

Comparison of Pain Scores and Rescue Analgesia Required Amongst Subjects Receiving Ropivacaine and Clonidine versus Ropivacaine Alone: An Institutional Based Study

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ABSTRACT

Background: Pain is an individual and subjective experience which can be modulated by several physiological, psychological and environmental factors such as previous experience, fear, anxiety and cultural factors. The usual trend is to prescribe an opioid or a NSAID for postoperative analgesia. NSAIDs also have certain side effects like hemostasis alteration, renal dysfunction, gastrointestinal hemorrhage etc. TAP block is a local anaesthetic block used to provide analgesia to the anterior and lateral abdominal wall. The present study was conducted to compare pain scores and rescue analgesia required amongst subjects receiving ropivacaine and clonidine versus ropivacaine alone.

Materials and Methods: A prospective, randomized, double blinded control trial undertaking 70 patients was conducted between September 2014 to March 2016 at the Department of Anaesthesiology, Northern Railway Central Hospital, New Delhi. Patients undergoing infra umbilical surgery under subarachnoid block were included hysterectomy, caesarean section, cystolithotomy and bilateral inguinal hernias. All investigators involved in study were unaware of envelope details throughout study period. Group C was given 20 ml of 0.2% ropivacaine with 25 microgram clonidine on each side, total of 40 ml of 0.2% ropivacaine with 50 mcg clonidine. Group R was given 20 ml of 0.2% ropivacaine on each side, total 40 ml of 0.2% ropivacaine. The postoperative pain at 1 hr, 3 hr, 6 hr, 9 hr, 12 hr, 18 hr, 24 hr by VAS score were noted and the total postoperative rescue analgesic dose in two groups. All the data

thus obtained was arranged in a tabulated form and analyzed using SPSS software.

Results: Total males included in the study were 17 and females were 53. There was significant difference in group C and group R in VAS score. It was consistently lower in group C when compared with group R for first 12 hours. Total amount of rescue analgesia used in the two groups was significantly different. Total mean 150 mg of diclofenac sodium was given to patients in group C.

Conclusion: USG-TAP block when used with adjuvant α_2 agonist (clonidine) along with local anaesthetic (ropivacaine) leads to prolongation of analgesic effect, lower vas scores and reduced requirement of rescue analgesic.


Keywords: Abdominal, Anaesthetic, Clonidine, Ropivacaine.

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Article History:

Received: 23-07-2019, **Revised:** 20-08-2019, **Accepted:** 17-09-2019

Access this article online	
Website: www.ijmrp.com	Quick Response code 
DOI: 10.21276/ijmrp.2019.5.5.037	

INTRODUCTION

Pain is an individual and subjective experience which can be modulated by several physiological, psychological and environmental factors such as previous experience, fear, anxiety and cultural factors.¹ Even a relatively small operation such as inguinal hernioplasty may be followed by a risk of a chronic pain state in about 12% of patients, with clinically significant effects on

daily activities if postoperative pain is not taken care of.² Pain is also considered as fifth vital sign.³ The usual trend is to prescribe an opioid or a NSAID for postoperative analgesia. NSAIDs also have certain side effects like hemostasis alteration, renal dysfunction, gastrointestinal hemorrhage etc. TAP block is a local anaesthetic block used to provide analgesia to the anterior and

lateral abdominal wall. Rafi⁴ and McDonnell⁵ were the first to describe this novel abdominal field block. O'Donnell et al described double pop method for this TAP block.⁶ Tap block can be given through lumbar triangle of petit using anatomical landmarks.^{7,8} Hebbard et al⁹ have subsequently described an ultrasound-guided approach to the TAP block. So far no study has compared duration of TAP block using clonidine as adjuvant. The present study was conducted to compare pain scores and rescue analgesia required amongst subjects receiving ropivacaine and clonidine versus ropivacaine alone.

MATERIALS AND METHODS

A prospective, randomized, double blinded control trial undertaking 70 patients was conducted between September 2014 to March 2016 at the Department of Anesthesiology, Northern Railway Central Hospital, New Delhi. Patients undergoing infra umbilical surgery under subarachnoid block were included hysterectomy, caesarean section, cystolithotomy and bilateral inguinal hernias. Patients with known cause of hypersensitive reaction to clonidine or ropivacaine, patients with medical complications like severe anemia, severe hypovolemia, patients with significant history of neurological, psychiatric and neuromuscular were excluded from the study. After thorough pre-anesthetic evaluation, patients were divided into two groups by randomization which was done using computer derived random

number sequence and sealed opaque envelopes. All investigators involved in study were unaware of envelope details throughout study period. Group C was given 20 ml of 0.2% ropivacaine with 25 microgram clonidine on each side, total of 40 ml of 0.2% ropivacaine with 50 mcg clonidine. Group R was given 20 ml of 0.2% ropivacaine on each side, total 40 ml of 0.2% ropivacaine. Patients included in study were given subarachnoid block with standard bupivacaine 0.5% (H) solution. Each patient received 75 mg of injection diclofenac sodium I.V. during surgery. After surgery was over, patient was cleaned and draped. A 23 G spinal needle was inserted using an in-plane approach (along the axis of the ultrasound probe) in the anterior-axillary line close to the ultrasound probe. The needle was positioned between the internal oblique and the transversus abdominis muscle in the fascial layer that separates the two muscle layers. After careful aspiration, local anesthetic solution was injected in the fascial plane. The local anesthetic solution observed to spread between the two layers. A total volume of 20 ml of 0.2% ropivacaine was injected on each side for a bilateral TAP block. An oval spread of the local anesthetic in the plane confirmed the presence of the needle in the correct plane. The postoperative pain at 1 hr, 3 hr, 6 hr, 9 hr, 12 hr, 18 hr, 24 hr by VAS score were noted and the total postoperative rescue analgesic dose in two groups. All the data thus obtained was arranged in a tabulated form and analyzed using SPSS software.

Table 1: Showing variation of VAS in group C and group R at different time in postoperative period.

VAS	Preop	Intraop	Postop	1hr	3hr	6hr	9hr	12hr	18hr	24hr
Group C										
Mean	0	0.89	0.74	1	1.97	2.29	3.29	2.83	3.03	1.6
SD	0	0.32	0.44	0	0.17	0.46	0.46	1.15	1.12	0.6
p value		<0.01	<0.01		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Group R										
Mean	0	0.89	0.69	1.57	2.66	3.94	3.74	2.89	2.97	2.09
SD	0	0.32	0.53	0.65	0.48	0.59	0.74	1.23	0.89	0.37
p value		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
p value		>0.05	>0.05	<0.01	<0.01	<0.01	0.01	>0.05	>0.05	<0.01

Table 2: Showing total dose of rescue analgesia in milligrams, used in two groups in postoperative period.

Rescue Analgesia (dose)	Group C		Group R		p value
	n	%	n	%	
150	35	100	23	65.71	<0.01
225	0	0	12	34.29	
TOTAL	35	100	35	100	
mean± SD	150.00 ±0		175.71 ±36.12		<0.01

RESULTS

Total males included in the study were 17 and females were 53. These were randomly distributed as group C included 9 males and 26 females while group R included 8 males and 27 females. Statistical analysis was done using Chi Square test showed P value of 0.390 which was more than 0.05. This indicates that two groups are comparable with regard to gender distribution. Table 1 illustrates the variation in the VAS scale at different time periods. There was significant difference in group C and group R

in VAS score. It was consistently lower in group C when compared with group R for first 12 hours. There after effect of rescue analgesia prevailed. Group C showed more reduction in VAS score compare to Group R in the first 12 hours. Mean vas score in group C was 1.76±0.18 while mean vas score in group R was 2.14±0.22 which was significantly different (p value<0.001). Table 2 shows the total dose of rescue analgesia in milligrams, used in two groups in postoperative period. Total amount of

rescue analgesia used in the two groups was significantly different. Total mean 150 mg of diclofenac sodium was given to patients in group C. In group R, however the requirement of diclofenac sodium increased to 175.71 ± 36.12 mg in the first 24 hours which was significantly higher (p value < 0.001). The use of clonidine as adjuvant was the leading factor to significant reduction in amount of rescue analgesia in group C.

DISCUSSION

In the study done by Sarita S Swami et al¹⁰, they used clonidine as adjuvant to ropivacaine in supraclavicular block in dose of 1 microgram/ kg body weight. M. J. Fredrickson et al¹¹ in their study compared 0.2% ropivacaine to 0.4% ropivacaine in C5 C6 superior trunk block for major shoulder surgery and concluded that ropivacaine 0.2% at 2 ml h 21 with on-demand 5 ml boluses administered via an ultrasound-guided C5–6 root/superior trunk perineural catheter produces similar analgesia, but higher patient satisfaction compared with ropivacaine 0.4%. Most studies have shown that the TAP block decreases postoperative pain and reduces the use of opioids.^{12,13}

McDonnell et al¹⁴ in their study contributed the prolonged effect of TAP block to the relatively poorly vascularised TAP resulting in a slower rate of drug clearance. The duration of analgesia observed with the use of local anaesthetic only as shown in various studies is 6 to 8 hours. This can be significantly increased by the use of a 2 agonists like clonidine and dexmedetomidine.

Masaki et al¹⁵ suggest that dexmedetomidine induces vasoconstriction via α_2 adrenoceptors in the human forearm possibly also causing vasoconstriction around the site of injection, delaying the absorption of local anesthetic and hence prolonging the effect. Other studies have shown such prolongation of effect in peripheral blocks using a 2 agonist dexmedetomidine. With regard to prolongation of block, clonidine has been recommended to prolong duration of axillary plexus block.¹⁶⁻¹⁸

In previous peripheral block studies that reported a significant effect with clonidine, a similar tendency to variability of duration of block in the groups containing clonidine exists.¹⁶⁻¹⁸ Study done by Wail Abdelaal et al¹⁹ has shown the increase in post-operative analgesic duration with use of dexmedetomidine with levobupivacaine in TAP block.

Waleed A. Almarakbi et al²⁰ shown that addition of dexmedetomidine to bupivacaine significantly prolongs duration of analgesia in TAP block. Popping et al¹⁶ carried out meta-analysis of 20 randomized controlled trials suggests that clonidine may be a useful adjuvant to local anesthetics for peripheral nerve and plexus blocks. The duration of the analgesic and sensory block is prolonged by about 2 hour with use of clonidine as adjuvant.

In the study done by Sarita S Swami et al²¹, they used clonidine as adjuvant to ropivacaine in supraclavicular block in dose of 1microgram/ kg body weight. M. J. Fredrickson et al²² in their study compared 0.2% ropivacaine to 0.4% ropivacaine in C5 C6 superior trunk block for major shoulder surgery and concluded that ropivacaine 0.2% at 2 ml per hour with on-demand 5 ml boluses administered via an ultrasound-guided C5–6 root/superior trunk perineural catheter produces similar analgesia, but higher patient satisfaction compared with ropivacaine 0.4%. Using both the studies as reference, we used 0.2% ropivacaine in both groups and 50 microgram clonidine as adjuvant in group C. According to a study conducted by Indira Kumari et al (2018) studied the effect

of addition of clonidine to ropivacaine for epidural labor analgesia and they found a significant difference between the two groups regarding visual analog score and quality of analgesia.²³ Shaman Bhardwaj et al (2017) performed a study comparing the efficacy of local subcutaneous wound infiltration of ropivacaine alone with ropivacaine plus dexmedetomidine. They found that Dexmedetomidine addition to ropivacaine for the management of surgical wound infiltration significantly decreases the postoperative pain and rescue analgesic consumption.²⁴

CONCLUSION

USG-TAP block when used with adjuvant α_2 agonist (clonidine) along with local anaesthetic (ropivacaine) leads to prolongation of analgesic effect, lower vas scores and reduced requirement of rescue analgesic better hemodynamic control without any complication, in the first 24 hours of post-operative period.

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Source of Support: Nil. **Conflict of Interest:** None Declared.

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Cite this article as: Mrinal Kamal, Mohit Rathee, Mamta Chadha, A K Sharma. Comparison of Pain Scores and Rescue Analgesia Required Amongst Subjects Receiving Ropivacaine and Clonidine versus Ropivacaine Alone: An Institutional Based Study. *Int J Med Res Prof*. 2019 Sept; 5(5):171-74.
DOI:10.21276/ijmrp.2019.5.5.037