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Anesthesiology

KEY WORDS: ROPIVACAINE, DEXMEDETOMIDINE, INTRA-ARTICULAR, ARTHROSCOPIC KNEE SURGERY

A COMPARATIVE STUDY BETWEEN INTRAARTICULAR ROPIVACAINE AND ROPIVACAINE PLUS DEXMEDETOMIDINE FOR POST OPERATIVE ANALGESIA IN ARTHROSCOPIC KNEE SURGERY

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ABSTRACT

INTRODUCTION: Two types arthroscopic knee surgery
1) Diagnostic 2)Therapeutic. Opiate receptors & free nerve endings sense pain in intraarticular tissue. Dexmedetomidine---a2 receptor agonist and Ropivacaine---pure s(-) enantiomer amino acid local anesthetic intraarticular 0.75% 20ml 150mg, provides better sensory than motor block with minimal side effects and cardiac stability than bupivacaine.
AIM : Compare the efficacy and duration of analgesia of two drugs
METHODS: Randomised double blind study
RESULTS : Ropivacaine + dexmedetomidine better than ropivacaine for analgesia.
CONCLUSION: Dexmedetomidine plus Ropivacaine via intraarticular route in post arthroscopic surgery increase post operative analgesia without increase hemodynamic instability.

INTRODUCTION :

Arthroscopic knee surgery is for both diagnostic and therapeutic intentions. Intra articular structures of the knee, including the synovial tissue,the anterior pad of fat and the joint capsule have free nerve endings that are capable of sensing painful stimuli and producing pain.

That opiate receptors exist in peripheral tissues is of great potential value while approaching the modalities of preventing or reducing postoperative pain.

Post operative pain will delay discharge and early rehabilitation, so various methods and analgesics strategies are available for control of pain .

Ideal postoperative analgesic should have fast onset, suitable duration of action ,minimal side effects and quick regression of motor block to promote early mobilization, recovery and discharge.

Dexmedetomidine is alpha (α) 2 adrenergic agonist.and Ropivacaine, pure S (-) enantiomer, amino amide local anaesthetic , intraarticular 0.75% 20ml 150mg, provides better sensory than motor block with minimal side effects and cardiac stability than bupivacaine.

MATERIALS AND METHOD :

This study was conducted at civil hospital,Bjmc,Ahmedabad, Informed consent was obtained from patients. It was a prospective randomized double blind comparative study.

PROCEDURE :

50 patients of age between 18 to 65 years undergoing elective arthroscopy of knee joint under spinal anaesthesia. All patients were ASA status I and II. Detailed Preoperative history, Physical and systemic examination was carried out in detail.All patients were explained the nature of study, procedure, mode of anaesthesia, post-operative pain relief that will be given and the patient 's participation in evaluating the duration of post-operative analgesia. All patients are randomly allocated into two groups (n=25 for each group) and randomized into following 2 groups according to the drugs given intra-articularly.

1. Group A: ROPIVACAINE
Inj. Ropivacaine (0.25%) 19 ml + Inj. NS (1 ml) = 20 ml

2. Group B: **DEXMEDETOMIDINE + ROPIVACAINE**
Inj. Ropivacaine (0.25%) 19 ml + Inj. Dexmedetomidine (1 ml) = 20 ml

The patients were reassessed and reassured in the preoperative room. Preoperative monitoring included Baseline heart rate, Systolic and Diastolic blood pressure, spo_2.After securing intravenous line, pre-loading done with Inj Ringer Lactate 10-15 ml/kg body wt.

Patients were premeditated with Inj. Ondansetron 0.1mg/kg IV 10 minutes prior to anaesthesia procedure. Spinal anaesthesia was given with inj. bupivacaine 0.5% (heavy) 3 ml in the sitting position using a 23-gauge Quincke spinal needle positioned at the L3-L4 interspace. Onset and level of sensory and motor block were recorded. The pneumatic thigh tourniquet was applied on the lower limb to be operated with inflation pressure 250-350 mm Hg continuously during surgery. Intraoperative Blood pressure, Heart rate, Spo_2, ECG and Respiratory rate were monitored till completion of surgery. The study drug was deposited intra-articularly in an aseptic manner by the operating surgeon through the trocar and time was noted. Tourniquet was deflated after 10 minutes of intra-articulation of drug of either group.

Total duration of surgery and time of intra articular injection was noted.

Patients were monitored in the postoperative ward for Pulse, Blood pressure, SPO_2.

Sedation score of 1-5 during early postoperative period and Pain assessment was done using the Visual Analogue Scale with 0 to 10 cm score at 1hr, 2hr,4 hr ,6 hr,8 hr,12 hr,16 hr ,20 hr and 24 hr. Rescue analgesic in the form of inj. Diclofenac sodium 75 mg IV was provided when VAS score was ≥4 and the time was noted. Total number of dosages needed during 24 hr period were also noted. Analgesic duration was calculated from the time of intra articular deposition of the study drug to the first requirement of rescue analgesic. The efficacy of the drug was determined using VAS score, the duration of analgesia and total no. of doses of rescue analgesics during 24 hr.

Also, recovery time from spinal anaesthesia, in terms of motor and sensory, was noted. The heart rate and systolic blood pressure were measured and recorded. The Patients were also monitored to recognise any side effects during the post-operative period. Statistical analysis was performed with unpaired Student's t-test between two groups. A p' value < 0.05 was considered significant.

The patients were also monitored for complications related to drug or the procedure and treated appropriately.All the postoperative

observations were conducted by an observer blinded to the patient's group.

Statistical analysis was performed with unpaired Student's t-test between two groups. Statistically 'p' value <0.05 was considered significant.2 hourly data of vitals,visual analogue scale,Wilson sedation scale,no of rescue analgesic,complications and other variables collected.Mean and standard deviation of different variables was calculated. Then p value calculated with help of formula in Microsoft excel sheet.

OBSERVATION AND RESULTS :

TABLE 1 : Recovery from Spinal Anesthesia

Groups	RECOVERY FROM SPINAL ANESTHESIA	
	MOTOR	SENSORY
Group A	201.4± 32.66	222.6±33.45
Group B	207.4± 20.82	230.2 ± 20.60
P Value	0.44	0.33

Graph 1: Motor and sensory block of two groups

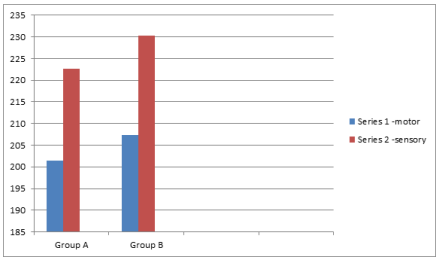
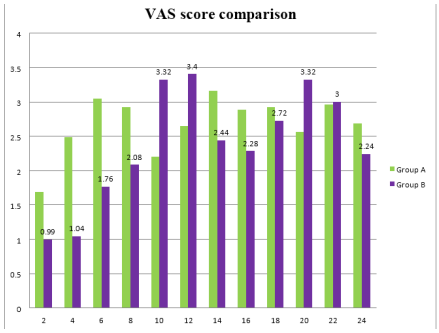


Table 1 and graph 1 show comparison of time of complete recovery from spinal anaesthesia in both groups. Motor block recovery was slightly delayed but statistically insignificant in group B (207.4± 20.82) as compared to group A (201.48±32.66) (p=0.44). Sensory block was delayed in group B (230.2±20.69) as compared to group A (222.6±33.45), the difference was statistically insignificant between the groups (p>0.05) (p=0.33).

Table 2:VAS score between two groups (Mean ± SD)(At rest)

Postoperative time	Group A	Group B	P Value(between the groups)
0 hr	0.16 ±0.37	0	Not applicable
2 hr	1.68 ± 0.80	0.99 ± 0.42	0.0040
4 hr	2.48 ± 0.77	1.04 ± 0.20	0.0001
6 hr	3.04 ± 0.98	1.76 ± 0.44	0.0010
8 hr	2.92 ± 0.91	2.08 ± 0.28	0.0001
10 hr	2.20 ± 0.58	3.32 ± 0.99	0.0001
12 hr	2.64 ± 0.76	3.40 ± 0.87	0.0019
14 hr	3.16 ± 0.90	2.44 ± 0.65	0.0020
16 hr	2.88 ± 0.88	2.28 ± 0.46	0.0040
18 hr	2.92 ± 1.08	2.72 ± 0.54	0.1
20 hr	2.56 ± 0.77	3.32 ± 0.85	0.0018
22 hr	2.96 ± 0.79	3.00 ± 0.91	0.80
24 hr	2.68 ± 0.80	2.24 ± 0.52	0.02

Graph 2: VAS score between two groups (At rest)



Above table 2 and graph 2 shows that post-operatively till 2 hrs none of the patient in both groups complained of pain. At 6 hrs patients in Group A had VAS score of 3.04 ± 0.98 is more as compared to VAS score 1.76± 0.44 in Group B, which is statistically significant (p value <0.05).At 2, 6 and 8 hour VAS score was higher in Group A 1.68 ± 0.8, 2.48± 0.77, 3.04±0.98 respectively as compared in group B 0.99±0.42, 1.049±0.2 and 1.76±0.44 respectively. (p=0.0001,p=0.0001,p=0.0013) which was statistically significant.

Table 3: Duration of analgesia and no. of doses of rescue analgesics between two groups

	GROUP A	GROUP B	p Value
Duration of Analgesia(hrs)	6.40 ± 1.29	11.42 ± 1.25	P<0.0001
No. of doses of Rescue analgesics	2.68 ± 0.48	1.88 ± 0.34	P<0.0001

(P value<0.05 is considered significant.)

Graph 3: Duration of analgesia and no. of doses of rescue analgesics between two groups

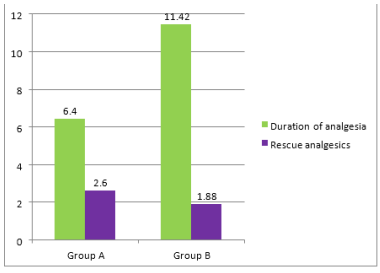
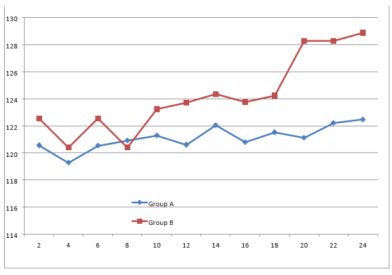


Table 3 & graph 3 show the duration of analgesia was significantly longer in Group B (11.42±1.25hr) as compared to Group A (6.4±1.29hr). (P Value <0.0001) The requirement of rescue analgesics was significantly lower in Group B (1.88±0.34) as compared to Group A (2.68±0.48). (P Value <0.0001)

In Group A, up to 8 hr 24/25 patients required rescue analgesics as compared to group B none of patients required rescue analgesics. In Group A 13/25 patients at 6 hr, 9/25 patients at 14 hr and. In Group B 14/25 patients at 12 hr, 10/25 patients at 20 and 22 hr required rescue analgesic.

Graph 4 : post operative systolic blood pressure changes



During post-operative period none of the patients in both groups had complaints like nausea, vomiting, respiratory depression or convulsions.

One patient from Group A and two patients from Group B experienced hypotension which were treated with IV fluids. Two patients suffered from bradycardia in group B.

DISCUSSSION :

Arthroscopic procedures of the knee are performed on day care basis, so inadequate control of postsurgical pain which can cause unnecessary suffering, delayed recovery, prolonged hospitalization and increased financial burden to the patient and hospital. Benefits of good postoperative analgesia like attenuation of the neuro- endocrine stress response, reduction of postoperative pulmonary and cardiac complications, an opportunity to institute early physiotherapy & early mobilization. S paul, D P Bhattacharjee, S Ghosh et al(2010)1 evaluated the efficacy of intraarticular ropivacine with or without dexmedetomidine for postoperative analgesia after knee

arthroscopy in double blind randomized study.They concluded Dexmedetomidine as an adjuvant to ropivacaine improves the quality and duration of postoperative analgesia, reduces the requirement of rescue analgesics without any adverse effects.our study results also supports this study by concluding similar results.

Dr.Anil K Paswan and Dr. Shashi Prakash (2011)2 evaluated effect of intraarticular bupivacaine, dexmedetomidine and morphine as double blind study. They concluded that postoperative administration of intraarticular dexmedetomidine and morphine with bupivacaine enhances postoperative analgesia, time to first analgesic request and decreases use of rescue analgesics after arthroscopic knee surgery.

Efthimios P Samoldas, Byron Chalidis, Hilas Fotiadis (2006)3 evaluated the efficacy, safety of intraarticular ropivacaine for postoperative analgesia in double blind randomized study in 60 patients.They concluded that intraarticular ropivacaine provides an alternative and effective solution for better postoperative pain control in arthroscopic knee surgery without any side effects. Similarly we also used intraarticular ropivacaine for postoperative analgesia without any side effect..

Dr.S K Rao, P S Rao (2005)8 compared intraarticular analgesics for postoperative analgesia in double blind randomized study for arthroscopic knee surgery under spinal anaesthesia.They concluded intraarticular bupivacaine with ketorolac provides effective and prolonged duration of postoperative analgesia, required less supplemental analgesia and early ambulation in postoperative period. Efthimios P Samoldas, Byron Chalidis, Hilas Fotiadis (2006)3 evaluated the efficacy, safety of intraarticular ropivacaine for postoperative analgesia in double blind randomized study in 60 patients.They concluded that intraarticular ropivacaine provides an alternative and effective solution for better postoperative pain control in arthroscopic knee surgery without any side effects.Similarly we also used intraarticular ropivacaine for postoperative analgesia without any side effect.

In comparative study between intraaricular Ropivacaine and Ropivacaine plus Dexmedetomidine for post operative analgesia in arthroscopic knee surgery,we found the duration of analgesia was significantly longer in group B(Ropivacaine plus Dexmedetomidine) as compared to group A(Ropivacaine) ($p<0.001$)

The mean VAS score and the requirement of rescue analgesic were significantly lower in group B as compared to group A.

In view of side effects Table 10 of Dexmedetomidine 1/25 patient (4%) in group A and 2/25 patients (8%), Group-B developed hypotension which were treated with IV fluids.2/25patients of group B developed bradycardia which was treated by iv inj atropine. None patients developed convulsions or respiratory depression.

CONCLUSION :

Intraarticular Dexmedetomidine and Ropivacaine produces significant longer duration of analgesia,lower pain scores, increased time to first rescue analgesia and decreased need for post operative analgesia as compared to Intraarticular Ropivacaine alone without significant side effect.

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