy, sternotomy and esophagectomy. Though it is clearly proven that Ropivacaine plus Dexemedetomidine provides better analgesia than Ropiavacaine alone for all types of thoracic surgeries but we conclude that the efficacy of ropivacaine with or without dexemedetomidine decreases in extensive surgeries like thoracotomy, sternotomy or esophagectomy and may require supplementation by intravenous opioids or NSAIDS. The alteration in dosage of either Ropivacaine or Dexmedetomidine might improve the efficacy of analgesia but that needs to be studied and evaluated.

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