

Title: The Use of Image-Enhanced Brachial Plexus Magnetic Resonance Neurography in the Comparative Study of Three Popular Infraclavicular Blockade Approaches

Authors: Raymond Tatevossian, MD, David T. Raphael, MD Ph.D, and Diane McIntee, MS

Affiliation: Los Angeles County and University of Southern California Medical Center, Los Angeles, California.

Introduction: Magnetic resonance neurography (MRN) is an imaging modality which can reliably and selectively image peripheral nerves. MRN has recently gained popularity in the selective imaging of the brachial plexus as an accepted radiological procedure for diagnostic purposes.

Methods: After IRB approval, MRN images of coronal and sagittal sequences of the brachial plexus in 10 volunteer subjects were obtained. Software programs were used to enhance and display brachial plexus anatomy. Multiple 2D frontal slab projections were converted into a single 3D composite frontal slab Photoshop image of the brachial plexus. For three popular infraclavicular approaches (using posteriorly pointed needle either midclavicle, infracoracoid, or caudomedial to coracoid) the specific approach error was measured as the distance from the target site of needle to ideal midpoint of the plexus by MRN.

Results: The distance errors (mean  $\pm$  s.d.) for the approaches - midclavicle, infracoracoid, and caudomedial to coracoid were, respectively,  $0.67 \pm 0.68$ ,  $0.99 \pm 1.22$ , and  $0.65 \pm 1.14$  cm. Animated GIFs, oblique sagittal fly-through views of the stack of images, were created with colorized nerves and vessels.

Discussion: Image-processed 3D slab composite neurographic scans allow for visualization of the entire brachial plexus within a single image. These images have educational value in illustrating both the complexity and respectable individual variation of the brachial plexus. Suggestions for improved needle guidance during infraclavicular block procedure are presented.