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Dexmeditomidine as an Adjunct to Ropivacaine for Transversus Abdominis Plane (TAP) Block for Subumblical Surgeries

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Abstract:

Background and Aims: *This prospective, randomized, double-blind study was done to evaluate the effect of addition of dexmedetomidine as an adjunct to ropivacaine in TAP (Transversus Abdominis Plane) block for lower abdominal/subumblical surgeries.*

Materials and Methods: *Hundred ASA (American Society of Anesthesiologists) class I and II patients undergoing lower abdominal surgeries were enrolled to receive either ropivacaine alone (Group 1) or ropivacaine with dexmeditomidine (Group 2) in TAP block for postoperative analgesia at the end of surgical procedure performed under spinal anesthesia. Duration of analgesia, total amount of rescue analgesia, hemodynamic parameters, and any adverse events were monitored.*

Results: *Analgesia in the postoperative period was better in Group 2 with comparable side effects.*

Conclusion: *Hence, addition of dexemedetomidine to ropivacine in TAP lock significantly increases the duration of analgesia without increasing the side effects.*

Keywords: ***Dexmedetomidine, TAP block, ropivacaine, analgesia.***

Introduction

Since the times, pain has remained the most significant issue making patients to seek medical consultation.[1] More than 80% of patients who undergo surgical procedures experience acute postoperative pain. Inadequately controlled pain affects quality of life, functional recovery, the risk of post-surgical complications, and the risk of persistent postsurgical pain.[2] Appropriate pain relief leads to shortened hospital stays, reduced hospital costs, and increased patient satisfaction. As a result the management of postoperative pain is an increasingly monitored quality measure.[3] The abdominal surgeries, may it be open or laparoscopic are associated with significant post-operative pain. In addition to parenteral opioids and NSAIDS, various other methods used for post-operative analgesia are infiltration of local anesthetic agents, dermal patches, patient controlled analgesia and epidural catheters, etc.[1] The transversus abdominis plane (TAP) block is a peripheral nerve block that results in anesthesia of the abdominal wall. The transversus abdominis plane (TAP) block is a regional anesthesia technique that provides analgesia to the parietal peritoneum as well as the skin and muscles of the anterior abdominal wall.[4]

The present study was conducted to compare the efficacy of dexmeditomidine as adjunct to ropivacaine in TAP block for lower abdominal surgeries.

Aims and Objectives

To study the efficacy ofdexmeditomidine as an adjuvant to ropivacaine in transversus abdominis block (TAP) block for post op analgesia in lower abdominal surgeries.

Materials and Methods

After obtaining approval from hospital ethics committee and written, informed consent, this randomized, prospective and double blinded study in which 50 patients in each group

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were enrolled for the study. The study was carried out from December 2014 to May 2016, in a Tertiary care Hospital (Sheri Kashmir Institute of Medical Sciences, Soura, Kashmir). The study population included patients of either sex, ASA grade I and II, in the age range of 18-60 years. The study was carried out on adult patients who underwent lower abdominal surgeries like hernia repair, mesh hernioplasty, repair of scar dehiscence etc under spinal anesthesia followed by TAP block at the end of surgical procedure. Patients refusal, ASA Physical status class III and IV, cardiac and neurological diseases, patients having concomitant procedures and allergy to the drug to be used were the exclusion criterias for the study. All the patients underwent thorough pre-anaesthetic checkup pre-operatively, explaining all risks and benefits. In the operation room baseline monitoring like heart rate (HR), non- invasive blood pressure (NIBP), ECG and pulse oxymetery (SpO2) were recorded. After securing IV access with 18G iv cannnula and starting iv fluids, patients were positioned in sitting position for spinal anesthesia under all aseptic precautions. Spinal anesthesia was given at L3-L4 level with 27G spinal needle using 2ml of 0.5% heavy bupivacaine and 25mcg of fentanyl. After confirmation of block and target sensory level of T10 dermatome (pinprick sensation) surgical procedure was started. At the end of surgical procedure TAP block was performed on all patients under USG guidance. Patients were randomized into two study groups as **GROUP 1** patients received a transverses abdominis plane (TAP) block with 30ml of 0.2 % ropivacaine alone and **GROUP 2** patients received a transverses abdominis plane (TAP) with 30ml of 0.2 % ropivacaine with inj clonidine 1mcg/kg as an adjuvant. Hypotension was defined systolic blood pressure of <90mmHg or drop of more than 20% basal mean arterial blood pressure and bradycardia as heart rate less than 60 beats per minute and was treated with intravenous ephedrine 5- 10 mg bolus doses and atropine IV 0.01 mg/kg bodyweight respectively. Oxygen supplementation was provided in case of respiratory depression, that is SPO2 < 90% and respiratory rate < 10 per minute. The parameters observed after administration of TAP block were first feeling of pain/ rescue analgesia, hemodynamic alteration and any untoward incident or side effect.

Patients were evaluated for 24 hours regarding total duration of analgesia, and post-operative analgesic requirements. Postoperatively pain was recorded by using Visual Analogue Scale (VAS) between 0 and 10 (0 = no pain, 10 = most severe pain). Rescue analgesia was given on VAS Score of more than 4. For rescue analgesia 75mg of injection diclofenac was given. Total consumption of rescue analgesic was computed between the two groups. Any untoward incident or side effect like nausea, vomiting, hypotension, bradycardia and respiratory depression was recorded.

Statistical Analysis

All the collected data was entered in Microsoft Excel sheet and then transferred to SPSS software ver. 17 for analysis. Qualitative data was presented as frequency and percentages and analysed using chi-square test of fisher's exact test (in case of 2x2 contingency tables). Quantitative data was presented as mean and SD and compared by unpaired t-test or Man Whitney U test (in case of non-normal distribution).P-value < 0.05 was taken as level of significance.

Results

Table 1: The two groups were comparable with regard to age, weight, sex and ASA Status

Parameters	Group 1	Group 2
Age (years)	46.4±1.24	46.7±11.7
Weight (kg)	64.4±7.7	63.7±7.
ASA (I/II)	16/14	18/12
Gender M/F	16/14	17/13

p>0.05

Table 2: Cardiorespiratory parameters were comparable at baseline, before performing TAP block and after performing TAP block between the groups

Parameters	Time	Group 1	Group 2	p-value
		Mean±S.D	Mean±S.D	
Heart Rate	Baseline	73.7±7.19	77.66±1.627	1.76
	Before TAP Block	72.1±6.728	77.99±2.040	0.85
	After TAP Block	73.5±7.099	77.09±2.480	2.13
RR	Baseline	16.3±1.41	17.37±0.31	0.98
	Before TAP Block	16.266±1.741	17.53±0.38	1.76
	After TAP Block	16.466±2.013	17.32±0.23	2.45

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MAP	Baseline	94.1222±6.43892	84.21±8.78	0.88
	Before TAP Block	94.1111±7.32671	83.08±7.96	2.23
	After TAP Block	93.4556±6.95992	84.56±8.24	0.32
SpO2	Baseline	98.52±0.21	98.07±0.583	0.65
	Before TAP Block	98.56±0.21	97.7±0.952	1.22
	After TAP Block	98.52±0.19	97.87±0.86	1.03

Although wide variations were seen in postoperative pain score, however, group 2 had lowest VAS scores compared to group 1 (P <0.01) (Table 3). The time gap between initial medication and the time to 1st rescue analgesic was highest 721.83±22.91 mins in Group 2 and 331.46±15.28 mins in Group 1. The difference among groups was statistically significant (p=<0.01).

Table 3: Although wide variations were seen in postoperative pain score, however, group 2 had lowest VAS scores compared to group 1 (P <0.01)

Parameters	Group 1	Group 2	p-value
Average VAS	5.43±5.28	3.15±5.8	<0.001
Time to first feeling of pain (minutes)	331.46±15.28	721.83±22.91	<0.001
Total dose of ketorolac(mg) consumed	84.53±0.68	32.96±0.81	<0.001

The time gap between initial medication and the time to 1st rescue analgesic was highest 721.83±22.91 mins in Group 2 and 331.46±15.28 mins in Group 1. The difference among groups was statistically significant (p=<0.01).

Table 4: There was no significant difference between the two groups regarding nausea/vomiting, hypotension, bradycardia and respiratory depression (p>0.05)

Parameters	Group 1	Group 2
Nausea / Vomiting	3	2
Hypotension	2	2
Bradycardia	0	0
Respiratory depression	0	0

p>0.05

Discussion

TAP block has shown to reduce postoperative pain scores allowing for early ambulation and faster discharge, after lower abdominal operations.[5] TAP block has proved beneficial by virtue of its simplicity and effectiveness in providing analgesia, appropriateness for surgical procedures where parietal pain is a significant component of postoperative pain.[6] The benefits of adequate postoperative analgesia include a reduction in the postoperative stress response, improved surgical outcome, decrease in the incidence of side effects from analgesics and improved patient comfort.[7,8,9]

In the present study, the two groups were comparable with regard to demographic parameters like age, weight, sex, ASA status and baseline cardiorespiratory parameters (heart rate, respiratory rate, mean arterial pressure and oxygen saturation), cardiorespiratory parameters before and after performing TAP block.

Although wide variations were seen in postoperative pain score, however group 2 had significantly lower mean VAS score compared to group 1. Time to first rescue analgesic and total consumption of rescue analgesic was also significantly lower in group 2 compared to group 1. Local anaesthetic agents exert anesthetic and analgesic effects by blocking sodium channels whereas dexmeditomidine an alpha-2 adreno receptor agonist act by binding to pre-synaptic c fibers and post-synaptic dorsal horn neurons.[10] Dexmedetomidine acts on pre and post-synaptic sympathetic nerve terminal and central nervous system thereby decreasing the sympathetic outflow and norepinephrine release to cause sedation, analgesia and hemodynamic effects. It acts peripherally by blocking conduction through Aα and C fibers to enhance the effects of local anesthetics without increasing the incidence of side effects. The prolongation of effect may result from synergism between local anaesthetic and alpha-2 adreno receptor agonist. Earlier Eskandar A M *et al.* Studied effects of epidural dexmedetomidine and low-volume bupivacaine on postoperative analgesia after total knee replacement. Visual analogue scale of pain showed a significant reduction between the two groups at both rest and movement, and the total dose of nalbuphine consumption during the study period was significantly reduced ($P < 0.002$) in group receiving dexmeditomidine (5 ± 5.15) than in group receiving bupivacaine (11 ± 7.63).[11] Yaksh showed that alpha-2 adrenoreceptor when given intrathecally causes dose

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dependent decrease in motor strength in animals.[12] Alpha-2 adreno receptor agonists administered intrathecally have been found to have antinocicepive action for both somatic and visceral pain.[13] Yoshitomi *et al*., demonstrated that dexmedetomidine as well as clonidine enhanced the local anesthetic action of lignocaine via peripheral α-2A adrenoceptors.[14] Brummett *et al*., showed that dexmedetomidine enhances duration of bupivacaine anesthesia and analgesia of sciatic nerve block in rats without any evidence of histopathological damage to the nerve.[15,16] In another study, Brummett *et al*., showed that dexmedetomidine added to ropivacaine increased the duration of sciatic nerve blockade in rats, most likely due to the blockade of hyperpolarization-activated cation current (i.e., a direct effect on the peripheral nerve activity).[17] Esmaoglu *et al*., reported prolongation of axillary brachial plexus block when dexmedetomidine was added to levobupivacaine.[18] Dexmedetomidine also prolongs the effects of local anesthetic agents for posterior tibial nerve and greater palatine nerve sensory blockade.[19,20]

Incidence of side effects like nausea, vomiting, hypotension and bradycardia was comparable between the two groups that correlates the earlier studies. None of our study patient had respiratory depression.

Conclusion

Addition of dexmeditomidine as an adjunct to ropivacaine in TAP block for postoperative analgesia in lower abdominal surgeries resulted in improved postoperative analgesia in the form of increased duration of analgesia and decreased analgesic requirements without any untoward side effects.

References

[1] Mishra M, Mishra SP Transversusabdominis plane block: The new horizon for postoperative analgesia following abdominal surgery. Egyptian Journal of Anaesthesia, 2016; 32, 243–247.

[2] Chou R, Gordon DB, de Leon-Casasola OA, Rosenberg JM, Bickler S, Brennan T et al Management of Postoperative Pain: A Clinical Practice Guideline From the American Pain Society, the American Society of Regional Anesthesia and Pain Medicine, and the American Society of Anesthesiologists' Committee on Regional Anesthesia, Executive Committee, and Administrative Council. J Pain, 2016; 17(2), 131-57.

[3] Garimella V, Cellini C Postoperative Pain Control.Clin Colon Rectal Surg, 2003; 26, 191–196.

[4] Charlton S, Cyna A M, Middleton P, Griffiths J D. Perioperative transversus abdominis plane (TAP) blocks for analgesia after abdominal surgery. Cochrane Database Syst Rev. 2010; (12):CD007705.

[5] Young MJ, Gorlin AW, Modest VE, Quraishi SA. Clinical implications of the transversus abdominis plane block in adults. Anesthesiol Res Pract. 2012:731645.

[6] Rana S, Verma RK, Singh J, Chaudhary SK, Chandel A Magnesium sulphate as an adjuvant to bupivacaine in ultrasound-guided transversusabdominis plane block in patients scheduled for total abdominal hysterectomy under subarachnoid block. Indian J Anaesth, 2016;60(3), 174–179

[7] Kehlet H. Surgical stress: the role of pain and analgesia. Br J Anaesth. 1989; 63:189-95.

[8] Capdevila X, Barthelet Y, Biboulet P, Ryckwaert Y, Rubenovitch J, d'Athis F. Effects of perioperative analgesic technique on the surgical outcome and duration of rehabilitation after major knee surgery. Anesthesiology. 1999; 91:8-15.

[9] Bonnet F, Marret E. Influence of anaesthetic and analgesic techniques on outcome after surgery. Br J Anaesth. 2005; 95:52-8.

[10] Eisenach JC, De Kock M, Klimscha W. á2-Adrenergic Agonists for Regional Anesthesia: A Clinical Review of Clonidine (1984 - 1995). Anesthesiology 1996;85:655-74

[11] Eskandar AM, Ebeidb AM. Effects of epidural dexmedetomidine and low-volume bupivacaine on postoperative analgesia after total knee replacement: Ain-Shams Journal of Anesthesiology 2014, 07:193–197.

[12] Yaksh TL: Pharmacology of spinal adrenergic systems which modulate spinal nociceptive processing. Pharmacol Biochem Behav1985;22: 845-58

[13] Al-Ghanem SM, Massad IM, Al-Mustafa MM, Al-Zaben KR, Qudaisat IY, Qatawneh AM, Abu-Ali HM: Effect of Adding Dexmedetomidine versus Fentanyl to Intrathecal Bupivacaine on Spinal Block Characteristics in Gynecological Procedures: A Double Blind Controlled Study. Am J Appl Sci. 2009; 6:882-7.

[14] Yoshitomi T, Kohjitani A, Maeda S, Higuchi H, Shimada M, Miyawaki T. Dexmedetomidine enhances the local anesthetic action of lidocaine via an alpha-2A adrenoceptor. Anesth Analg. 2008; 107:96–101.

[15] Brummett CM, Norat MA, Palmisano JM, Lydic R. Perineural administration of dexmedetomidine in combination with bupivacaine enhances sensory and motor blockade in sciatic nerve block without inducing neurotoxicity in rat. Anesthesiology. 2008; 109:502–11.

DOI: 10.23958/ijirms/vol02-i08/09

[16] Brummett CM, Amodeo FS, Janda AM, Padda AK, Lydic R. Perineural dexmedetomidine provides an increased duration of analgesia to a thermal stimulus when compared with a systemic control in a rat sciatic nerve block. Reg Anesth Pain Med. 2010; 35:427–31.

[17] Brummett CM, Hong EK, Janda AM, Amodeo FS, Lydic R. Perineural dexmedetomidine added to ropivacaine for sciatic nerve block in rats prolongs the duration of analgesia by blocking the hyper polarization-activated cation current. Anesthesiology. 2011; 115:836–43.

[18] Esmaoglu A, Yegenoglu F, Akin A, Turk CY. Dexmedetomidine added to levobupivacaine prolongs axillary brachial plexus block. Anaesth Analg. 2010; 111:1548–51.

[19] Obayah GM, Refaie A, Aboushanab O, Ibraheem N, Abdelazees M. Addition of dexmedetomidine to bupivacaine for greater palatine nerve block prolongs postoperative analgesia after cleft palate repair. Eur J Anaesthesiol. 2010; 27:280–4.

[20] Rancourt MP, Albert NT, Cote M, Letourneau DR, Bernard PM. Posterior tibial nerve sensory blockade duration prolonged by adding dexmedetomidine to ropivacaine. Anesth Analg. 2012; 115:958–62.

DOI: 10.23958/ijirms/vol02-i08/09