

**Augmentation of Paramedian 3D Ultrasound Images of the Spine****Abtin Rasoulian - ubc.ca****Robert Rohling - ubc.ca****Purang Abolmaesumi - ubc.ca**

The blind placement of an epidural needle is among the most difficult regional anesthetic techniques. The challenge is to insert the needle in the mid-sagittal plane and to avoid overshooting the needle into the spinal cord. Prepuncture 2D ultrasound scanning has been introduced as a reliable tool to localize the target and facilitate epidural needle placement. Ideally, real-time ultrasound should be used during needle insertion. However, several issues inhibit the use of standard 2D ultrasound, including the obstruction of the puncture site by the ultrasound probe, low visibility of the target in ultrasound images, and increased pain due to longer needle trajectory. An alternative is to use 3D ultrasound imaging, where the needle and target could be visible within the same reslice of a 3D volume; however, novice ultrasound users (i.e., many anesthesiologists) still have difficulty interpreting ultrasound images of the spine and identifying the target epidural space. In this paper, we propose to augment 3D ultrasound images by registering a multi-vertebrae statistical shape+pose model. We use such augmentation for enhanced interpretation of the ultrasound and identification of the mid-sagittal plane for the needle insertion. Validation is performed on synthetic data derived from the CT images, and 64 in vivo ultrasound volumes.

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