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To Evaluate the Efficacy of Ultrasonography Guided Lumbar Plexus Block for Postoperative Analgesia in Lower Limb Surgeries

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Abstract:- Patients with lower limb fracture often have acute pain and discomfort from changes in position, and such pain affects early postoperative recovery. This study aimed to evaluate the efficacy of ultrasonography guided lumbar plexus block for postoperative analgesia in lower limb surgeries. Total 50 ASA I &II, patients of age between 25 to 70 years were included in this study. All patient received 30 to 40ml inj. Bupivacaine 0.25% for Lumbar plexus block under USG guidance, under all aseptic precautions. In our study there were 48% females and 52% males. Time taken to give block mean 20.6 ±1.41 min. All patients were given rescue analgesia as per their threshold of tolerable pain at that time. Pain is major cause of morbidity in patients undergoing femur surgeries. It causes major discomfort and delays recovery in these patients. Use of ultrasound for Lumbar plexus block results in high success rate.

Keywords: *Lower Limb Fracture, Ultrasonography, Lumbar Plexus Block, Postoperative Analgesia.*

I. INTRODUCTION

Major Lower Limb surgeries are Often Painful in Postoperative Period and require aggressive pain management. Peripheral nerve blocks are suitable for analgesia after lower limb surgeries.[1]

In traditional lumbar plexus block (LPB), local anaesthetic injection is identified by loss of resistance, paraesthesia1, or quadriceps contractions after nerve stimulation. Although surface anatomical landmarks are useful, they can vary from patient to patient and are only surrogate markers. Failure to contact the transverse process or elicit quadriceps muscle contraction can result in inadvertent deep needle insertion, renal5 or vascular injury.6

The lumbar plexus is made up of the anterior divisions of L1, L2, L3, and the majority of L4. The L1 root frequently receives a branch from the T12. The lumbar plexus is most typically found in the posterior one-third of the psoas major muscle, prior to the transverse processes of the lumbar vertebrae. A The lumbar plexus has four nerves that serve the lower limb in addition to the ilioinguinal and illiohypogastric nerves (femoral, lateral cutaneous nerve of the thigh, obturator, and genitofemoral). Psoas compartment block or posterior lumbar plexus block are other names for it. Although the individual nerves of the lumbar plexus can be reached anteriorly, the whole lumbar plexus can be blocked via a posterior approach (also known as the psoas compartment block).2,4

LPB is an effective and reliable means of managing postoperative pain. Further, a unilateral analgesia can be achieved and there is a lack of complete sympathectomy.[5,6]

LBP can be performed blindly or under ultrasound guidance. Blind needle insertion may cause various complications, like epidural spread, total spinal anesthesia, intraperitoneal injection, retroperitoneal hematoma, and renal puncture. Ultrasound guided (USG)- Lumbar plexus

block is a more effective way to identify and locate the lumbar plexus and also to avoid associated complications.[3]

Ultrasound has been used to preview the relevant anatomy, measure the depth to the transverse process, guide the block needle to the posterior aspect of the psoas muscle or the lumbar plexus in real time, and monitor needle–nerve contact10 or spread of local anesthetic during an Lumbar plexus block. Understanding the sonoanatomy of the lumbar paravertebral region is a prerequisite to using Ultrasound for Lumbar plexus block.

- *Aim:* To evaluate the efficacy of ultrasonography guided lumbar plexus block for postoperative analgesia in lower limb surgeries.

- *Objectives:*
- To see haemodynamic response to block such as – pulse, BP, MAP.
- To evaluate duration of postoperative analgesia.
- Time taken for block procedure.
- To study incidence of complication if any.

II. MATERIAL & METHODS

Source of Data: Patients admitted for Femur surgeries in our hospital. Study Period: september-2019 to October 2021. Study Design: A Prospective Clinical Study. Study Sample: 50 Patients. Preanesthetic checkup of all study population done prior to surgery. These patients received subarachnoid block with 0.5% Bupivacaine (2.8-3.2 ml) as anaesthesia for routine operative procedure. These patients in immediate postoperative period were given ultrasound guided Lumbar plexus block using Inj. Bupivacaine 0.25% 30-40 ml in the operating room under all aseptic measures before shifting to recovery room Time taken for procedure, Haemodynamic response to block, duration of postoperative analgesia & complications were noted.

- *Inclusion Criteria:*
- Patient of aged between 15 -80 yrs. of either sex.
- Patient with ASA grade 1,2,3.
- Patient undergoing femur surgeries.

- *Exclusion Criteria:*
- Patients refusal for the procedure.
- Patients with significant coagulopathies
- Patient allergic to amide local anaesthetics
- Patient with skin infection at site of block
- Patient with ASA grade 4and 5

- *Preoperative Evaluation:*

Written consent form, History including fasting hrs, any medical or surgical history, allergy history.

"Routine clinical examination" including airway assessment (modified Malampatti classification) Vitals Respiratory and cardiovascular system examination Investigations such as complete blood count, Coagulation profile, serum electrolytes, Random blood sugar, Renal and Liver function tests, ECG, x-ray, Lignocaine sensitivity test.

- *Procedure:*

After completion of operative procedure patient was given the lateral decubitus position in the operative table. Maintenance i.v fluid continued during procedure. Monitors such as pulseoxymeter, ECG, and non invasive BP connected during block. After Scanning and identifying the sonoanatomy and structures in the Ultrasound image, the lumbar plexus is approached from caudal end of ultrasound probe by in-plane approach. Lumbar plexus is blocked using Inj. Bupivacaine 0.25% 30-40 ml.

Time taken for procedure define as time taken for starting of scanning to end of local anaesthetic infiltration. Vital signs recorded throughout the procedure. post operative analgesia was assessed by use of numeric pain scale as described by the patients and by time of 1st rescue analgesia.

III. RESULTS

This prospective observational study was done to evaluate the efficacy of USG guided LPB for postoperative analgesia in lower limb surgeries.

Fifty ASA grade I & II, patients of age between 25 to 70 yrs. were included in this study. All patient received 30 to 40ml inj. Bupivacaine 0.25% for Lumbar plexus block under USG guidance, under all aseptic precautions. In our study there were 48% females and 52% males. Mean age was 51.24±15.25 years in the study population. The youngest patient in our study was 25 years and oldest patient was 70 years. In our study there were 58% ASA 1 and 42% ASA 2 patients.

Time taken to give block mean 20.6 ±1.41 min. Minimum time taken to give block is 16 minutes 12 seconds and maximum time is 24 min 36 seconds. Post operative analgesia mean was 7.57±0.30 hrs.

All patients had a numeric pain score of 0 at the end of 2 Hrs after block which denotes patients had no pain at this point. At the end of 4 hrs patients had mean score of 0.7 ±0.2 suggesting mild or no pain. At the end of 6 hrs patients had score of 1.82 ±0.19 suggesting mild pain. At the end of 8 hrs and 10 hrs patients had mean scores of 3.8 ±0.20 and 5.1 ±0.23 respectively which denotes moderate pain. All patients were given rescue analgesia as per their threshold of tolerable pain at that time.

All patients receiving the LPB had a fall in SBP and DPB upto 30 mins. after the block, but there was no major haemodynamic changes during the period of monitoring upto 10 hrs after the block. No patients during the study had hypotension or hypertension after the lumbar plexus block.

All patients receiving the LPB had a fall in pulse upto 30 mins. after the block, but there was no major haemodynamic changes during the period of monitoring upto 10 hrs. No patients during the study had bradycardia or tachycardia after the lumbar plexus block.

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During the study there was no incidence of epidural spread, total spinal anaesthesia, systemic toxicity, intraperitoneal injection, renal puncture, vessel puncture, nerve injury, hematoma. So, no complication found during USG ultrasound guided lumbar plexus block

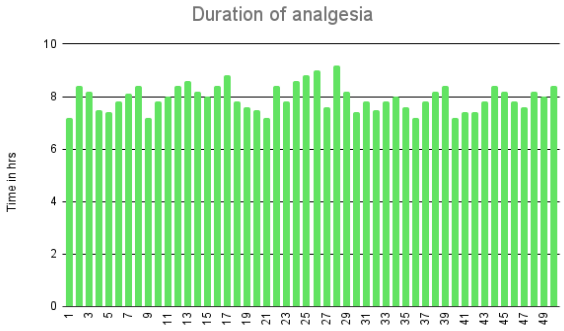

Fig 1 Duration in Analgesia

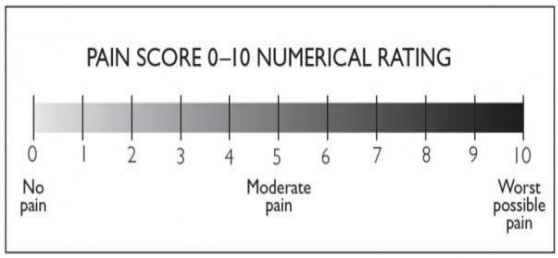

Fig 2 Numerical Rating

IV. DISCUSSION

Most Lower Limb surgeries are Often Painful in Postoperative Period and require aggressive pain management. Lumbar plexus block can provide a better alternative for management of postoperative analgesia in major orthopedic surgeries. Use of ultrasound has made this block safer and increased the success of the block.

This prospective observational study was done to evaluate the efficacy of ultrasonography guided lumbar plexus block for postoperative analgesia in lower limb surgeries.

Fifty patients of ASA grade - I and II of both sexes undergoing major routine surgerie Femur fracture nailing/plating, Proximal femur nail for intertrochanteric fracture, hip bipolar hemiarthroplasty between the ages of 25-70 yrs.

Patients were given ultrasonography guided lumbar plexus block in a lateral position after the completion of surgery with the limb to be blocked being up using a Paramedian Sagittal scan using in-plane approach.

All patients were given Inj.Bupivacaine 0.25% 30-40 ml, not exceeding 2mg/kg body wt.

The mean time taken for ultrasound guided lumbar plexus block was 20.6±1.41 min. **Naeem G M** et al (2020) found time taken for Lumbar plexus block approach was 22.14 ± 4.45 minutes which is almost similar to our result.[7]

Ahamed and Sreejit in 2019, which found that in the LPB group the time for performing the block was significantly higher (20.72 ± 3.985 min) [8]

In my study average duration of post operative analgesia was 7 hrs 57 minutes with standard deviation of 30 minutes.

Naeem M G et al (2020) found that first analgesic requirement (duration of sensory blockade) was 495.43 ± 56.62mins which is similar to my results.[7]

Ahamed and Sreejit in (2019), found that in the LPB group the time for the first request for analgesia was significantly higher (8.702 ± 1.26 hours).[8]

All patients receiving the Lumbar plexus block had a fall in pulse, SBP and DBP upto 30 mins. after the block, but there was no major haemodynamic changes during the period of monitoring upto 10 hrs after the block.

Naeem M G et al (2020) found that there was no clinically significant fall in the blood pressure after LPB.[7] **Amiri** et al. in 2014 showed that hemodynamic stability was pleasantly achieved with LPB. This because LPB accompanied by less sympathetic involvement.[9] **Ahamed and Sreejit** in (2019) found that in a LBP group there as significant reduction in blood pressure was noted.[8] Similar results were observed in present study.

In our study in all 50 patients there was successful ultrasound guided lumbar plexus block, as seen by duration of postoperative analgesia and spread of drug seen during ultrasonography. Similar success rate was observed in other studies. [10,11,12]

V. CONCLUSION

Pain is major cause of morbidity in patients undergoing femur surgeries. It causes major discomfort and delays recovery in these patients. Use of ultrasound for Lumbar plexus block results in high success rate. Under USG guided block complications are negligible as needle is visualized throughout the procedure. Thus lumbar plexus block is a way to alleviate this perioperative pain in femur orthopedic surgeries effectively without or minimum undesirable side effects.

So we recommend ultrasound guided lumbar plexus block with 0.25% inj.Bupivacaine (30-40ml not exceeding 2mg/kg) for postoperative analgesia in patients undergoing femur surgeries and this will be more helpful in old and comorbid patients.

REFERENCES

[1]. Chayen D, Nathan H, Chayen M. The psoas compartment block. Anesthesiology 1976; 45: 95–9
[2]. Winnie AP, Ramamurthy S, Durrani Z, Radonjic R. Plexus block for lower extremity surgery. Anesth Rev 1974; 1: 11–6
[3]. Parkinson SK, Mueller JB, Little WL, Bailey SL. Extent of blockade with various approaches to the lumbar plexus. Anesth Analg 1989; 68: 243–8
[4]. Ho AM, Karmakar MK. Combined paravertebral lumbar plexus and parasacral sciatic nerve block for reduction of hip fracture in a patient with severe aortic stenosis. Can J Anaesth 2002; 49: 946–50
[5]. Aida S, Takahashi H, Shimoji K. Renal subcapsular hematoma after lumbar plexus block. Anesthesiology 1996;84: 452 – 5
[6]. Aveline C, Bonnet F. Delayed retroperitoneal haematoma after failed lumbar plexus block. Br J Anaesth 2004; 93:589 – 91
[7]. Naeem, M. G., Mohammed, N. K., Elrahman, R. S. A., & Shalaby, O. M. (2020). Comparative Study between Spinal Anesthesia and Lumbar Plexus Block for Intraoperative Anesthesia and Postoperative Analgesia in Fracture Femur Surgery. Journal of Advances in Medicine and Medical Research, 32(15), 75-84.
[8]. Ahamed ZA, Sreejit MS. Lumbar Plexus Block as an Effective Alternative to Subarachnoid Block for Intertrochanteric Hip Fracture Surgeries in the Elderly. Anesthesia, essays and researches. 2019;13:264-8.
[9]. Amiri HR, Zamani MM, Safari S. Lumbar plexus block for management of hip surgeries. Anesthesiology and pain medicine. 2014;4:19407.
[10]. Karmakar MK, Ho AMH, Li X, Kwok WH, Tsang K, Ngan Kee WD. Ultrasound-guided lumbar plexus block through the acoustic window of the lumbar ultrasound trident. British Journal of Anaesthesia. 2008;100(4):533–537.
[11]. Strid JMC, Sauter AR, Ullensvang K, Andersen MN, Daugaard M, Bendtsen MAF, Søballe K, Pedersen EM, Børglum J, Bendtsen TF. Ultrasound-guided lumbar plexus block in volunteers; a randomized controlled trial. Br J Anaesth. 2017 Mar 1;118(3):430-438.
[12]. Sharma H, Mitra S, Singh J, Gupta S, Garg S. A Randomized Study Comparing the Efficacy of Ultrasound Guided Lumbar Plexus Block and Epidural Anesthesia for Postoperative Analgesia in Patients Undergoing Total Hip Replacement. Asian J Anesthesiol. 2020 Dec 1;58(4):131-137.