Systematic Approach to Ultrasound-guided Neuraxial Blockade of the Adult Lumbar Spine: 7 steps

1. Preparation for scanning
2. PS transverse process view
3. PS articular process view
4. PS oblique view
5. Identify and mark intervertebral levels
6. Transverse interlaminar view
7. Mark needle insertion point for a midline approach

Anesthesiology 2011; 114:1459–85

**Figure 4.** Paramedian sagittal sonogram of the transverse process from the (a) water-based spine phantom, (b) volunteers and (c) the Visible Human Project (cadaver). In the latter, the transverse processes of L3 and L4 have been shaded in green (c). Note how the acoustic shadow of the TPs produces the “Tri dent sign” [3].

ESM, erector spinae muscle; PM, psoas muscle; TPs, transverse process.

**Transverse Process – “Trident”**

The British Journal of Radiology, 85 (2012), e262–e269

Anesthesiology 2011; 114:1459–85

**Articular Process “Camel”**

The British Journal of Radiology, 85 (2012), e262–e269

Anesthesiology 2011; 114:1459–85

**Lamina – “Horse Head” / “Sawtooth”**

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Ultrasonography for Lumbar Neuraxial Blockade
Figure 6. Paramedian oblique sagittal sonogram of the lumbar spine at the L3/L4/L5 level. Note the acoustic shadow of the lamina and the acoustic window, which result from reflections of the ultrasound signal from the neural structures within the spinal canal. ILS, interlaminar space.

Figure 7. Paramedian oblique sagittal sonogram of the lumbar spine at the L3/L4/L5 level. The posterior epidural space is seen as a hypoechoic space (a few millimeters wide) between the hyperechoic ligamentum flavum and the posterior dura. Note that the posterior dura appears brighter and is also better visualized than the ligamentum flavum in this sonogram. ESM, erector spinae muscles; ILS, interlaminar space; LF, ligamentum flavum.

Paramedian sagittal oblique view

- "Sawtooth" appearance of the laminae
- Posterior complex (ligamentum flavum, epidural space and posterior dura)
- Anterior complex (anterior dura, posterior longitudinal ligament, vertebral body)

Transverse View – Spinal Process

- Posterior Spinal Process
- Superior Articular Facet
- Lamina
- Transverse Process
- Spinal Canal (Transverse Foramen)
- Body

Transverse View – Spinal Process

- Tip of spinous process
- Spinal epidural space
- Intrathecal space

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Transverse View – Interlaminar

FIGURE 3. Distribution of conclusive images at all interspinous levels in the right paramedian sagittal oblique plane (A) and in transverse median plane (B).
With the subjects seated in the standard flexed position with legs supported and cradling a pillow, they were asked to rotate their shoulders to a 45° angle (a).

Goal is to visualize gaps between bones, if US can get through, so can your needle.

In transverse view, spinal cord should be at depth of TP

Do not do parasagittal oblique too close to midline, the side of SP will confound the view

References

- www.nysora.com
- www.usra.ca/vspine.php
- http://viewer.zmags.com/publication/70ed5a23#/70ed5a23/1
- Ultrasonography of the adult thoracic and lumbar spine for central neuraxial blockade
- Ultrasonography of the lumbar spine, sonoanatomy and practical applications
- Sonoanatomy relevant for ultrasound-guided central neuraxial blocks via the paramedian approach in the lumbar region