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A Pilot Study on Hand Palmar and Digital Nerve Ultrasound in Peripheral Nerve Diseases

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INTRODUCTION:
Palmar and digital nerves of the hand can be imaged with high resolution using ultrasonography because of their superficial anatomic locations. However, no studies have systematically evaluated these nerves in polyneuropathies.

OBJECTIVE:
Measure the cross-sectional area (CSA) and echogenicity (represented as % black) of the palmar and digital nerves of the hand in chronic polyneuropathies.

METHODS:
We studied 52 individuals: 26 with electrodiagnostically confirmed chronic peripheral nerve diseases (16 demyelinating/10 axonal) compared with 26 age and gender matched controls. Ultrasonography was performed in the median and ulnar nerves at: digit 2/5 lateral common palmar nerves at the distal palmar crease(D2/5-LCP), digital nerve to digit 2/5 at the metacarpophalangeal joint (D2/5-MP), distal wrist crease (DWC) and forearm (FA) with a 22mHz transducer (GE Logiqe R8). CSA and % black were measured using ImageJ.

RESULTS:
In demyelinating polyneuropathies, regardless of underlying pathology D2-LCP was significantly enlarged in CSA compared to axonal polyneuropathies ($3.23\pm0.399mm^2$ versus 1.17 ± 0.582 $mm^{2,}$ $p<0.001$) and healthy individuals ($3.23\pm0.399mm^2$ versus 1.306 ± 0.321, $p<0.001$). The % black of the D2-LCP, D2-MP, and D5-MP was significantly reduced in axonal polyneuropathies compared to demyelinating polyneuropathies ($35.4\pm7.72\%$, $41.9\pm6.97\%$, $46.6\pm6.54\%$ versus $53.0\pm9.25\%$, $63.8\pm7.11\%$, $62.9\pm5.66\%$ all $p>0.01$) and healthy individuals ($35.3\pm7.72\%$, $41.9\pm6.97\%$, $46.59\pm6.54\%$ versus $51.36\pm6.29\%$, $60.08 \pm8.71\%$, $59.4\pm7.11\%$ all $p>0.05$). No statistically significant difference in % black was seen in the DWC or FA.

SUMMARY/CONCLUSION:
In this pilot study we show digital and palmar nerves of the hand reproduces CSA enlargement of demyelinating polyneuropathies as reported in other nerves and may detect axonal loss in the form of increased intraneural echogenicity.

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