Paravertebral Block for Breast Surgeries

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ABSTRACT

Introduction: 40% of patients undergoing breast surgery have shown to have inadequate pain relief. Para vertebral block (PVB) has been successfully used to provide long lasting unilateral anesthesia for multiple thoracic and abdominal procedures. Thoracic paravertebral block (TPVB) is provides beneficial effects in breast surgeries, especially those with malignancies. Study aimed to see the effect of paravertebral block using dexmedetomidine (1mcg/kg) with 0.2% ropivacaine as an adjuvant to general anaesthesia in patients undergoing breast surgery.

Material and methods: After obtaining ethical clearance and patient consent, 60 patients of ASA physical status I and II, aged 20-65 years, scheduled for unilateral breast surgery were enrolled in this randomized, double blinded, prospective clinical study. Patients were randomized in groups RD (n=30) and RS (n=30) to receive either (22ml of 0.2%) with dexmedetomidine (2ml of 1mcg/kg) or ropivacaine (22ml of 0.2%) with saline (2ml) in TPVB respectively, along with general anesthesia. Patients were monitored and observed postoperatively for pain using VAS score, analgesic requirement and postoperative nausea and vomiting (PONV).

Results: Demographic, preoperative and intraoperative vital parameters were comparable between the two groups. Total dose of propofol intraoperatively was less in RD group (30.33 ± 1.07) vs (60.23 ± 3.48) in RS group ($p<0.001$). Time to first analgesia was significantly more in RD group (172.31 ± 10.31) vs (172.31 ± 10.31) in RS group ($p<0.001$).Postoperative analgesic requirement of tramadol was lower in RD group (135.2 ± 3.31mg) vs (276.3 ± 7.11mg) in RS group ($P<0.001$) and incidence of PONV was lower (6.7%) in RD group as compared to (10%) in RS group.

Conclusion: TPVB can be used as a suitable adjunct to GA as the anesthetic procedure in elective breast surgeries as it has proved to provide excellent analgesia in the postoperative period and has shown low rate of serious complications, along with potential for early ambulation and home discharge,

Keywords: Analgesia, Dexmedetomidine, Paravertebral block, Ropivacaine

INTRODUCTION

The concept of Para vertebral Block (PVB) was pioneered by Hugo MSellheim of Leipzig in 1905. It was further refined by Lawen M (1911) and Kappis (1919).[1] PVB have been successfully used to provide analgesia for multiple thoracic and abdominal procedures owing to its property of giving long lasting analgesia.[2] Thoracic paravertebral block (TPVB) has been used for different surgeries. Apart from acute postoperative pain relief TPVB may prevent the pain becoming chronic.[3,4] Breast cancers are most common malignancy requiring surgical intervention in females. Traditional pain management have been reported to cause inadequate pain control in about 40% of patients who had undergone breast surgeries.[5] General anaesthesia is the common anaesthetic technique used for breast surgeries, but inadequate pain relief and side effects like nausea, vomiting increase overall morbidity. Paravertebral block (PVB) interfere with the cortical responses to thoracic dermatomal stimulation and decreases the need of postoperative analgesics,[6] PVB has also been used effectively in other unilateral surgeries like thoracotomy, herniorrhaphy and cholecystectomy.[7-10]

Aim of the study was to see effect of paravertebral block using dexmedetomidine (1mcg/kg) with 0.2% ropivacaine as an adjuvant to general anesthesia in patients undergoing breast surgery.

MATERIAL AND METHODS

After obtaining Institutional ethics committee approval, 60 patients of ASA physical status I and II, aged 20-65 years, scheduled for a unilateral breast surgery with or without axillary clearance, were enrolled in this randomized, double blinded, prospective clinical study after taking consent from all the participants in the study. Power calculation suggested a sample size of 30 in each group with a power of 60% and significance level of 5%. Patients who refused to participate, less than 20 years of age, ASA physical status 3 or more, pregnant and lactating mothers. Patients with bleeding disorders or allergy to any of the study drugs, patients having any contraindication to placement of PVB and patients with psychiatric diseases were not included in this study. Patients were randomized into group RS (n=30) and group RD (n=30) to receive either ropivacaine (0.2%) with saline or ropivacaine (0.2%) with dexmeditomidine (1mcg/kg) in thoracic PVB respectively. visual analogue scale (VAS) was explained in preoperative visit. Patients were kept fasting for six hours. Tab ranitidine (150mg) was given the night before surgery.

On arrival to the operation theatre (OT) complex, all the patients were connected to multichannel monitor and baseline cardiorespiratory parameters like pulse rate, non-invasive blood pressure (NIBP), respiratory rate and peripheral arterial oxygen saturation (SpO2) were noted. IV cannulation was done using 18G cannula. Anatomical landmarks were identified and landmark for needle insertion was identified 2.5cm away from superior aspect of T4 spinous process. Drugs for resuscitation and intubation were kept ready. After cleaning the area 18G Tuoheys needle was inserted at the identified point perpendicular to skin and advanced till it contacted transverse process. The needle was slightly withdrawn and redirected in cephalic or

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caudad direction till there is loss of resistance checked with loss of resistance syringe. A total of 24ml of testing solution {22ml of ropivacaine and 2ml of saline in RS group and 22ml of ropivacaine and 2ml of dexmeditomidine (1mcg/kg) in RD group} was injected into PVS after repeated negative aspiration for blood or cerebrospinal fluid, whether or not paresthesia was elicited. Simultaneously Intravenous infusion of lactated Ringer's solution as maintenance fluid was started.

Monitoring was continued throughout the operative procedure, recorded at 5 min interval in the intraoperative and at 1-h intervals in the post-operative period. Dermatomal level of sensory loss to pinprick was noted. All the patients were induced with propofol 2.5mg/kg and proseal LMA was inserted. Proper position of LMA was confirmed. All the patients were maintained on O2 (30%), N2O (70%) and Isoflurane 1MAC on PSV mode of ventilation with target EtCO2 OF 32-35. Intermittent bolus doses of propofol 10 mg were given for supplemental sedation and tramadol 50mg if heart rate or Mean Arterial Pressure (MAP) increased more than 20% of the baseline value.

Duration of surgery was defined as the time between surgical incision and application of adhesive bandage after closure of the wound in both the groups. Post-operatively, all patients were monitored in the postoperative ward for the first 24 h. Nausea, vomiting and pain was observed in recovery room by a resident who was not involved in the study. Data was collected at 2, 4, 6, 12 and 24 h after block placement. In postoperative period once VAS≥4 rescue analgesia was given using tramadol 100mg i.v which was repeated after 15minutes if necessary. Further pain relief was achieved by intravenous Ketorolac 0.5mg/kg if required. Total analgesic requirement of tramadol and ketorolac during first 24hrs was recorded. Time to rescue analgesia was recorded. Time between last suture and rescue analgesia was noted. Any PONV was noted and treated. Any other complication during study period was also noted.

STATISTICAL ANALYSIS

Descriptive statistical analysis was carried out. Analysis of variance (ANOVA) was used to find the significance of study parameters on continuous scale. Chi-square/Fisher Exact test was used to find the significance of study parameters on categorical scale. P value ≤0.05 was considered statistically Significant. The statistical software namely SPSS 17.0, was used for analysis.

RESULTS

Demographic patterns and pre-operative vital parameters were similar when the two groups were compared (Table 1). Durations of surgery were 100.32±7.98 and 99.36±7.33 min in group RS and group RD, respectively, the values being comparable (P>0.05). Vital parameters during intraoperative were comparable in the two groups (P>0.05). The requirement of tramadol was significantly lower in group RD (135.2±3.31 mg) as compared with group RS (276.3±7.11 mg), P<0.0001 (Table 2). The total dose of propofol for additional intraoperative sedation after induction was higher in group RS (60.23±3.48 mg) than in group RD (30.33±1.07 mg), P<0.0001. Time to first request for rescue analgesia was considered as the duration of postoperative analgesia

It ranged from 183 to 500 min in group RD and from 100 to 210 min in group RS. The mean duration of post-operative analgesia was 335.31±5.52 min in group RD and 172.31±10.31 min in group RS, the difference was statistically significant (P<0.001) (table-3). Total dose of tramadol for rescue analgesia during the first 24 h was 135.2±3.31 mg in group RD as compared with 276.3±7.11 mg in group RS (P<0.001). Intramuscular diclofenac sodium had to be used in three patients (10%) in group RS as compared with none in group RD (P=0.01). The VAS scores in the immediate post-operative period and after 2, 4 h, 6, 12 and 24 h in the post-operative period were significantly higher in group RS (P<0.05 but with higher analgesic consumption in group RS. The incidence of PONV requiring treatment was 10.00% in group RS and 6.7% in group RD. We have not observed any incidence of direct epidural spread, inadvertent intravascular injection, hemodynamic instability or persistent

Parameters	Group RS (n=30)	Group RD (n=30)	P value
Age (years)	48.72.17±11.77	44.54±12.30	1.63
Weight (kg)	60.72±7.95	60.88±7.79	1.72
ASA status(I/II)$	18/12	19/11	1.71
Preoperative pulse (bpm)	76.30±7.08	77.13±5.35	1.36
Preoperative MAP (mmHg)	91.34±11.74	92.8±6.33	2.31
Preoperative SpO2 (%)	99.33±10.82	99.1±0.75	1.64
Data are given as mean±SD, except ASA physical status. Test done, Independent sample t-test, $Pearson Chi square. n: Number of patient, Bpm: Beats per minute; BMI: Body mass index; MAP: Mean arterial pressure			

Table-1: Demographic patterns and pre-operative

Parameters value	Group RS (n=30)	Group RD (n=30)	P
Duration of surgery(mins)	100.32±7.98	99.36±7.33	2.3
Recovery time (mins)	12.54±7.85	18.51±7.63	0.01
Intraoperative pulse (bpm)	74.56±12.1	74.85±3.29	2.6
Intraoperative MAP (mmHg)	88.07±5.78	87.77±7.54	3.24
Intraoperative SpO2 (%)	98.01±6.97	98.18±9.62	3.32
Tramadol (mg)	276.3±7.11	135.2 ± 3.31	<0.0001*
Data are given as mean±SD. n: Number of patient, Test done: Independent, sample t-test. *Statistically significant; bpm: Beats per minute; mins: Minutes			

Table-2: Vital parameters

Parameters	Group RS (n=30)	Group RD (n=30)	P value
Time to first analgesic at VAS≥4 (mins)	172.31±10.31	335.31±5.52	<0.001*
Patients receiving ketorolac [n (%)]	3	0	0.01*
VAS score in immediate postoperative period	2.21±6.41	1.03±5.68	<0.0001*
VAS score at 2 hrs	2.33±5.72	1.32±6.19	<0.0001*
VAS score at 4 hrs	3.52±0.64	1.33±2.41	<0.0001
VAS score at 6 hrs	2.54±4.32	1.43±6.50	<0.0001
VAS score at 12 hrs	3.87±1.49	2.27±4.43	<0.0001
VAS score at 24 hrs	3.68±2.51	2.23±4.45	<0.0001
PONV requiring treatment; n (%)	3 (10.34)	2 (6.67)	3.21

Data are given as mean±SD, n: Number of patient; Test done: Independent sample t-test, $Pearson Chi square. *: Statistically significant mgs: Milligrams; PONV: Postoperative nausea and vomiting; VAS: Visual analogue scale

Table-3: Period of analgesia

pain after the block procedure. Bilateral spread of sensory block was not observed in any patient. No significant bleeding or inadvertent pleural puncture was observed.

DISCUSSION

The present study has found that adding dexmeditomidine as an adjuvant to paravertebral ropivacaine 0.2% in patients undergoing breast surgery significantly reduced postoperative pain with significant reduction in postoperative tramadol and diclofenac consumption with cardiorespiratory stability. Thoracic PVB has been described as an alternative to GA for selected breast surgery patients.[11] α_2 adrenoceptor agonists are used with great interest in anesthesia practice for their sympatholytic, sedative, analgesic, and anesthetic-sparing effects.[12,13] Dexmeditomidine is a highly selective α_2 agonist with a greater selectivity for the α_2 receptors than the α_1 receptors.[14] Dexmeditomidine has also been reported to enhance central and peripheral neural blockades by local anesthetics.[14-16] Dexmeditomidine potentiates sensory and motor block during epidural anesthesia with ropivacaine and prolongs postoperative analgesia and without causing hemodynamic instability. But the literature related to paravertebral block for post operative analgesia with ropivacaine and dexmeditomidine is scare.

Paravertebral nerve blockade produces adequate level of analgesia without any additional need of monitoring in postoperative[17] Complications like hypotension, vascular puncture, pleural puncture, and pneumothorax can be detected and managed. PVB has been used for thoracotomy, rib fractures and breast surgeries.

Post-operative pain control was assessed by the time to first analgesic consumption, total amount of analgesic consumed in the first 24 h postoperatively and the VAS scores at different times in the first post-operative day. Time to first rescue analgesic was significantly greater in group RD than in group RS. Mean requirement of tramadol (rescue analgesic) in the first 24 h was also lesser in group RD as compared with group RS [Table 3]. No patient in group RD required injection diclofenac (back-up analgesic) in contrast to three patients in group RS. Tramadol and diclofenac resulted in better post-operative analgesia subsequently in the later part of the post-operative period due to its delayed onset and prolonged duration of action. Results of our study were limited to 24 hours postoperative period due to early discharge of patients from institute. Total consumption of propofol to deepen the level of sedation was significantly lower in group RD as compared to group RS. Recovery time after stopping volatiles was significantly prolonged in RD group as compared to RS group. This could be attributed to sedation effect of dexmeditomidine.

The general risk of PONV in women undergoing breast surgery under GA is appreciably high about 20-50% of all surgical procedures. Postoperative nausea and vomiting seen following breast surgery are higher compared to other surgeries (intra-abdominal surgery, gynecological surgery, strabismus repair and otolaryngology surgery). The incidence of postoperative nausea and vomiting can be as high as 80% after breast cancer surgeries. The etiology of postoperative nausea and vomiting followed by breast surgery under general anesthesia is complex. Patient's age, history of obesity, vehicle motion sickness and previous postoperative nausea and vomiting, surgical procedures, anesthetic techniques, postoperative pain, menstrual cycle phase and psychological factors are predisposing factors for PONV. Perioperative opioid administration compounds the problem further. Three patients developed PONV and required treatment (10.00%) patients of group RS and in two (6.67%) patients of group RD. Most of the studies for dexmeditomidine as an adjuvant analgesic in PVB for breast cancers have been used with bupivacaine. There is no data available with ropivacaine. Mohammad SA studied addition of dexmeditomidine 1mcg/kg to bupivacaine 0.25% in thoracic PVB for breast surgery. They found that quality and duration of analgesia improved with no serious side effects.[18]

CONCLUSION

Thus excellent postoperative analgesia, fewer requirements of analgesics, less side effect profile along with possibility of early ambulation and discharge makes PVB a suitable adjunct to GA for elective breast surgeries.

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