Original Research Article

Comparative study of ropivacaine with dexmedetomidine versus ropivacaine in ultrasound guided transversus abdominis plane block for post-operative pain relief in cesarean section

Naveen Chandru Anguchamy[1], Kamalakannan Manian[2*]

[1]Assistant Professor, [2]Associate Professor, Department of Anaesthesia, Karpagam Faculty of Medical Sciences and Research, Coimbatore, Tamil Nadu, INDIA.
Email:kamal97@gmail.com

Abstract

Background: Ultrasound guided TAP block endows with a superior postoperative pain release for patient go through cesarean section under spinal anesthesia. Duration as well as quality of analgesia is limited when TAP block is given with local anesthetic alone. Dexmedetomidine added as an adjuvant with local anesthetic increases the extent and also provides better postoperative analgesia. Aim of this study is to evaluate the efficacy of Dexmedetomidine with Ropivacaine to Ropivacaine single-handedly in TAP block following the Cesarean Section. **Methodology:** 70 ASA I and II patients undergoing cesarean section with the assistance of spinal anesthesia were separated into two groupings in this randomized double blinded study. Postoperatively patients in Group RD (n=35) be given bilateral TAP block with total volume of 42ml containing 0.2% ropivacaine plus 50µg of dexmedetomidine , divided as 21ml on each side. Group R(n=35) be given bilateral TAP block with 42ml of 0.2% ropivacaine alone ,divided as 21ml on each side. Each patient's age, weight, height, time to initial post-operative pain, VAS at preliminary exposure of postoperative ache, time to initially get rid of analgesia, quality of block and adverse events were documentated. **Result:** The mean time to preliminary commencement of postoperative ache [334.14(53.21) vs 254.57(51.73); P=0.000] and the mean time to initially get rid of analgesia [407.86(56.60) vs 329.71(55.40); P = 0.000] were extensively longer in group RD when evaluated against group R. Both groups were comparable in demographics and quality of block. Side consequences were statistically insignificant in both the groups. **Conclusion:** In accordance with the outcome and the methodology utilized, we have found that Dexmedetomidine as an adjuvant to ropivacaine in TAP block for cesarean section provided better and prolonged post operative analgesia than ropivacaine alone.

Key Words: Ropivacaine; Dexmeditomidine; Transverse Abdominis Plane; cesarean section

***Address for Correspondence:**
Dr. Kamalakannan Manian, Associate Professor, Department of Anaesthesia, Karpagam Faculty of Medical Sciences and Research (KFMSR), Coimbatore, Tamil Nadu, INDIA.
Email: kamal97@gmail.com

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INTRODUCTION

The Caesarean section is a common surgery in India. [1-3]. Intraoperative pain is taken care by spinal anaesthesia but inadequate control of postoperative pain leads to patients discomfort, prolonged hospital stay and thromboembolic complications. Postoperative pain is usually managed by oral or intravenous analgesic agent and Regional Anaesthesia. Oral or IV analgesic agents have several limitations and adverse effects. Regional analgesia reduces the use of oral or IV analgesic agent along with

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good control of postoperative pain. Trans versus abdominisplane (TAP) block with ropivacaine has shown effective in reducing the postoperative use of opioids after Cesarean section[4-8].However, the results have not been consistent with some studies showing no additional postoperative pain control after TAP block with ropivacaine alone[9,10]. Dexmedetomidine, an exceedingly selective alpha-2 adrenergic receptor agonist, has been employed in a variety of anesthetic schemes because of its hemodynamic alleviating characteristic, sedative, analgesic and sympatholytic results to various local anesthetic actions [11,12]. Adding Dexmedetomidine as an adjuvant to ropivacaine in TAP block has exposed raise in the extent of analgesia after various abdominal surgeries[13,14]. There are only limited study comparing the combination of dexmedetomidine with ropivacaine. Hence this investigation is planned for the purpose of comparing the consequence of dexmeditomidine with ropivacaine along with ropivacaine alone in Ultrasound-guided Transversus Abdominis Plane Block for post operative ache release in Cesarean section. At this point, the major objective and intention of the investigation is to evaluate the effectiveness of Dexmedetomidine together with Ropivacaine to Ropivacaine single-handedly in Ultrasound guided TAP block subsequent to the Cesarean section in terms of time to initial reporting of postoperative pain, time to first release analgesia and quality of block.

MATERIALS AND METHODS

This double blinded, comparative, cross sectional investigation was carried out in the department of Anaesthesia, Karpagam Faculty of Medical Sciences and Research, Coimbatore subsequent to obtaining endorsement from our institutional ethical committee. Institutional human Ethical commitee reference no is - IHEC/164/Anesthesia/4/2019. On paper informed permission was acquired from every participant. We included patients above 18 years of age, undergoing Cesarean section beneath spinal anesthesia, American Society of Anesthesiology grade 1 or 2, who could understand, in addition to rate their pain on Visual Analog Scale(VAS). We excluded unwilling Patients, History of anaphylaxis with ropivacaine or dexmedetomidine, History of drug abuse, were unable to understand VAS, Coagulopathy, who did not tolerate spinal anesthesia well and had tobe converted to general anesthesia for Cesarean section, had Cesarean section planned with general anesthesia. Patients who are fulfilling the inclusion and exclusion criteria were explained about the investigation. Seventy patients were consigned to one of the two groups Ropivacaine (R) or Ropivacaine with Dexmedetomidine (RD). After getting consent patients were allotted into either one of the group based on the closed envelope method (simple random sampling) already designed. Medications were prepared in a 50ml syringe and labelled as study drug in order to uphold blinding. Each and every patient, nursing team, data collecting assistant were blinded to the patient group project. Bilateral TAP block was carried out on all the study patients during the conclusion of cesarean section underneath spinal anaesthesia in the operating room. The US probe was positioned crosswise to the abdomen in the mid-axillary line connecting the costal boundary and the iliac crest on one side. The layer of exterior oblique, interior oblique and transversus abdominis was identified by the ultrasound. A 10cm tiny bevel needle was commenced in plane of the ultrasound probe and highly developed until it attains the plane connecting the interior oblique and transversus abdominis muscle. After arriving at the plane, a small volume of local anesthetic (1 mL) will be introduced to confirm the needle position and subsequently the remaining dose (20 mL) of local anesthetic will be given. This process was replicated on the opposite side.Group RD has been given bilateral TAP block with 40ml of 0.2% ropivacaine plus 50 µg of dexmedetomidine diluted to 2 mL in normal saline to form total of 42ml, with 21ml on every side. R Group has been given bilateral TAP block with 40ml of 0.2% ropivacaine plus 2 mL of normal saline to form total of 42ml, with 21ml on every side. After completion of TAP block, each patient was moved to the postoperative room for monitoring the vitals and adverse events. Every patient was inquired to state the postoperative pain by means of VAS scale. Time to preliminary reporting of postoperative ache was noted. Rescue analgesia was given with IV tramadol 1 mg/kg. Each patients completed the study at the time of receiving rescue analgesia. Each patient's age, weight, height, time to initial postoperative pain, VAS at preliminary reporting of postoperative ache, time to first rescue analgesia, quality of block and adverse events were documentated in the data collection proforma.Sample size was considered in accordance with the previous investigation done by Prannal and Dinesh. Mean time to first rescue analgesia in hours was 7.80(2.29) and 6.47(1.22) for ropivacaine with dexmeditomidine and ropivacaine alone respectively [15]. Considering confidence interval of 95 % and relative precision of 20% the minimum test size calculated was 31 in every group. Here, recruited 35 in every group. It is to be noted that the statistical examination was done with the assistance of SPSS Software version 22. The collected datas were analysed using the Arithmetic mean, Standard deviation, number, percentages and Independent T test. $P<0.05$ is measured statistically significant.

RESULTS

70 patients were enrolled and completed the study. The group is divided into two with 35 in each group. The demographic data in both the groups were equivalent in terms of age, weight and height. The results were shown in table 1.

Table1: Demographic data in both groups

Group	R(N=35)	RD(N=35)	P-Value
Age Mean(SD)	27.40(4.95)	25.66(4.26)	0.119
Weight Mean(SD)	63.63(5.30)	66.37(6.83)	0.065
HeightMean (SD)	154.26(2.41)	154.89(2.34)	0.271

The mean time to initial reporting of postoperative pain was significantly higher in group RD [334.14(53.21)] when compared with group R [254.57(51.73)]. The results were shown in table 2.

Table 2:Time to initial reporting of postoperative pain

Group	RMEAN(SD)	RDMEAN(SD)	P-Value
Time to initial reporting of postoperative pain [minutes]	254.57(51.73)	334.14(53.21)	0.000

VAS at initial reporting of post operative pain were statistically insignificant between both the groups. The results were shown in table 3.

Table 3:VAS at initial reporting of postoperative pain

Group		R(%)	RD(%)	P-Value
VAS at initial reporting of postoperative pain	1	18(51.4)	23(65.7)	0.170
	2	14(40.0)	11(31.4)	
	3	3(8.6)	1(2.9)	

The mean time to initially rescue analgesia was drastically higher in group RD [407.86(56.60)] when compared with group R [329.71(55.40)]. The results were shown in table 4.

Table 4: Time to first rescue analgesia

Group	R MEAN(SD)	RD MEAN(SD)	P-Value
Time to first rescue analgesia [Minutes]	329.71(55.40)	407.86(56.60)	0.000

The quality of block were comparable in both groups.The results were shown in table 5.

Table 5: Quality of Block

Group		R(%)	RD(%)	P-Value
Quality of Block	Excellent	9(25.7)	16(45.7)	0.085
	Good	19(54.3)	15(42.9)	
	Fair	7(20.0)	4(11.4)	

Side effects were arithmetically insignificant in the two groups were shown in table 6.

Table 6: Adverseevents

Adverse events	R(%)	RD(%)	P-Value
Sedation	0	3(8.57)	
Hypotension	0	1(2.86)	0.053

DISCUSSION

The effective postoperative ache management is an imperative element of the surgical patients. Insufficient ache reduction results in augmented morbidity and death. The management of pain in postoperative period decreases the risks of various complications and provides early ambulation. The ideal analgesic agents used in pain management have to be harmless and effective with negligible consequences. Multimodel analgesic regimes mostly achieves this goal. Various studies have confirmed that effectiveness of TAP Block as a constituent of multimodal postoperative analgesia subsequent to cesarean section and lower abdominal surgery [16, 17]. TAP block in cesarean section with local anesthetic has better analgesia but with limited duration. Dexmedetomidine, the pharmacologically vigorous d-isomer of medetomidine is an exceedingly precise and discerning alpha-2 adrenergic receptor agonist. In this randomized double blinded investigation, we engaged 70 parturient

who were undergoing Cesarean sections under spinal anesthesia and separated them arbitrarily into two different groups. This study analyze the consequence of dexmedetomidine as an adjuvant with ropivacaine in US‑guided TAP block for postoperative ache relief. Our study shows that addition of dexmedetomidine to ropivacaine provided an extended mean time to initial reporting of postoperative pain[334.14(53.21) minutes vs 254.57(51.73)minutes; p< 0.05] when compared with ropivacaine alone. Similarly in the investigation the mean time to initial reporting of rescue analgesia was also extended when dexmedetomidine is added with ropivacaine [407.86(56.60) minutes vs 329.71(55.40) minutes; p<0.05] than the ropivacaine alone. Close to our findings, investigation carried out by Mishra *et al*. showed that patients undergoing lower abdominal surgeries, TAP block with RD reduced postoperative pain score on VAS scale up to 12 h when compared with ropivacaine alone[18]. The above study shows that the accumulation of Dexmedetomidine with local anesthetics in TAP block for lower abdominal surgeries provided better analgesia when comparing ropivacaine alone. Similarly, an investigation by Xu *et al*. demonstrated that TAP block after emergency abdominal surgery with RD reduced the postoperative pain score on VAS scale up to 12 h, increased the time to first use of PCA (248.5 vs. 157.5 min), and reduced the overall use of PCA when compared with ropivacaine alone[19]. In the investigation carried out by Rai *et al*., found that accumulation of dexmedetomidine to ropivacaine in TAP block led to further persistence of analgesia, less requirement of rescue analgesia with lower VAS [20]. In the study done by Almarakbi*et al* stated that addition of Dexmedetomidine to bupivacaine in TAP block for patients undergoing abdominal hysterectomy provided better analgesia in the postoperative period [21]. Similarly an investigation carried out by Marhofer*et al* observed that adding dexmedetomidine in ropivacaine for ulnar nerve block prolonged the duration of analgesia [22]. There was an extensive distinction in the duration of analgesia in the above studies are because of the differences in the location of block, different dosages of the drugs used and the differences in the nature of surgeries done.The limitation in our study were the inability to assess dexmedetomidine plasma concentration and the optimal dosage . We were also not able to determine the commencement time of TAP block since the patients did not completely make progress from spinal anesthesia. The occurrence of adverse events reported in our study was not considerably dissimilar among the groups. Considering this a seperate study with large population might be required to demonstrate the incidence of adverse events.

CONCLUSION

In accordance with the outcomes and the methodology utilized, we have found that Dexmedetomidine as an adjuvant to ropivacaine in TAP block for cesarean section provided better and prolonged post operative analgesia than ropivacaine alone.

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