

COMBINED LUMBAR PLEXUS AND MODIFIED PARASACRAL ISCHIAL PLAIN BLOCK FOR SURGICAL ANESTHESIA IN GERIATRIC HIGH-RISK PATIENTS UNDERGOING INTERTROCHANTERIC FRACTURE FEMUR SURGERY : CASE SERIES

Anaesthesiology

Dr Shikha Agrawal*

Senior Consultant ,Department of Anaesthesia, J.L.N Hospital And Research Centre, Bhilai, Chhattisgarh,India*Corresponding Author

Dr Kumudni Tigga

Dy CMO, Department of Anaesthesia, J.L.N Hospital And Research Centre, Bhilai, Chhattisgarh,India

Dr Anjali Ekka

J.L.N Hospital And Research Centre, Bhilai, Chhattisgarh,India

ABSTRACT

Intertrochanteric Fracture (IT)femur is a common orthopedic condition presenting for surgery among elderly high risk patients. General anesthesia and neuraxial anesthesia often lead to hemodynamic fluctuations in patients with severe comorbidities. With the advancement of ultrasound in anesthesia, lumbar plexus (LP)block combined with modifiedparasacral ischial plane(MIP)block can be a good choice for surgery in such patients . ASA grade 2 and 3 IT fracture patients were given combined lumbar plexus block and modified parasacral ischial plane block (LPIP). Intraoperative anaesthesia quality and haemodynamic conditions were observed in these patients

KEYWORDS

Lumbar Plexus Block, Modified Parasacral Ischial Plane Block, High Risk Patients, Intertrochanteric Fracture Femur

INTRODUCTION

The innervation of hip involves lumbar and sacral plexuses¹. Ultrasound (USG) guided method to block lumbar plexus block by Capdevilla's approach along with parasacral approach to sacral plexuses(SP) have been used^{2,3}

Parasacral ischial plane (PIP) block is a novel fascial plane approach to sacral plexus, which is technically less challenging and obviates the need for visualization of nerves⁴. Local anaesthetic(LA)is injected into the posteromedial aspect of iliac bone which freely spreads under the piriformis muscle blocking the SP resulting in good sensory block but inadequate motor block⁵.For SP block to be effective, and achieving a complete motor block the local anaesthetic must encompass the medial sacral plexus. Few recent studies, modified the PIP block, by placing needle at innermost end of the poster medial surface of ilium, so that when LA is injected it completely surrounds SP achieving a complete sensory motor block. In this case series this modification has been used to block the SP. The PIP block mentioned in the article refers to this modified PIP approach(MPIP)⁶. We present 10 high-risk patients with multiple comorbidities listed for repair of fracture IT femur. All patients were given a Combined lumbar plexus and modified parasacral ischial plain (LPIP) block. First two cases are discussed further. The other 8/10 cases are listed in Table 1.

TECHNIQUES

Lumbar plexus (LP) block was performed with affected limb lying in upper lateral position, using a low-frequency convex array of 2–5 Hz ultrasound probe. The spinous process, articular process, transverse process, psoas major muscle, and lumbar plexus deep to the transverse processes was seen 4 cm above the intersection of the iliac crest line and the spine. 100 mm needle was inserted in plane to observe the contraction of quadriceps femoris muscle. LA was injected when anterior thigh movement disappeared after adjusting the nerve stimulator current to 0.4 mA. Fig 1

MPIP block was performed in same position. A 2–5 MHz curvilinear probe was placed on a line joining posterior superior iliac spine (PSIS) and the greater trochanter (GT), with one corner of the probe lying superficial to the PSIS. Then the probe was moved downwards and medially, similar to Parasacral parallel shift (PSPS)⁷. At the level of greater sciatic foramen, the posteromedial surface of the ischium was identified as hyperechoic curved line. An 100 mm needle was inserted from lateral to medial using an in-plane approach, directing towards the end of the ischium(tip of the posteromedial surface). LA was injected, while observing its spread below piriformis surrounding SP. Fig 2 Nerve stimulator was not needed for this block as it is a fascial plane block⁷

Sensory block was assessed after 30 minutes by pinprick test. Motor power was assessed by plantar and dorsiflexion of ankle joint as 0 = normal motor power, 1 = reduced motor power, and 2 = complete

block. In patients with failure to attain loss of pain to pinprick or no motor block after 30 min of administration of block, it was considered as a block failure and converted to General anesthesia (GA). Intraoperatively, ketamine 10 mg intravenously was given if the patient had pain repeated to a maximum of 2 times, after which the block was considered a failure and the patient was given GA. After completion of surgery, the patient was shifted to post-anesthesia care unit. The time required for first rescue analgesia and any complications were noted.



Fig 1. Showing USG image of LP block

- A. Lumbar plexus in psoas muscle
- B. Transverse process
- C. Vertebral body
- D. Black line showing Needle direction

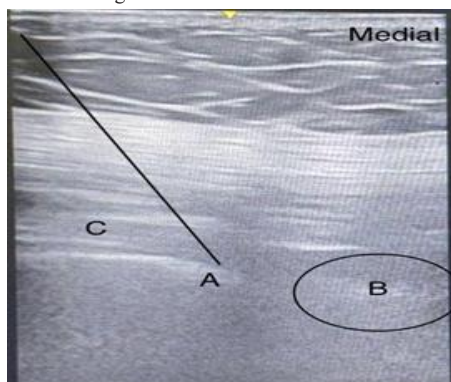


Fig. 2 showing USG image of MPIP Block

- A. hyperechoic posterior border of ischium
- B. LA spread surrounding sacral plexus

C. Pyriformis muscle
Black Line showing direction of needle

CASE 1

A 85 Year old female with moderate Aortic Stenosis was admitted with left IT femur fracture. Blood investigations revealed hemoglobin 8.5 g/dl, serum urea 110 mg/dl and creatinine 3.8 mg/dl. ECG revealed a left bundle branch block. Echocardiograph suggested moderate calcific aortic stenosis with a pressure gradient of 48mmHg, associated mild mitral and tricuspid regurgitations, Grade II LVDD and an EF of 50%. Considering her comorbidities, an unstable hemodynamics was anticipated under neuraxial block so LP block was planned.

An ultrasound and neurostimulation guided LP block was administered with 15ml 0.5% Bupivacaine. After this USG guided MPIP block was given with 10ml 0.5% Bupivacaine and 10 ml 2% Lignocaine. Patient had motor block but slight sparing at incision site which was managed with 4ml 1% lignocaine adrenaline infiltration at incision site. Surgery was started and during intraoperative period patient did not complaint of pain. The haemodynamics was stable perioperatively. Postoperative analgesia lasted for 18 hours

Case 2

A 52 year old male patient with severe Left ventricular systolic dysfunction was admitted with right IT fracture. On admission his ECG suggested LVH with q waves in inferior leads. 2D echo showed LVEF 25%, with regional wall motion abnormalities in in basal and posterior wall, severely hypokinetic mid septum, dilated LA, LV, Grade 3 LVDD. An unstable hemodynamics was anticipated under spinal or epidural. LP block was planned.

An ultrasound and neurostimulation guided LP block was administered using 20 ml 0.5% Bupivacaine, followed by USG guided MPIP block with 15ml 0.5% Bupivacaine and 10 ml 2% Lignocaine. Patient had complete motor and sensory block. Surgery completed in 60 minutes and the haemodynamics was stable perioperatively. Postoperative analgesia lasted for 12 hours.

RESULT

Of the 10 patients given LP block, 9 were analysed. 1 patient had no motor block and was converted to GA. Of the 9 patients, 1 had pain during hip internal rotation and required two times bolus of ketamine 10 mg intravenously. 1 patient had incision site sparing which was managed with local infiltration. There were no complications in perioperative period.

DISCUSSION

Combined lumbar and sacral plexus block provides effective unilateral limb anesthesia with lesser physiological changes and better postoperative analgesia in high risk hip fracture surgeries^{8,9}. In this cases series we have used modified parasacral ischial plane block as an alternative to Parasacral Sacral Plexus Block.

The Sacral Plexus being a deep structure with similarity to surrounding tissues, is difficult in locating especially in obese patients and tissue edema¹⁰. Haematoma, rectal perforation, and neural injection are complications of parasacral sacral plexus block¹⁰. MPIP block is an easier fascial plane approach to sacral plexus (SP), which does not require accurate needle tip Placement and the posteromedial end of ischium is readily identified under ultrasound⁷. The needle tip is distant to the neurovascular structures, in MPIP block making it a safer approach⁷. Complications of LP block are abdominal organ injury, nerve injury, LA toxicity, hematoma, and infection at puncture site¹¹ which can be avoided by frequent negative aspiration during injection, suspension of injection against resistance and <0.3mA twitch response¹². Despite this combined lumbar plexus and sacral plexus block causes limited hemodynamic effects compared to spinal anesthesia.⁸

Table 1. Patient Characteristics And Outcome

Age (years)/gender	ASA grade	Comorbidities	Block volume	Motor block at 30 min	Sensory block at 30 min	Need to give inj Ketamine	Required GA	Time to rescue Analgesia (hours)

68/M	III	SEVERE PAH, AF, HTN	LP-20 ml 0.5% bupivacaine MPIP-10 ml 0.5% bupivacaine + 10ml 2% lignocaine with adrenaline	2	Yes	Yes 10+10 mg	No	12 hours
80/F	III	EF 30%, OLD INFARCT DM2	LP-20 ml 0.5% bupivacaine MPIP-10 ml 0.5% bupivacaine + 10ml 2% lignocaine with adrenaline	2	Yes	No	No	16 hours
72/M	II	MOD AS, COPD DM2	LP-20 ml 0.5% bupivacaine MPIP-10 ml 0.5% bupivacaine + 10ml 2% lignocaine with adrenaline	2	Yes	No	No	12 hours
88/M	II	OLD AAMI EF 45%	LP-20 ml 0.5% bupivacaine MPIP-10 ml 0.5% bupivacaine + 10ml 2% lignocaine with adrenaline	2	Yes	No	No	18 hours
92/M	III	CKD, HYPOT HYROID	LP-18 ml 0.5% bupivacaine MPIP-8 ml 0.5% bupivacaine + 10ml 2% lignocaine with adrenaline	1	Yes	No	No	21 hours
78/F	II	DCMP, EF 25% DM2, HTN	LP-20 ml 0.5% bupivacaine MPIP-10 ml 0.5% bupivacaine + 10ml 2% lignocaine with adrenaline	0	Yes	No	Yes	19 Hours

75/ F	III	SEVERE PAH DM2, HTN	LP-20 ml 0.5% bupivacaine MPIP-10 ml 0.5% bupivacaine+10ml 2% lignocaine with adrenaline	2	Yes	No	No	16 Hours
85/ M	II	SEVERE MR MODE RATE TR MODE RATE AS	LP-18 ml 0.5% bupivacaine MPIP-8 ml 0.5% bupivacaine+10ml 2% lignocaine with adrenaline	2	Yes	No	No	17 hours

Papadimos et al studied the feasibility of MIP block with LP block for orthopedic hip surgeries. They concluded that MPIP block with LP block can give adequate surgical anaesthesia with better intraoperative haemodynamic stability and reduced post operative Analgesia requirements.⁶

In this case series we found that MPIP can block SP safely and easily achieving complete motor block and can be a better approach to SP as compared to parasacral approach. MPIP block combined with LP block can be a safer anaesthesia modality for high risk fracture IT femur patients with multiple comorbidities

CONCLUSION

MPIP is an easier alternative to parasacral SP Block and absence of neurovascular injury in MPIP block is advantageous as compared to other techniques of SP block. The combined Lumbar plexus and modified PIP block can be an alternative to the neuraxial blocks in surgery for fracture of IT femur in high risk geriatric patients.

REFERENCES

- Barnett JG, Shakeri S, Agur AMR. Overview of the Innervation of the Hip Joint. *Phys Med Rehabil Clin N Am*. 2021 Nov;32(4):745-755.
- Karmakar MK, Li JW, Kwok WH, Hadzic A. Ultrasound-guided lumbar plexus block using a transverse scan through the lumbar intertransverse space: a prospective case series. *Reg Anesth Pain Med*. 2015 Jan-Feb;40(1):75-81.
- Bendtsen TF, Leninist PA, Jepsen KV, Petersen M, Knudsen L, Børglum J. Preliminary results of a new ultrasound-guided approach to block the sacral plexus: The parasacral parallel shift. *Br J Anaesth* 2011;107:278-80.
- Venkataraju A, Narayanan M, Phillips S. Parasacral ischial plane (PIP) block: An easy approach to sacral plexus. *J Clin Anesth* 2020;59:103-5.
- Sherfudeen KM, Sankaral NK, Jayapal I, Kaliannan SK. Parasacral ischial plane block for lower limb wound debridement surgeries – A case series. *Indian J Anaesth* 2022;66:861-4.
- Yingchao Ye, Thomas J. Papadimos, Yunxia, Quanguang Wang. Comparison of combined lumbar and PIP block versus general anesthesia on postoperative outcomes in hip surgery. *Perioperative Care and Operating Room Management*, Volume 32, 2023, 100320
- Sherfudeen KM, Kumar SEJ, Jayapal I, Sankaral N, Jawahar S, Kaliannan SK. Ultrasound-guided parasacral ischial plane block for lower limb surgeries in high-risk patients – comparison of two sites of needle placement. *JARSS* 2025;33(2):119-124.
- Adali S, Erkalp K, Erden V, Colmeck M, Bulbul M, et al. Aldem T. Spinal anesthesia and combined sciatic nerve/lumbar plexus block techniques in lower extremity orthopedic surgery. *Acta Orthop Traumatol Turc* 2011;45:225-232
- Amin NH, West JA, Farmer T, Basmajian HG. Nerve blocks in the geriatric patient with hip fracture: a review of the current literature and relevant neuroanatomy. *Geriatr Orthop Surg Rehabil*. 2017;8:268–75.
- Ripart J, Cuvillon P, Nouvellon E, Gaertner E, Eledjam JJ. Parasacral approach to block the sciatic nerve: A 400-case survey. *Reg Anesth Pain Med* 2005;30:193-7.
- Petchara S, Paphon S, Vanlapa A, Boontikar P, Disya K. Combined lumbar sacral plexus block in high surgical risk geriatric patients undergoing early hip fracture surgery. *Malays Orthop J*. 2015;9:28–34
- Amiri HR, Zamani MM, Safari S. Lumbar plexus block for management of hip surgeries. *Anesth Pain Med*. 2014;4:e19407