

Ultrasound lumbar sympathetic block: Out of plane approach with insulated stimulation needle - Case series of three patients

INTRODUCTION

Lumbar sympathectomy in peripheral arterial disease (PAD) of lower limbs is usually performed by fluoroscopy but has disadvantage of radiation exposure and requirement of a special area. Ultrasound guided blocks have no radiation exposure with advantage of real time visualisation of needle, vessels and spread of local anaesthetic but literature on ultrasound guided lumbar sympathetic block (ULSB) is scarce.^[1-5] We hypothesised that as lumbar sympathetic ganglion (LSG) is located deep at anterior region of lumbar vertebrae, an ultrasound out-plane needle trajectory in lateral patient position would be the shortest path to reach it and needle tip, when not visualised, could be guided by muscle contractions if block is performed by insulated stimulation needle.

METHODS

This new approach is described in 3 patients of PAD with numerical rating score (NRS) of more than 5, referred for lumbar sympathectomy to relieve pain secondary to PAD.

After confirming normal coagulation parameters, patients were recruited after ethical clearance and consent. After intravenous access and application of standard monitors and skin temperature probe attached to the affected lower limb, patients were positioned laterally with affected limb non-dependent with a pillow placed under the trunk to decrease the lateral lordosis. Injection midazolam 1 mg and injection fentanyl 50 µg was given. After cleaning and draping with standard aseptic precautions, low frequency curved probe (FUJIFILM SonoSite Edge, 2-5 MHz), covered with a sterile cover was placed transversely at the highest part of the iliac crest in abdomen mode of ultrasound. Kidney moving with respiration and the closest vertebral body and its transverse process were identified. Color doppler confirmed aorta and IVC. A 15 cm, 22 G insulated stimulation needle, current set

at 2.0 mA, was inserted in out-of-plane approach from below lower pole of kidney targeting the anterior part of the vertebral body. If needle tip was not visualised, 4 needle trajectories were anticipated by observing the following and needle was directed anteriorly, if required:

1. Contractions of quadriceps in patient and contractions of psoas muscle on ultrasound: needle stimulating lumbar plexus lying on lateral part of vertebral body in the psoas muscle [location A, Figure 1]
2. Contractions of psoas muscle seen without contractions of quadriceps in patient: needle lying on lateral side of vertebral body but anterior to the previous description of the needle [location B, Figure 1]
3. No muscle contractions seen, and needle hit a bone: needle thought to lie anterior to the previous two descriptions on anterolateral side of the vertebral body [location C, Figure 1]
4. No muscle contractions seen, and no bone hit: needle inserted till it lies anterior to vertebral body at the desired position [location D, Figure 1]. If needle tip not visible, depth from skin to anterior part of vertebral body noted on ultrasound and needle (which has markings) inserted till calculated depth.

All non-ideal needle tip locations were conceived in the protocol so that minimum number of needle

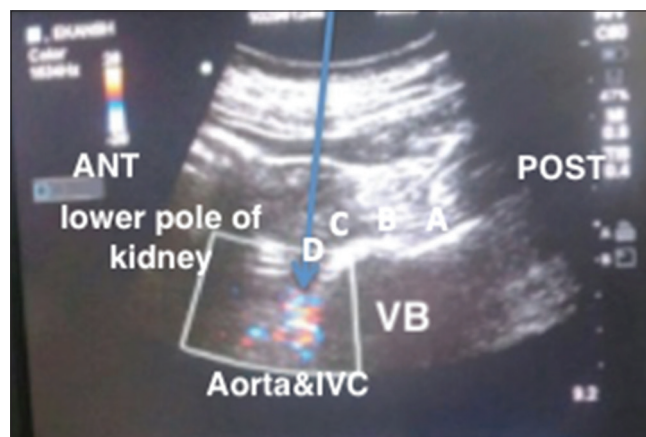


Figure 1: Arrow depicts needle path to anterolateral part of vertebral body. Lower pole of kidney is seen. Location A; Needle tip location when bone is hit and quadriceps contractions are seen externally. Location B; Needle tip location when bone is hit and psoas muscle contractions are seen on ultrasound. Location C; Needle tip location when bone is hit but there is no psoas muscle contraction. Location D; Needle tip position when no bone is hit and there is no psoas muscle contraction visible on ultrasound. VB: vertebral body/IVC: inferior vena cava/ANT: anterior/POST: posterior

attempts are required to place the needle tip at the desired location.

0.5-2 ml of Omnipaque® dye was given to check for correct needle tip position in lateral and anteroposterior position on fluoroscopy [Figure 2a and b]. If not optimal, needle was redirected under ultrasound. If more than three attempts were unsuccessful, needle was directed under fluoroscopy guidance at another sitting. After dye confirmation, 0.2% ropivacaine 20 ml with 15-mcg clonidine was injected slowly over two minutes. Post procedure patients were monitored for 2 hours and discharged after 4 hours.

RESULTS

In all patients, correct dye spread was seen as confirmed on fluoroscopy in anteroposterior and lateral view. In all patients, dye spread was seen at L3 vertebral level. On an average, less than two needle attempts were required to place the needle tip at the desired location. In none of the patients, ULSB had to be abandoned to convert to fluoroscopic procedure. There was a decrease in NRS to 3 or less after 24 hours, which remained low for more than ten days [Table 1]. In all patients, a temperature rise of 2° C from baseline temperature was noted. All patients reported high satisfaction score.

DISCUSSION

ULSB was first described by using an echo probe in 1992.^[1] After 25 years, a single case report described

the block in prone position with in-plane approach to reach anterolateral part of upper third of L3 vertebra.^[2] This same technique was used in a randomised trial with no advantage of ultrasound found over fluoroscopy, except no radiation exposure.^[3] 2 more non-indexed studies were found.^[4,5]

The previous techniques employed a longer needle trajectory (in-plane) in contrast to the present technique which employed a shorter out plane technique which would be more comfortable to the patient. The in-plane technique of previous studies would result in placement of needle tip at the anterolateral part of vertebral body which would be a ‘little away’ from the anatomical location of lumbar sympathetic ganglion which lies on anterior part of vertebral body. In the present technique, as the needle trajectory was out plane in a lateral position of patient, it was possible to place the needle tip directly at the desired anatomical location, the anterior part of vertebral body. Lastly, unlike the previous studies, the present study did not use pre-determined vertebral level to avoid kidney injury. In the present study, needle was inserted between the kidney and the vertebral body below, thus avoiding kidney injury, which was easily visible on ultrasound. Thus, the proposed present technique is based on patient safety, patient comfort and high success rate.

Lumbar sympathetic ganglion is present from L1 to L3 vertebral levels and is most commonly performed at L3 level. In the present technique, needle tip was placed at the desired L3 level.^[6]

As a new technique of ULSB was being validated by the authors, local anaesthetic was chosen as the initial drug. All patients were subsequently posted for LS with a neurolytic agent.

The new technique proposed is being validated in a larger number of patients in our institution. The new proposed technique of ULSB appears to be safer with more patient comfort and safety than previously proposed technique of ULSB for which comparative studies are proposed.

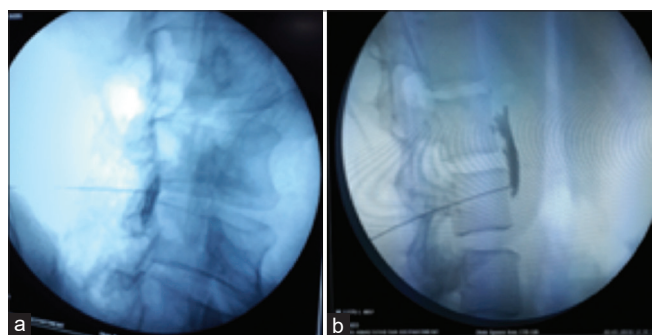


Figure 2: (a) Correct spread of dye seen on antero posterior view of fluoroscopy. (b) Correct spread of dye seen on lateral view of fluoroscopy

Table 1: Description of ultrasound guided lumbar sympathectomy blocks in the patients							
	Needle insertion	Number of fluoroscopy exposure	Location of needle tip [Figure 1] A/B*/C/D	Dye spread: AP/Lat	Vertebra level of needle tip	NRS: Baseline/2hrs/1 day/1 week after procedure	NRS >3 after block
Case 1	Two	Two	A*/B*/C/D	AP/Lat	L3	8/6/3/2	14 days
Case 2	One	One	A*/B/-/D	AP/Lat	L3	8/7/3/2	21 days
Case 3	One	One	-/B*/C/D	AP/Lat	B/w L3 & L4	9/7/3/2	10 days

A; Lumbar plexus stimulation/B; Psoas muscle contraction/C; Contact with bone/D; No bone no muscle/*; Visible needle tip. NRS Numerical rating scale. AP anterolateral/Lat: Lateral

The limitation was that fluoroscopy had to be used to confirm correct needle location, but exposure would be lesser compared to an 'only' fluoroscopy technique.

CONCLUSION

ULSB performed in lateral position with out-of-plane needle trajectory is the shortest approach to reach the desired anterolateral site of LSG with needle tip location by muscle contractions of insulated stimulation needle.

Informed consent

Taken from all patients.

Ethical approval

Taken from institute ethical committee.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

Jyotsna Punj, Snehitha Marada

Department of Anesthesiology, Critical Care and Pain Medicine,
All India Institute of Medical Sciences, New Delhi, India

Address for correspondence:

Dr. Jyotsna Punj,
Room No 5016, Academic Block, All India Institute of Medical
Sciences, New Delhi - 110 029, India.
E-mail: jyotsna_punj@yahoo.com

Received: 22nd September, 2019

Revision: 14th December, 2019

Accepted: 06th January, 2020

Publication: 04th February, 2020

REFERENCES

1. Kirvelä O, Svedström E, Lundbom N. Ultrasonic guidance of lumbar sympathetic and celiac plexus block. *Reg Anesth* 1992;17:1.
2. Moon JY, Choi JK, Shin JY, Chon SW, Dev S. A brief report on a technical description of ultrasound-guided lumbar sympathetic block. *Korean J Pain* 2017;30:66-70.
3. Ryu JH, Lee CS, Kim YC, Lee SC, Shankar H, Moon JY. Ultrasound-assisted versus fluoroscopic-guided lumbar sympathetic ganglion block: A prospective and randomized study. *Anesth Analg* 2018;126:1362-8.
4. Ma DX, Wang Y, Bao MM, Zhang C, Li XY, Wu AS, *et al.* Ultrasound-guided lumbar sympathetic ganglion blockade using shamrock method: A prospective case series. *J Anesth Perioper Med* 2016;3:114-8.
5. Tuyakov B, Kruszewski M, Stepień Z, Abkary MA, Onichimowski D, Malinowski P. Ultrasound-guidance lumbar sympathetic ganglion block. Case report. *Clin Anesthesiol Intensive Care* 2018;1:11.
6. An JW, Koh JC, Sun JM, Park JY, Choi JB, Shin MJ, *et al.* Clinical identification of the vertebral level at which the lumbar sympathetic ganglia aggregate. *Korean J Pain* 2016;29:103-9.

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

Access this article online	
Quick response code	Website: www.ijaweb.org
	DOI: 10.4103/ija.IJA_686_19

How to cite this article: Punj J, Marada S. Ultrasound lumbar sympathetic block: Out of plane approach with insulated stimulation needle - Case series of three patients. *Indian J Anaesth* 2020;64:148-50.

© 2020 Indian Journal of Anaesthesia | Published by Wolters Kluwer - Medknow