



To Know How Femoral Nerve Block [FNB] with 0.75% Ropivacaine is an Aid to Regional Anesthesia [SAB] For Femur and Hip Surgeries

KEYWORDS

0.75% Ropivacaine , hip surgery , femoral block.

Dr. Anitha Kulkarni

Dr. D. Y . Patil Medical college & Hospital,
Pimpri , Pune - 411018.

Dr.W.S.Thatte

(HOD Anesthesia dept.), Dr. D.Y.Patil
medical college & Hospital, Pimpri ,
Pune-411018.

Dr. Tejeswi Sai

No. 66, Mahesh Nagar, Near D. Y.
Patil medical college, Sant Tukaram
Nagar, Pimpri, Pune-411018.

ABSTRACT

Context: Femoral nerve block is safe and reliable for surgeries on anterior thigh ,knee and post-op pain management .15-20ml of drug used, which diffuses underneath fascia iliaca and also blocks lateral cutaneous nerve of thigh, complimenting FNB.

Aims: To assess efficacy of femoral block in reducing pain due to femur fracture before positioning patient for spinal anesthesia.

To access efficacy of femoral block in providing post-operative analgesia ,using VAS score.

Materials and Methods: Femoral block was given, to 30 patients aged 18-60 years ASA grade I-IV ,with 15-20ml of Inj. 0.75% Ropivacaine (3mg/kg) Hemodynamic parameters, onset and duration of post-op analgesia was recorded. 30 minutes after FNB, Sub Arachnoid block was given with Inj.0.5% heavy Bupivacaine .

This study was compared with femur, knee surgeries done only under SAB with 3.5 ml 0.5% heavy Bupivacaine.

Results: Femoral nerve block with 0.75% Ropivacaine helped in decreasing pain and keeping hemodynamic parameters stable while giving sub-arachnoid block. Post op analgesia ,lasted more than 10 hrs.

Introduction:

A femoral block is a basic nerve blocking technique , easy to master , with low risk of complications¹ , high success rate and a significant clinical applicability for postoperative pain management². This block is well suited for surgeries on the anterior thigh , knee , quadriceps tendon repair and post operative pain management after femur and knee surgeries³. Femoral nerve innervation: Sensory: Anterior branch : To entire anterior and medial thigh and most of femur and knee joint. Posterior Branch: To medial aspect of the leg below the knee joint along the distribution of the saphenous nerve , which is a superficial terminal extension of femoral nerve.⁴ The success rate for this block is very high and hence does not necessitate the use of a peripheral nerve locator.

Motor innervation causes hip flexion and knee extension.

Ropivacaine is a local anesthetic drug belonging to the amino amide group. It is a pure S(-) enantiomer⁵. Ropivacaine is less lipophilic and has less cardiovascular and central nervous system toxicity than racemic Bupivacaine. Ropivacaine exhibits less motor block, as it is less lipophilic due to decreased penetration of large myelinated motor nerves⁶. It is used in the dose of 3mg/kg for nerve blocks. Most adverse reactions relate to administration technique (resulting in systemic exposure)⁷.

The aim of our study was to reduce the pain especially due to femur fracture while enabling sitting position to the patient for spinal anesthesia⁸. We tried to assess the efficacy of femoral nerve block in providing analgesia ,in decreasing pulse rate and blood pressure , making the patient hemodynamically more stable before giving spinal anesthesia⁹. And the efficacy of femoral nerve block with 0.75% Ropivacaine in providing prolonged postoperative analgesia¹⁰, using VAS score.

Subjects and Methods:

After institutional ethics committee approval, the study was conducted on 30 patients of either sex ,between age groups 18 to 60 with physical status ASA grade 1 to 4 undergoing elective surgical procedures on the femur and knee.

Written informed consent was obtained.

All patients were subjected to a thorough pre anesthetic clinical and laboratory evaluation.

Ideally this block should be given in the ward before shifting the patient to the OT to avoid pain during shifting¹¹. Since this had certain obvious constraints the block was given in the pre anesthetic room¹². The baseline pulse rate and blood pressure were monitored. Intravenous line was secured with a 20 g cannula and the patient was connected to a pulse oximetry probe.

This technique is associated with minimum patient discomfort ,but however if patients felt uncomfortable during palpation of femoral artery ,sedation with Inj. Midazolam 1mg intravenously was given ,keeping oxygen supplementation ready if required via ventimask.

The main landmarks are the femoral crease and femoral artery .Under all aseptic precautions ,femoral artery was palpated and local skin infiltration was given with 2-4 ml Inj. Lignocaine with a 23 g needle ,lateral to the artery .Then using a 22g,1 & ½ inch needle ,block was given with 15-20ml 0.75% Ropivacaine (3mg/kg body weight) taking care to direct the needle laterally and after negative aspiration for blood.¹³

After 30mins of FNB, Sub Arachnoid Block with 3.5ml Inj. 0.5% heavy Bupivacaine.

This study was compared with 30 similar surgeries of the

femur, but done under plain Sub- arachnoid block with 3.5ml of Inj.0.5% heavy Bupivacaine.

Assessment of block:

The first sign of the onset of blockade ,was noted by the loss of sensation of skin over medial aspect of leg below knee.

Onset of sensory blockade was determined by pinprick method by a three point score and motor blockade by three point score .Hemodynamic changes , duration of post operative analgesia and any adverse effects were noted .

Following criteria was assessed in the pre anesthetic room:

The onset of sensory blockade according to a three point score by pinprick method:

Grade 0- anesthesia-no sensation felt.

Grade 1 –analgesia-dull sensation felt.

Grade 2 –normal sensation.

Sensory score of 1 was taken as onset time of sensory block.

The onset of motor blockade according to Bromage score:

Bromage 3 -Complete paralysis. Unable to move feet or knees.

Bromage 2 -Almost complete. Able to move feet only. Unable to move knees.

Bromage 1 –Partial.Just able to move knees.

Bromage 0 -None.

Bromage score of 2 was taken as onset time of motor block.

Assessment of quality of analgesia during positioning of patient for spinal anesthesia after femoral block:

Grade 0- Co operative but after i.v analgesia due to pain.

Grade 1- Co operative but C/O mild pain ,no i.v analgesia required.

Grade 2- Full co-operation for position.

Pulse rate and BP was measured before block (baseline) t-0,at 5 minutes t-5,t-10,t-20,t-25 and t-30,that is 30 minutes after block.

The quality of analgesia was assessed till the induction of spinal anesthesia (that is 30 minutes after femoral block). In the postoperative period (that is after the end of surgery ,or after 3 hrs of induction of spinal anesthesia, whichever is earlier)analgesia was assessed every 3 hrly according to visual analogue scale(VAS) score, upto 24hrs postoperatively¹⁴.

Post operatively, when patients began to experience pain more than 3 on the VAS (0 being no pain and 10 being unbearable pain) it was considered that the analgesic action of the drug has terminated and additional (rescue) analgesia with Inj.Tramadol (2mg/kg) was given with slow i.v

infusion¹⁵.

Pulse rate and BP was measured before block (baseline) and at 30 minutes after block.¹⁶

Results:

Patient posted for hip and femur surgeries were selected randomly and assigned into group R and group S. There were no statistical differences in age and body weight between the groups R and S .P value being 0.157 and 0.561 respectively.

We compared the pain observed during positioning for SAB, in Group R patients (who received femoral block) and in Group S patients (who didn't receive femoral block), using three point score.

Quality of analgesia during positioning of patient for spinal anesthesia: (Graph 1)

We were successful in decreasing pain during positioning for SAB. 20 patients of 30 in Group R, co-operated to give position without any complaints. Whereas none of the patients in Group S gave full co operation for position and so i.v analgesia was required in 12 out of 30 patients [Graph 1].

Paired T-test was used to compare if any hemodynamic stability achieved was significant after administering the block.

Comparison between blood pressure before femoral block and after 30 minutes of femoral block: Table 1:

Variable(mmHg)	B.P of Group R before femoral block	B.P of Group R after 30mins of femoral block
Mean of 30 patients	99.55	94.83
S.D. of 30 patients	14.678	13.22
P-value		0.098

Comparison between pulse rate before and after 30 minutes of femoral block:[Table 2]

Variable (bpm)	Pulse of Group R before femoral block	Pulse of Group R after 30mins of femoral block
Mean of 30 patients	88.96	82.46
S.D. of 30 patients	14.27	13.19
P-value		0.036

We compared the mean arterial pressure before femoral block and after 30 minutes of giving the block¹⁷. The P-value for change in B.P before and after FNB was insignificant (P>0.05) [Table 1]. However there was a descending trend seen with Pulse parameters after femoral block, in patients posted for hip and femur fracture¹⁸ surgeries. The P value was significant (P=0.036) [Table 2]. This shows that the regional technique has been successful in decreasing the pain and anxiety of the patients prior to surgery.

Average of onset of sensory block was 6.3 +/- 3.5 minutes. In other words, sensory onset was immediate within 3 to 9 minutes.

Duration of post operative analgesia with 20ml Inj. 0.75% Ropivacaine in femoral block:[Graph 2]:

Mean analgesic duration was 13 hours with Ropivacaine including the surgical time[Graph 2]. So post op analgesia subtracting the intra operative time will be 10 hours or more¹⁹.

Pre operative femoral block²⁰ with Inj.0.75% Ropivacaine provides a prolonged post operative analgesia.

Onset of motor block was delayed. Mean time of onset for motor block was 14 minutes in our study. In 15 patients the onset of motor block could not be assessed as they were bed ridden and on traction , hence it was difficult to assess movement at hip and knee joint. Post operatively, they were mobilized sometime after the block wore off , and hence duration of motor block was not assessed.

The total duration of spinal anesthesia in Group S lasted for 4 to 5 hours. Post operative i.v analgesia was given with Inj. Tramadol 2mg/kg body weight in 100ml normal saline.

Discussion:

Patients posted for hip surgeries, required to be given sitting position , in order to administer Sub arachnoid block. This involved flexion of hip joint (hip fracture) or traction on femur fracture ,which led to increased pain in the fracture region. Femoral block could be a safe, quick and effective technique for these patients. Though it carries risks of intra arterial injection, carefully adhering to the right technique reduces side effects to minimal²¹.

Inj.0.75% Ropivacaine 3ml/kg in femoral block was used in our study, in hip and femur fracture patients to assess how far a single injection technique of a long acting local anesthetic with improved safety profile, would help in relieving pain both pre-operatively and post-operatively. Onset of action and duration of analgesia were studied , so as to determine its applicability in clinical aspect. A typical onset time for the femoral block is 8-10 mins depending on the type of local anesthetic used . Onset of sensory block with Inj. Ropivacaine was early , mean of onset being 6.3 mins²².

Hip fracture related pain both before and after surgery is generally reported as severe by most patients. Administering femoral block preoperatively helps decreasing pain associated with positioning the patient prior to giving a Sub arachnoid block²³, thus making the patient more hemodynamically stable, reducing the requirement of narcotics or analgesics for positioning.

Mostly a hip fracture is a fragility fracture due to weakened osteoporotic bone . So majority are geriatric patients with associated co-morbidities (ASA 2 ,3 and 4 categories)²⁴ Pre operative block with 0.75%Inj.Ropivacaine provides pre operative analgesia , is an aid to regional anesthesia and also provides post operative analgesia. Post -op regional analgesia ,helps avoid opioids or NSAIDS administration²⁵ for nearly 10 hours or greater ;therefore avoiding their side effects and sometimes decreasing the delirium seen in elderly patients as a result of fracture and opioid superimposing effects²⁶.Since large volumes of drug are used , the drug diffuses underneath the fascia iliaca and results in blocking the lateral cutaneous nerve of thigh also²⁷.

Hence giving femoral block with Inj. Ropivacaine is better in terms of safety and comparatively early onset²⁸.

Femoral block with spinal anesthesia does not necessitate the use of intrathecal adjuvants²⁹. Femoral block when given pre-operatively or prior to spinal anesthesia, with Inj.0.75% Ropivacaine improves the quality of analgesia for painless positioning. Improves the hemodynamic parameters prior to SAB.

Prolongs post-operative analgesia³⁰, with no side effects in our case study. Prolonged analgesia decreases pain after surgery and associated anxiety after spinal anesthesia wears off.

REFERENCE

1. Auroy Y, et al. Major complications of regional anesthesia in France: *Anesthesiology* 2002;97:1274-80. | 2. Mulroy MF, Larkin KL, Batra MS, Hodgson PS, Owens BD: Femoral nerve block with 0.25% or 0.5% bupivacaine improves postoperative analgesia following outpatient arthroscopic ACL repair. *Reg Anesth Pain Med* 2001; 26:24-9. | 3. Allen HW , Liu SS , Ware PD ,Nairn CS, Owens BD: Peripheral nerve blocks improve analgesia after total knee replacement surgery. *Anesthesia Analogue* 1998; 87:93-7. | 4. Vluka JD, Hadzic A, Mulcare R, Lesser JB et al: Femoral and genitofemoral nerve blocks versus spinal anesthesia for outpatients undergoing long saphenous vein stripping surgery. *Anesth Analg* 1997;84:749-52 | 5. Kuthida G, Chaudhary G et al. Ropivacaine :a review of its pharmacology and clinical use. *Indian Journal of Anesthesia* 2011.55(2):104-110. | 6. McClellan KJ, Faulds D. Ropivacaine-an update of its use in regional anesthesia. *Drugs* 2000;60:1065-93. | 7. Satsumae T, Tanaka M, Saito S, et al. Convulsions after Ropivacaine 300mg for brachial plexus block. *Br J Anaesth* 2008;101:860-2. | 8. Sia S, Pelusio F, Barbagli R et al. Analgesia before performing a spinal block in the sitting position in patients with femoral shaft fracture: a comparison between femoral nerve block and intravenous fentanyl. *Anaesth Analg*. 2004 Oct;99(4):1221-4. | 9. Opinder Sahota, Martin Rowlands, Jim Bradley, et al.Femoral nerve block intervention in neck of femur fracture, study protocol for a randomized controlled trial. *Trials* 2014;15:189. | 10. Fanelli G, Casati A, Beccaria P et al.A double blind comparison of Ropivacaine, Bupivacaine and Mepivacaine during sciatic and femoral nerve blockade. *Anesth Analg* 1998 Sep;87(3):597-600. | 11. Sziard Szucs, Gabriella Iohom, Brian O'Donnell, et al.Analgesia efficacy of continuous femoral nerve block commenced prior to operative fixation of fractured neck of femur. *Perioperative Medicine* 2012 June;1:4. | 12. McGlone R, Sadhra K, Hmaer DW,et al. Femoral nerve block in the initial management of femoral shaft fractures. *Archives of emergency medicine* 1987;4:163-68. | 13. Litz RJ, Popp M, Stehr SN, Koch T. Successful resuscitation of a patient with Ropivacaine-induced asystole after axillary plexus block using lipid infusion. *Anesthesia* 2006; 61: 800-1. | 14. Polly E, Wendy Silver MA, John Gallger: Reliability of the visual analog scale for measurement of acute pain. *Academic emergency medicine*. 2001;8(12):1153-1157. | 15. Cuvillon P, Ripart J, Lalourcy L, et al. The continuous femoral nerve block catheter for post operative analgesia :Bacterial colonization, infectious rate and adverse effects. *Anesth Analg* 2001;93:1045-9. | 16. Wang H, Boctor B, Verner J. The effect of single-injection femoral nerve block on rehabilitation and length of hospital stay after total knee replacement. *Reg Anesth Pain Med* 2002; 27: 139-44. | 17. Cousins M J, Bridenbaugh P O. *Neural blockade in clinical anesthesia and management of pain*, Philadelphia: J B Lippincott, 1987: 111-44. | 18. Rogers BA, Rang S. Femoral nerve block for diaphyseal and distal femoral fractures in the emergency department. *J Bone Joint Surg Am*. 2008;90:1787-88 | 19. Iskandra H, Benard A, Ruel-Raymond J et al:Femoral block provides superior analgesia compared with intra-articular Ropivacaine after anterior cruciate ligament reconstruction. *Reg Anesth Pain Med*. 2003 Jan-Feb;28(1):29-32. | 20. Fletcher AK, Rigby AS, Hayes FL. Three-in-one femoral nerve block as analgesia for fractured neck of femur in the emergency department. *Ann Emerg Med* 2003;42:596-7. | 21. Goldfarb G, Ang E T, Debaene B, Galet C, Jolis P. Duration of analgesia after femoral nerve block with Bupivacaine: effect of clonidine added to the anesthetic solution. *Anesthesiology* 1989;71 : A643 | 22. Ala Kokko T I, Partanen A, Karinen K, et al. Pharmacokinetics of 0.2% Ropivacaine and 0.2% Bupivacaine following caudal blocks in children. *Acta Anesth Scandinavica* 2000;44(9):1099-1102. | 23. Hamid Reza Amiri, Saied Safari, Jalil M:Comparison of combined FNB and spinal anesthesia with Lumbar plexus block for post operative analgesia in intertrochanteric fracture surgery. *Anesthesiology and pain medicine*.2012 June;2(1):32-35. | 24. Parker MJ, Handoll HH, Griffiths R: Anesth for hip fracture Surgery in adults. *Cochrane database system revision*.2004;(4):CD000521. | 25. Ologoiu D, Manoleli A, et al. Evaluation of femoral block effect for post operative delirium in elderly patients undergoing femoral surgery in order to facilitate spinal anesthesia in a sitting position. *European Journal of Anesth* 2013 June;30:131-131. | 26. Sakura Kinjo, Eunjung Lim, Laura P Sands et al:Does using a femoral block for total knee replacement decrease post operative delirium. *BMC anesthesiology*.2012;12(4):1471-2253. | 27. Miller T, Benthaus S, Huber M, et al.A Randomized and observer blinded comparison of continuous femoral block and fascia iliaca compartment block in hip replacement surgery. *Journal of anesthesia and clinical research*. 2011 Oct;4:277. Doi:10.4172/2155-6148.1000.277. | 28. J Mathew, S Varghese, S Jagadees. Tumescent infiltration versus femoral nerve block for skin graft harvest-a prospective randomized study. *Indian Journal of plastic surgery* 2005;38(2):110-113 | 29. Tondare AS, Nadkarni AV. Femoral nerve block for fractured shaft of femur. *Can Anaesth Soc J*.1982;29:270-1. | 30. Pia cherski Valery, Marachkou Aliaksei, et al. Reducing the dose of local anesthetic reduces the duration of analgesia-myth or reality:A double blind randomized study. *OJ Anes*;5(1):7-12. |