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A Comparative Study to Evaluate Post Operative Analgesia with Usg Guided Unilateral Adductor Cannal Block by Using Combination of Bupivacaine with Dexamethasone Or Morphine After Total Knee Replacement

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ABSTRACT

TKR surgery refer to surgical intervention in the knee joint to replace diseased joint and many studies investigated post operative pain control, Adductor cannal block is a newer alterative to femoral block after TKR with better multimodal analgesia and better quadriceps muscle strength, Many studies investigated the prolongation of analgesic duration when adjunct is added to a local anesthetic. A prospective randomized ,double blind, parallel- two group trial. A total of 78 ASA 1 and ASA 2 patients undergoing total knee replacement were included in the study. Seventy eight patients undergoing TKR were randomly allocated into two groups and received block as per the study protocoal and the main outcome measure was the duration of postoperative analgesia. The result revealed that at equal volumes Bupivacaine 0.5% with 30mcg/kg of morphine has an advantage over Bupivacaine 0.5% when combined with 8mg of dexamethasone. We conclude that adductor canal block with 0.5% Bupivacaine with 30mcg/kg of morphine has better outcome over conventional intravenous paracetamol analgesia.

INTRODUCTION

Total knee replacement is surgical intervention to replace diseased knee which is associated with moderate to severe pain, TKR needs a delicate balance between postoperative analgesia and early mobilization[1] .various studies investigated postoperative pain control that include systemic and intra articular analgesic and neuraxial and peripheral block 2 .Numerous modalities have been used but with undesired side effects which delays post-operative mobilization [3]. Distal peripheral nerve block has the potential to provide adequate analgesia at the same time preserving muscle function. The Adductor canal block is a newer block which provides adequate postoperative analgesia after knee surgery with only sensory blockade. Postoperative analgesia with motor preservation and early mobilizationare considered main goal following knee surgery.

Early Recovery After Surgery (ERAS) and rapid rehabilitation after knee surgery require a good amount of postoperative analgesia.

Many adjuvant have been added to local anesthetics to prolong analgesic duration like dexamethasone, fentanyl, morphine, dexmeditomidine.

We hypothesize that that there is no difference in pain score between groups in the postoperative period after the Adductor canal block with 0.25% Bupivacaine and 8mg dexamethasone or 30mcg/kg of morphine.

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METHODOLOGY

This study was a prospective randomized,single center study conducted after institutional ethical committee approval in tertiary care hospital in Kolkata. Following WHO standards a written consent was obtained from all patients. This study included 78 patients aged 18-70yrs, who were in ASA status I and II, of either sex. For reducing the selection bias and variability of procedure and disease among patients, we have restricted our study to a single surgery.

The study excluded patients with a history of drug allergy, drug addiction, or long-term opioid intake, diabetes mellitus, morbid obesity (BMI >35), and any contraindications to the regional nerve block.

Seventy-eight patients receiving TKR were randomly allocated into two groups Group M or Group D. In the Group M (Morphine group), the patients received a single-shot of 20 ml plain bupivacaine (0.5%) + 30mcg/kg Morphine In the Group D (dexamethasone group), the patients received 20 ml plain bupivacaine (0.5%) + 8 mg dexamethasone. The total volume injected in both groups was 22 ml.

Randomization was performed using computer generated random number table in opaque sealed envelopes with 1:1 allocation ratio by an anaesthesiologist not involed in the study.the group allocation list was shared with anaesthesiologist (not involved in the study) who prepare the study drug syringe as per sequence number and assign patient to trial group. Both trial drug were given to OT anesthesiologist for administration to ensure binding.

Patients were evaluated by the researcher who was unaware of group allocation, thus the patient, anaesthesiologist and the researcher were blinded.

In the operating room, basic monitoring in the form of electrocardiogram (ECG), non-invasive blood pressure, and pulse oximeter were attached to the patients. An intravenous line was inserted and ringer lactate was infused, and emergency drugs and precaution were prepared for toxicity or other complications.

All patients received standard spinal anaesthesia with heavy bupivacaine 0.5% injected through a 25-G quincke's needle at L3–L4 interspace and at the end of the surgery block was performed at the mid-thigh level approximately halfway between the anterior superior iliac spine and the patella. A 5 MHZ high-frequency linear ultrasound transducer of Mindray USG system was placed in the transverse cross-sectional view to obtain the short-axis view of the adductor canal and its contents. The femoral artery was identified underneath the Sartorius muscle with the vein just underneath the artery ' the saphenous nerve which usually appears at this position was identified lateral to the artery as a hyperechoic structure. The block needle was inserted in the plane in a lateral-to-medial orientation and advanced toward the femoral artery from the lateral side of the transducer, through the Sartorius muscle, with the tip of the needle being placed lateral to the femoral artery. After careful aspiration, 22 ml of local anaesthetics were injected to spread lateral to the femoral artery and deep to the Sartorius muscle. 30 min were allowed for assessment of the block and exclusion of any signs of toxicity.

After reaching the ward the patients were handed over to duty nursing officer, but they were kept blind to the group allocation of the patient (Group D or M). The nursing staff was instructed to keep a watch on the pain (VAS score 0 to 10) of the patient and to give rescue analgesic only if patient felt pain intensity VAS $\geq$ 3. In these cases the rescue analgesic was standardized to be Inj Paracetamol 1gm intravenous to

all patients. If the patient had severe pain or the pain is not ameliorated after 1hr of i.v. paracetamol then Inj Tramadol was given at a dose of 50mg slow intravenous along with 4mg of Inj Ondansetron. The time of giving first analgesic as well as the total number of analgesics given was noted.

VAS score was noted by the observer (blinded to group allocation) after 6 hr, 12, 18 and 24hrs of completion of surgery. Since patent had been educated prior to surgery on VAS scoring, he/she was asked to put a point with a pen over the line drawn as his/her pain perception. The distance from left side of line to the mark is noted with a scale marked in millimeters. Along with the VAS score the blood pressure and the heart rate were also noted

Primary outcome: The duration of postoperative analgesia through the assessment of VAS

Secondary outcome :The total dose of iv paracetamol was used postoperatively for 24hrs and the number patients requested rescue analgesia.

RESULT

All data analysed statistically and were included in the SPSS software version 21. The appropriate stastical method was used for analysis. Descriptive stastics such as mean, standard deviation, percentages were used. Comparision of categorical data was done using Chi-square test and for countinous data ;an unpaired "t" test was used.

The patients in our study groups did not vary significantly with respect to Age, Sex and Weight. The ASA physical status and the duration of surgery were also not significantly differing in between two groups.

Adductor canal block with bupivaine 0.5% with dexamethasone or morphine both reduce the VAS score at 6hr in patients undergoing TKR but we have also found that block with 0.5% Bupivacaine with morphine is lowering the 12, 18 and 24hr VAS score more than the 0.5% Bupivacaine with dexamethasone

We also found that morphine used as an adjuvant with 0.5% Bupivacaine (when used in adductor canal block) resulted in a longer duration of analgesia delaying the first rescue analgesic requirement as compared to a combination of Dexamethasonent with 0.5% Bupivacaine.

No patient in our study developed any significant side effect within 24hr post-operative period either due to spinal anesthesia or due to block.

So we failed to find any adverse effects in our study population attributable to block or anesthesia procedure.

P-value >0.05: Non significant , P-value <0.05: Significant , P-value<0.01: Highly Significant

DISCUSSION

The present study aimed to compare the effect of adding dexamethasone or morphine to bupivacaine to improve the efficacy of adductor cannal block in patients undergoing TKR.The result revealed that morphine used as an adjuvant with 0.5% Bupivacaine (when used in adductor canal block) resulted in a longer duration of analgesia delaying the first rescue analgesic requirement as compared to a combination of Dexamethason with 0.5% Bupivacaine.

Dexamethasone has been used to prolong the duration of local anesthetics. In our study dexamethasone decreased VAS 6,12,18,24 hrs postoperatively was 2,3,5,5.5 respectively, decreased the need for postoperative analgesia, decreased the need for analgesic request (average twice per 24hrs postoperatively) and prolonged the time of first analgesic requirement to be 4.5hrs.

Dexamethasone reduces the response of small ,unmyelinated ,and slow conducting C fibers in a dose dependent manner leading to increased duration of block.along with loal effects, systemic effects of dexamethasone increase the duration of analgesia.

Our study agrees with Chisholm etal., that discussed the role of dexamethasone as perineural adjuvant for saphenous nerve block where addition of 1mg and 4mg to local anaesthetics increased the duration of block.

The addition of 30mcg/kg morphine to bupivacaine decreased VAS at 6,12,18,24hrs was 1,2,3,4 respectively, decreased the need for postoperative analgesia, decreased the need for analgesic request (average once) and prolonged the time of first analgesic requirement to be 6hrs.

Our results are in line with the study conducted by Turkoglu et al., which revealed the addition of morphine to bupivacaine in adductor cannal block decreased VAS score postoperatively and decreased total analgesic use and additional analgesic consumption.

Adverse effect or complication

No patient in our study developed any significant side effect within 24hr post-operative period either due to spinal anesthesia or due to block.

So we failed to find any adverse effects in our study population attributable to block or anesthesia procedure

CONCLUSION

On the basis of our study, we can draw the conclusion that at equal volumes Bupivacaine 0.5% with 30mcg/kg of morphine has an advantage over Bupivacaine 0.5% combined with 8mg of dexamethasone for Adductor canal block block in terms of

- VAS score at 6 hr ,12,18 and 24 hrs post operative
- Time for first rescue analgesic
- Total number of rescue analgesic doses needed in 24 hrs

We have also concluded that adductor canal block with 0.5% Bupivacaine with 30mcg/kg of morphine has better outcome over conventional intravenous paracetamol analgesia in the above mentioned parameter

		Number	Mean	SD	Minimum	Maximum	Median	p-value
VAS AT 24HR	GROUP-D	38	5.2368	1.9512	0.0000	8.0000	5.5000	**<0.0001**
	GROUP-M	40	3.6250	1.4968	1.0000	7.0000	4.0000	
VAS AT 18HRS	GROUP-D	38	4.5000	1.5378	1.0000	6.0000	5.0000	**0.0021**
	GROUP-M	40	3.4000	1.5157	1.0000	7.0000	3.0000	
VAS AT 12HR	GROUP-D	38	3.2895	1.6588	1.0000	7.0000	3.0000	**<0.0001**
	GROUP-M	40	2.0000	.8771	1.0000	4.0000	2.0000	

VAS 6HR	GROUP-D	38	2.7632	2.0459	1.0000	9.0000	2.0000	**<0.0001**
	GROUP-M	40	1.3750	.6675	1.0000	4.0000	1.0000	

		Number	**Mean**	**SD**	**Median**	**p-value**
1ST RESCUE ANALGESIC TIME (MIN POST BLOCK)	GROUP-D	38	284.8684	32.0786	280.0000	<0.0001
	GROUP-M	40	349.0000	34.4592	360.0000	
TOTAL NO RESCUE ANALGESIA IN 24 HR	GROUP-D	38	1.9737	.3666	2.0000	<0.0001
	GROUP-M	40	1.2500	.4385	1.0000	