

Ultrasound-assisted subarachnoid block in obese parturient: Need of the hour

ABSTRACT

Subarachnoid block is commonly used for caesarean deliveries, by virtue of its simplicity in terms of performance and safety for the parturients when compared with general anesthesia. The landmark technique involves palpating the interspinous space at the level of Tuffier's line to ensure the interspace level and direct the spinal needle through optimally selected puncture site for performing the subarachnoid block. However, spinal block is sometimes not easy to perform in obese parturients primarily because of poorly palpable surface landmarks and challenges related to positioning for the block. Recently, ultrasound (USG) is being used for facilitating central neuraxial block, using low-frequency curvilinear probe with encouraging results. We report a case of a 28-year-old, 95-kg parturient, with body mass index of 39.1 kg/m² scheduled for elective lower segment caesarean section under subarachnoid block, the indication being previous caesarean section. As the landmarks were not appreciable on palpation, we performed USG-assisted preprocedural landmark-based subarachnoid block successfully.

Key words: Lumbar ultrasonography; neuraxial block; obstetric anesthesia; preprocedural

Perioperative Medicine

Subarachnoid block is considered the optimal choice for providing anesthesia in caesarean deliveries, unless contraindicated. The mere simplicity in performing the block, quick onset, good safety profile for the parturient, and good postoperative analgesia are some of the factors for propensity toward the subarachnoid block. However, the success of the block by conventional landmark technique depends primarily on appreciating the landmarks, that is, spinous process, interspinous space by tactile palpation, and selecting the optimal site for needle puncture. As the quality of the landmarks^[1] is one of the defining factors for the success of the block, in patients with poorly localized landmarks^[2] (obesity, elderly), the probability of multiple


punctures and redirections of the needle increases, thereby increasing the chances of complications such as paresthesia and postdural puncture headache, to name a few. Point of care ultrasound (USG)-assisted preprocedural assessment^[3] of the lumbar spine for facilitating the location of the interspinous space, point of insertion, and needle angulation has been proved to be beneficial in obese, obstetric patients with poorly palpable landmarks, scheduled for surgery under central neuraxial block.

We report a case of a 28-year-old, 95-kg parturient, with body mass index (BMI) of 39.1 kg/m² and period of gestation 40+3 weeks, scheduled for elective lower segment caesarean section under subarachnoid block, the indication being

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previous caesarean delivery under subarachnoid block. During the preanesthetic assessment, the parturient gave history of multiple spinal punctures during previous caesarean delivery along with the history of postdural puncture headache lasting for 3 days. As the landmarks were not palpable in this case, we anticipated procedural difficulty in performing the block using landmark technique. Therefore, we explained to the parturient regarding the use of point of care preprocedural USG for correct identification of space and site of puncture, thereby reducing the probability of multiple punctures again. The parturient gave consent for USG-assisted subarachnoid block, taking into considering the benefits thereof.

On the day of surgery, the parturient was kept nil orally for solid for 8 h and anti-aspiration prophylaxis was given in the form of injection ranitidine 50 mg along with intravenous metoclopramide 10 mg 30 min before the procedure.

In the operation theater, routine monitors (noninvasive blood pressure, three-lead ECG, oximetry) were applied and peripheral intravenous access was instituted. The parturient was placed in a sitting position and palpation of spine done before the preprocedural USG to assess the probability of palpating surface landmarks (iliac crests, spinous processes, and interspinous space) and graded as 4 on the 4-point difficulty scale^[4]: [easy (1), moderate (2), difficult (3), and impossible (4)].

Prepuncture USG imaging was performed using SonoSite Maxx USG using low-frequency (2–5 MHz) curvilinear array probe. The USG imaging protocol consisted of placing transducer longitudinally in the parasagittal oblique (PSO) view at the levels of lamina, starting from sacrum and then moving the transducer in cephalad direction to identify and mark L5–S1, L4–L5, and L3–4 interspace and appreciating posterior complex (PC) and anterior complex (AC), respectively [Figure 1]. At L3–4 interspace, the probe was oriented in the transverse plane and centered in the midline to get the clear view of the structures (laminae, articular processes, and transverse processes, PC, and AC) [Figure 2]. We measured the depth of AC, PC, and intrathecal space in the midline with the help of inbuilt caliper. The insertion point for the needle was taken as the point of intersection of vertical and horizontal lines drawn from the center of the probe in the longitudinal and transverse axes. We also noted the probable angulation of the spinal needle based on the angulation of the probe. The USG-measured depth from skin to the PC was 5.56 cm, whereas skin–AC depth was 7.10 cm. The USG assessment took only 3 min for locating the L3–L4 interspinous space, marking the optimal puncture site for needle placement and the approximate depth for needle

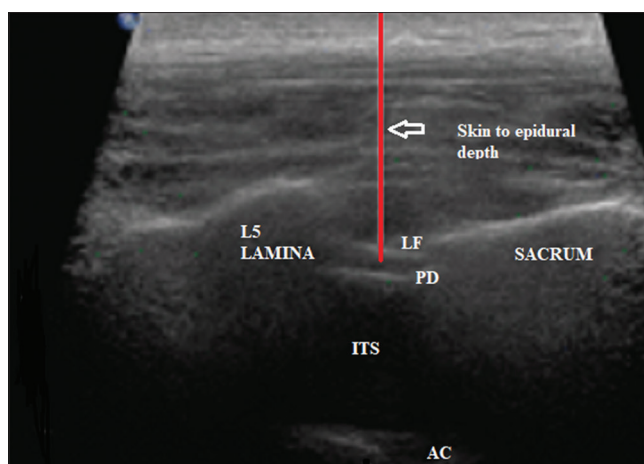


Figure 1: Paramedian sagittal oblique sonogram of the lumbar spine at the level of lamina L5 and sacrum interspace. AC: anterior complex; LF: ligamentum flavum; PD: posterior dura; ITS: intrathecal space

placement by measuring the PC and AC depth. We were able to perform the block in single attempt without any redirection or reinsertion of the spinal needle. Afterward, under all aseptic conditions, the subarachnoid block was performed using 26 G Quincke needle through the marked optimal puncture site. We were able to perform the block in a single attempt without any redirection or reinsertion of the spinal needle. The actual needle depth for obtaining subarachnoid space was approximately 6.5 cm. We did not encounter any Paresthesia and successful spinal anesthesia was achieved.

Discussion

Subarachnoid block is commonly used for caesarean deliveries, by virtue of its simplicity in terms of performance and safety for the parturients when compared with general anesthesia. The traditional landmark approach^[1] for subarachnoid block tends to yield unsatisfactory results in patients with poorly palpable landmarks, and this could be because of obesity,^[5] obstetric and elderly patients, spinal deformity, or previous spinal surgery. The probability of multiple needle insertions or redirections increases the risk of paraesthesia and postdural headaches.^[6] Therefore, in an attempt to minimize the technical difficulty of neuraxial block, the point of care preprocedural USG-guided assessment of spine seems to be beneficial.

The main factors depicting difficult subarachnoid block are multiple needle insertions or redirections and elicitation of paresthesia. The multiple needle punctures while performing block is an independent predictor for undue complications such as paresthesia, vascular puncture, and postdural puncture headaches. Paresthesia is the risk factor for the

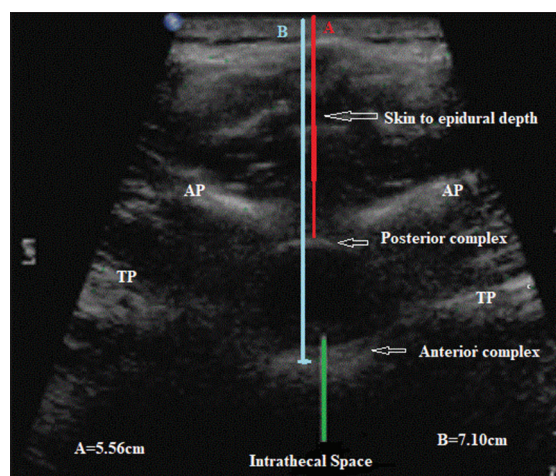


Figure 2: USG-guided transverse interspinous view of lumbar spine at L3–L4 interspace. AP: articular process; TP: transverse process

subsequent neurological deficit after subarachnoid block.^[6] In patients with poorly palpable landmarks (parturients with a BMI of 35 kg/m²), the success rate of first needle pass for neuraxial blockade was observed to be approximately 35%.^[5]

However, Chin *et al.*^[7] demonstrated that technical difficulty of central neuraxial block can be minimized with the help of USG guidance, especially in patients with increased BMI. Whereas the use of USG has some inherent limitations especially in obese patients as the landmarks are less distinct on USG due to phase aberration resulting from irregularly placed adipose tissue.^[8] On the contrary, we were able to appreciate all the structures in the PSO and transverse interspinous view on USG assessment of the spine.

The probable needle insertion depth (ND) for subarachnoid block can be accurately predicted by preprocedural ultrasound assessment of the spine. The USG-measured depth to posterior and AC and the intrathecal space depth correlates well with ND; however, the probability of overestimating needle depth by a margin of 2–2.5 mm is still there. The possible reason being variation in the anteroposterior diameter of the thecal space by 6–12 mm,^[9] and second while scanning, the probe placement over skin can also cause tissue compression. In our case, the estimated USG-measured depth of PC and AC from skin was 5.56 and

7.10 cm, respectively. Whereas the actual needle depth for entering the subarachnoid block was 6.5 cm. Therefore, point of care USG spine can predict the actual needle depth for subarachnoid plane.

Therefore, we are of the opinion that USG-assisted preprocedural assessment of spine is useful for facilitating central neuraxial block due to its ability to provide accurate anatomical location of intervertebral level, the optimal site, direction, and the probable depth of needle insertion especially in obese parturient with poorly palpable landmarks.

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Conflicts of interest

There are no conflicts of interest.

References

1. Atallah MM, Demian AD, Shorrab AA. Development of a difficulty score for spinal anaesthesia. *Br J Anaesth* 2004;92:354-60.
2. de Filho GR, Gomes HP, da Fonseca MH, Hoffman JC, Pederneras SG, Garcia JH. Predictors of successful neuraxial block: A prospective study. *Eur J Anaesthesiol* 2002;19:447-51.
3. Li M, Ni X, Xu Z, Shen F, Song Y, Li Q, *et al.* Ultrasound-assisted technology versus the conventional landmark location method in spinal anesthesia for cesarean delivery in obese parturients: A randomized controlled trial. *Anesth Analg* 2019;129:155-61.
4. Chin KJ, Perlas A, Singh M, Arzola C, Prasad A, Chan V, *et al.* An ultrasound-assisted approach facilitates spinal anesthesia for total joint arthroplasty. *Can J Anesth* 2009;56:643-50.
5. Ellinas EH, Eastwood DC, Patel SN, Maitra-D'Cruze AM, Ebert TJ. The effect of obesity on neuraxial technique difficulty in pregnant patients: A prospective, observational study. *Anesth Analg* 2009;109:1225-31.
6. Horlocker TT, McGregor DG, Matsushige DK, Schroeder DR, Besse JA. A retrospective review of 4767 consecutive spinal anesthetics: Central nervous system complications. Perioperative outcomes group. *Anesth Analg* 1997;84:578-84.
7. Chin KJ, Perlas A, Chan V, Shreves DB, Koshkin A, Vaishnav V. Ultrasound imaging facilitates spinal anesthesia in adults with difficult surface anatomic landmarks. *Anesthesiology* 2011;115:94-101.
8. Saranteas T. Limitations in ultrasound imaging techniques in anesthesia: Obesity and muscle atrophy? *Anesth Analg* 2009;109:993-4.
9. Arzola C, Balki M, Carvalho JC. The antero-posterior diameter of the lumbar dural sac does not predict sensory levels of spinal anesthesia for Cesarean delivery. *Can J Anesth* 2007;54:620-5.