Ultrasonographic Evaluation of the Normal Ulnar Nerve: Cross-Sectional Area and Anthropometric Measurements

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Abstract

Introduction: Ulnar nerve entrapment is an infrequent disorder, but is often seen in long distance cycling. Electrodensitometry and imaging modalities have been used to evaluate the ulnar nerve CSA in multiple conditions. The goal of this study was to obtain ultrasonographic normative data of the ulnar nerve (UN) CSA of healthy volunteers using the GE LOGIQ E9. We hypothesized that the UN CSA in Guyon’s tunnel is influenced by factors. Anthropometric measurements were also obtained.

Methods: 40 healthy volunteers (male=30) were recruited (age=24.7 ± 4.5 years) and evaluated using ultrasound imaging and physical examination. A total of 83 wrists were examined, 41 dominant wrists and 42 nondominant wrists. Image processing was performed using the GE LOGIQ E9 ultrasound system; GE Healthcare, Milwaukee, WI. The CSA of the UN was measured using the ellipsoid formula, with measurement functions for both the sensory and motor branches of the UN, as well as intraexaminer reliability of the CSA measurements of the UN between three examiners were performed using the intraclass correlation coefficient with IBM SPSS 18 software. The CSA was measured in the transverse plane (Figure 2B). Intraneural hyperechogenicity was assessed using power Doppler in the transverse plane with the position of the field of view. The CA of the UN was measured using the ellipsoid and/or tracing functions on the GE LOGIQ E9. The CSA of the UN was correlated with wrist width, wrist depth, wrist circumference, palm length, hand width and UN CSA at 1.0 mm2 for females. There was a significant difference between female and male in the measurements of wrist width, depth, circumference, palm length, hand width and UN CSA at 1.0 mm2. There was a significant difference between the dominant and non-dominant hands, it is more practical to compare the contralateral hand with the asymptomatic hand of the same patient in order to make a conclusion of ulnar nerve enlargement. Multiple studies have validated the internal consistency of anthropometric variables and CSA for determining normal limits. Thus, we used the ultrasound CSA of the contralateral nerve as the control.

Conclusions: UN CSA of subjects in this study was different from that of reported studies. Varying CSA values can be attributed to differences in body type and wrist/hand size. Normal limits should be considered when evaluating both unilaterally and bilaterally.

Introduction

The annual incidence of upper extremity cumulative trauma disorders (CTD) ranges from 2.1 to 25.3% in industrial and clerical occupations [1,2], and carpal tunnel syndrome and cubital tunnel syndrome are the two most common. The ulnar nerve (UN) entrapment in the Guyon’s tunnel is less frequent, estimated to be one-to-two percent of that occurring in the carpal tunnel [3]. The CSA of the UN’s sensory branch is narrower than the unclassified carpal tunnel syndrome. Ultrasound imaging and Doppler were employed. The ultrasound CSA was measured at the sensory branch of the UN in Guyon's tunnel ([1, 2], and carpal tunnel syndrome and cubital tunnel syndrome are the two most common. The ulnar nerve (UN) entrapment in the Guyon’s tunnel is less frequent, estimated to be one-to-two percent of that occurring in the carpal tunnel [3]. The CSA of the UN’s sensory branch is narrower than the unclassified carpal tunnel syndrome. Ultrasound imaging and Doppler were employed. The ultrasound CSA was measured at the sensory branch of the UN in Guyon's tunnel ([1, 2], and carpal tunnel syndrome and cubital tunnel syndrome are the two most common. The ulnar nerve (UN) entrapment in the Guyon’s tunnel is less frequent, estimated to be one-to-two percent of that occurring in the carpal tunnel [3]. The CSA of the UN’s sensory branch is narrower than the unclassified carpal tunnel syndrome. Ultrasound imaging and Doppler were employed. The ultrasound CSA was measured at the sensory branch of the UN in Guyon's tunnel ([1, 2], and carpal tunnel syndrome and cubital tunnel syndrome are the two most common. The ulnar nerve (UN) entrapment in the Guyon’s tunnel is less frequent, estimated to be one-to-two percent of that occurring in the carpal tunnel [3]. The CSA of the UN’s sensory branch is narrower than the unclassified carpal tunnel syndrome. Ultrasound imaging and Doppler were employed. The ultrasound CSA was measured at the sensory branch of the UN in Guyon's tunnel ([1, 2], and carpal tunnel syndrome and cubital tunnel syndrome are the two most common. The ultra...