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Use of ultrasound to separate carpal tunnel syndrome associated with axonal degeneration

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In clinical practice, Nerve Conduction Studies (NCS) and Ultrasonography (US) have been validated for confirmation of the diagnosis and gradation of the severity of Carpal Tunnel Syndrome (CTS), a median nerve entrapment due to chronic compression at wrist. However, NCS cannot differentiate the CTS with demyelination alone from the disease with secondary axonal degeneration. It is unknown if Ultrasound (US) can compensate this deficit. This study aimed at exploring US to differentiate demyelinated CTS from that in association with axonal degeneration. We studied 28 demyelinated CTS hands and 23 demyelinated CTS hands with axonal degeneration in both motor and sensory median nerves by comparing Cross-Sectional Area (CSA-W) and Perimeter (P-W) of median nerve at wrist, ratio of CSA and P of wrist over mid-forearm or reversed ratio (R-CSA-W/MF, R-P-W/MF, R-CSA-MF/W, R-P-MF/W) measured by US. Results revealed significant differences in CSA-W ($p=0.021$), P-W ($p=0.007$), R-P-MF/W ($p=0.003$) while no significant difference in R-CSA-W/MF ($p=0.291$) and R-P-W/MF ($p=0.125$). ROC curves indicated poor-to-fair accuracy of CSA-W (Area=0.648, $p=0.156$); P-W (Area=0.711, $p=0.042$), R-CSA-W/MF (Area=0.677, $p=0.089$) and R-P-W/MF (Area=0.75, $p=0.016$) R-CSA-MF/W (Area=0.68, $p=0.066$) and R=P-MF/W (Area=0.764, $p=0.007$). Most of our findings were consistent with previous relevant studies and the result will be more robust with more cases enrolled. We conclude that US may be potentially used to differentiate demyelinated CTS from that with axonal degeneration in clinical practice.

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