

# Should ultrasound of the spine be mandatory before performing a lumbar central neuraxial block?

Ultrasound of the spine has been gaining popularity for peripheral nerve blocks and vascular access over the last decade, but its routine use for all central neuraxial blocks remains controversial.

The Third National Audit from the Royal College of Anaesthetists (Cook et al, 2009) estimated that over 500 000 lumbar central neuraxial blocks are done annually in the UK. Correct identification of the vertebral level during a lumbar central neuraxial block would avoid needle damage to the spinal cord, which usually ends at L1–2 in adults. An imaginary horizontal line joining the posterior iliac crests (Tuffier's line) is the most commonly used anatomical landmark by anaesthetists for a lumbar central neuraxial block as it passes through the L4 vertebral body.

Using the Tuffier's line as a guide, numerous studies have found that a more cephalad level for a central neuraxial block is likely to be identified in over 50% of patients than the correct level, with the error of margin extending up to four spinal levels too high, risking injury to the spinal cord as was reported by Reynolds (2001), although this is thankfully rare.

Pre-puncture ultrasound imaging may be undertaken by the anaesthetist to identify the relevant spinal anatomy and the point of insertion of needle for the procedure. Although real time visualization of the spinal or epidural needle using ultrasound is described, it is infrequently used for a routine central neuraxial block.

## Ultrasound is needed before a lumbar central neuraxial block

Grau et al (2002) found that ultrasound imaging of the spine was best suited to

**Dr J Longbottom** is ST6 in Anaesthetics,  
**Dr I Clegg** is ST7 in Anaesthetics and  
**Dr K Bhatia** is Consultant Anaesthetist  
in the Department of Anaesthesia, Central  
Manchester University Hospitals and St  
Mary's Hospital, Manchester M13 9WL

Correspondence to: Dr K Bhatia  
(kailash.bhatia@cmft.nhs.uk)

identifying the midline, the optimal puncture site, the presence of axial rotation and depth of the epidural and intrathecal space compared to the standard landmark technique and is associated with greater patient satisfaction. Ultrasound of the spine when compared to the landmark technique provided an accurate estimation of intervertebral level in 70–90% of cases thus enhancing patient safety.

The correlation between ultrasound-measured depth of the epidural space and actual needle insertion depth is excellent, having been evaluated in multiple studies, suggesting that ultrasound could also be used to guide the needle choice especially in morbidly obese patients.

A systematic review and meta-analysis by Shaikh et al (2013) revealed that ultrasound imaging reduced the risk of failed procedures, the number of insertion attempts and the number of needle re-directions. On comparing the landmark technique with a pre-puncture ultrasound imaging in patients with poor surface landmarks (morbidly obese, previous spinal surgery and lumbar scoliosis), Chin et al (2011) concluded that ultrasound facilitates the performance of spinal anaesthesia and increases the first attempt success rate.

The National Institute for Health and Care Excellence (2008) recognizes ultrasound as a useful adjunct to facilitate catheterization of epidural space. It does not involve any radiation, is compact, portable and readily available at the point of care.

## Ultrasound is not needed before a lumbar central neuraxial block

Ultrasound cannot detect anatomical abnormalities such as sacralization of lumbar vertebrae which can be seen in up to 12% of the general population. This pitfall often leads to inaccurate estimates of the vertebral level during a central neuraxial block.

The time taken to perform ultrasound imaging deters its mandatory use especially in an emergency scenario like a category 1 caesarean section. Ultrasound imaging requires a reasonable level of competence,

technical skill and has financial implications compared to the landmark approach.

A significant number of studies have stemmed from similar authors and some have significant methodological flaws pertaining to blinding. Some of the studies have a single experienced operator performing these scans, hence their findings should be extrapolated with caution.

## Conclusions

The available evidence highlights that ultrasound imaging of spine does have distinct advantages while siting a lumbar central neuraxial block compared to the traditional landmark technique. The authors recommend ultrasound imaging of the spine for anaesthesia for routine elective surgery (under supervision for trainees and those new to ultrasound) so as to gather the necessary experience along with the landmark technique, but the best evidence for its use is when dealing with patients with difficult surface landmarks such as obesity, musculoskeletal problems and previous spine surgery. **BJHM**

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Anaesthetic and critical care dilemmas are coordinated by Dr Steven Cone and Dr Matthew Henley, Specialist Registrars in Anaesthetics, Royal Free Hospital, London