Ultrasound Guidance for Neuraxial Anesthesia

Jens Kessler
Ultrasound Guidance for Neuraxial Anesthesia

A New Idea?

Jens Kessler
Historic attempts in Ultrasound Epidural Imaging

- Cork RC, Kryc JJ, Vaughan RW.
  Ultrasonic localization of the lumbar epidural space.
  Anesthesiology. 1980

- Currie JM.
  Measurement of the depth to the extradural space using ultrasound.
  Br J Anaesth. 1984
Historic attempts in Ultrasound Epidural Imaging
✔ WHY neuraxial sonography?

✔ What are the technical PROBLEMS?

✔ Which EQUIPMENT is adequate?

✔ What are the RELEVANT STRUCTURES?
✓ WHY neuraxial sonography?

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✓ What are the RELEVANT STRUCTURES?
`Why do you want to use ultrasound for that?´

P. Dressler

Whitty RJ, Maxwell CV, Carvalho JC.
Int J Obstet Anesth. 2007
Distribution of the effective puncture depth in 300 obstetric epidural anaesthesia

Grau T, Leipold RW, Conrad R, Martin E, Motsch J.
J Clin Anesth. 2002
Preprocedural ultrasonography of the spine can supply much anatomical information pertinent to central neuraxial blockade, including the location of the neuraxial midline and interlaminar spaces, and the depth to the epidural space and intrathecal space.

Although the routine use of ultrasound in central neuraxial blockade is probably unnecessary, we consider it invaluable in patients with abnormal spinal anatomy or poor surface landmarks. }
 ✓ WHY neuraxial sonography ?

 ✓ What are the technical PROBLEMS ?

 ✓ Which EQUIPMENT is adequate ?

 ✓ What are the RELEVANT STRUCTURES ?
Collins AB, Gray AT, Kessler J.  
Reg Anesth Pain Med. 2006

Winn.  
J U M. 2003
Collins AB, Gray AT, Kessler J.
Reg Anesth Pain Med. 2006

Winn.
JUM. 2003
Loss-Of-Resistance-Technique + Ultrasound:

3 hands needed!
Ultrasound Imaging for Regional Anesthesia in Infants, Children, and Adolescents

A Review of Current Literature and Its Application in the Practice of Neuraxial Blocks

Ban C. H. Tsui, M.D., F.R.C.P.C., * Santhanam Suresh, M.D., F.A.A.P.†

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Ultrasonography of the Adult Thoracic and Lumbar Spine for Central Neuraxial Blockade

Ki Jinn Chin, F.R.C.P.C.,* Manoj Kumar Karmakar, M.D.,† Phillip Peng, F.R.C.P.C.‡
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✓ What are the RELEVANT STRUCTURES?
Gelatin-Agar Lumbosacral Spine Phantom

A Simple Model for Learning the Basic Skills Required to Perform Real-time Sonographically Guided Central Neuraxial Blocks

Jia Wei Li, MPhil, Manoj K. Karmakar, MD, Xiang Li, PhD, Wing Hong Kwok, FANZCA, Warwick Dean Ngan Kee, MD

J Ultrasound Med 2011;30:263-272
1. Transverse View
2. Longitudinal View

Kessler J
3. Longitudinal Paramedian View

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
What about the 4D technique?
REGIONAL ANAESTHESIA

Feasibility study of real-time three-/four-dimensional ultrasound for epidural catheter insertion

D. Belavy¹*, M. J. Ruitenber² and R. B. Brijball¹,³
Interesting Cases from the OR...
Questions

- WHY neuraxial sonography?
- What are the technical PROBLEMS?
- Which EQUIPMENT is adequate?
- What are the RELEVANT STRUCTURES?
Conclusion

✓ **Why**

BMI, Success rates, Variation of puncture depth

✓ **Problems**

Indirect guidance (3 hands needed, angle of puncture)

✓ **Equipment**

Curved Array 2-5 MHz

✓ **Relevant Structures**

Spinous process, Ligamentum flavum, Dura mater
`...ultrasound guidance is likely to be most useful in patients who present challenging neuraxial anatomy secondary to obesity, spinal deformity, or previous spine surgery...´