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Differentiation of carpal tunnel syndrome with axonal degeneration *via* ratio of carpal tunnel outlet cross-sectional area and perimeters in the median nerve using ultrasound

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Nerve conduction studies (NCS) and Ultrasonography (US) are cross-validated tools for diagnostic confirmation and gradation of severity of the 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. Yet it is unknown if ultrasound (US) can compensate this deficit. This study aimed at exploring US to differentiate CTS with demyelination only from that in association with axonal degeneration. We studied 39 demyelinated CTS hands and 154 demyelinated CTS hands with axonal degeneration in sensory median nerves by comparing cross-sectional area (CSA-W) and perimeter (P-W) of median nerve at wrist, ratio of CSA (R-CSA) and P(R-P) of wrist over mid-forearm measured by US. Results revealed significant differences in R-CSA ($p=0.013$) and R-P ($p=0.05$) while descriptive differences in CSA-W and P-W. ROC curves indicated significant accuracy of R-CSA (Area=.62, $p=.015$) and R-P (Area=.615, $p=.02$). The cut-off value of R-CSA to indicate CTS associated with axonal degeneration is 1.82 with sensitivity of 71.4% and specificity of 45% while 1.51 for R-P with sensitivity of 70% and specificity of 43%. Our findings were consistent with previous relevant studies and the result would be more robust should more cases be 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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