
Conduction Block of Median Nerve Induced by Wrist Hyperextension: Implications for Intra-Arterial Catheter Placement

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Introduction: It is common practice in anesthesiology and critical care, during insertion of a radial intra-arterial catheter to hyperextend the wrist, in order to facilitate arterial puncture and cannulation. This position is often maintained for the length of the surgery, and as long as the arterial catheter is in place post-operatively. While there has been much discussion in the literature about optimal patient positioning and padding to protect the ulnar nerve and the brachial plexus, little attention has been paid to the consequences of wrist hyperextension. In this study we report the effects of wrist hyperextension on motor and sensory conduction in the median nerve.

Methods and Materials: Median nerve conduction was studied in 12 awake, healthy volunteers using standard sensory and motor nerve conduction tests. With the contralateral hand as a control, the right wrist was placed in hyperextension and compound sensory, as well as compound motor action potentials were recorded to determine the onset and magnitude of effects. Subsequently the hand was released from hyperextension and the recovery phase was recorded.

Results/Discussion: In 10 of 12 (83%) subjects, hyperextension resulted in a significant decrease of compound sensory action potential amplitudes, sufficient to qualify as conduction block (16.6% of baseline amplitude). The average time to conduction block in these 10 subjects was 43 minutes \pm 13.2. Hyperextension also increased latencies of waveforms. Although changes in motor compound action potentials were less dramatic, they are noteworthy, with an average decrease in amplitude to 77% \pm 33% of control. All subjects who manifested conduction block showed marked improvement within five minutes after release from hyperextension.

Conclusion: Extrapolating these results to the clinical setting, wrist hyperextension for arterial line placement and stabilization is likely to result in profound sensory and motor impairment of the median nerve. Although in this study the effects were transient, more prolonged periods of hyperextension may be associated with significant neuropathy. To minimize the chance for nerve injury, we recommend that whenever possible wrists should be returned promptly to the neutral position following arterial line placement.