



A Comparison of Ultrasound and MRI Measurements of the Cross-Sectional Area of the Median Nerve at the Wrist

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Introduction

- Ultrasound (US) measurement of the cross-sectional area (CSA) of the median nerve has emerged as a viable alternative to the use of electromyography/nerve conduction studies (EMG/NCS) for the diagnosis of carpal tunnel syndrome (CTS).
- In a classic study, Buchberger *et al.* (1992) compared the CSA of the median nerve using magnetic resonance imaging (MRI) and US. The authors found US to be an accurate method to measure the CSA of the median nerve, but did not specifically report the mean difference between US and MRI measurements and did not provide the strength of correlation.
- The purpose of this study is to compare CSA of the median nerve between US and MRI using current MRI and US technology.
- The null hypothesis is that there is no difference between US and MRI CSA measurements.

Methods

- Observational cohort design, enrolling patients who presented to clinic for evaluation with MRI of the wrist for a diagnosis other than carpal tunnel syndrome.
- MRI measurements of CSA of the median nerve on T1 weighted axial images of the wrist were performed by a hand fellow blinded to the results of US measurements and US measurement of median nerve CSA was performed by a hand fellowship trained surgeon blinded to the results of the MRI measurements.
- The measurements were analyzed via percent error, Pearson correlation, and t-tests.

Figure 1.

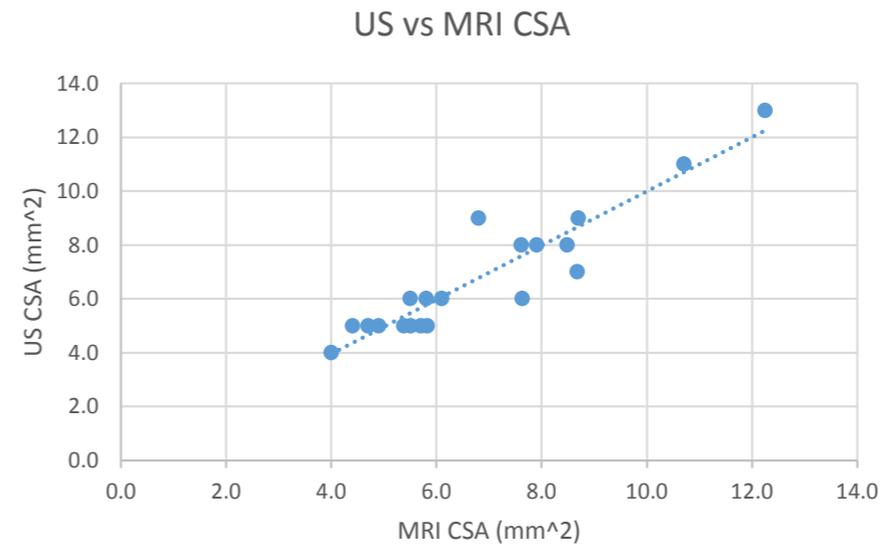


Figure 1. US vs MRI CSA. 20 measurements of CSA of the median nerve at the level of the pisiform.

Results

- Twenty subjects were enrolled, mean age 29.4, 4 left and 16 right wrists. Diagnoses included but were not limited to scaphoid fracture, ganglion cyst, and triangular fibrocartilage complex tear.
- Mean CSA of the median nerve on US was 6.8mm^2 ($\pm 2.330\text{mm}^2$), and mean CSA of the median nerve on MRI was 6.8mm^2 ($\pm 2.153\text{mm}^2$), $P = 0.442$.
- Pearson correlation between modalities was 0.93.
- Mean percent error was 8.8%.

Conclusion

- Results of this study confirm the work of Buchberger and colleagues and suggest that US is an accurate method to measure the CSA of the median nerve at the carpal tunnel inlet.
- The mean difference between US and MRI was small and unlikely to be of clinical significance.
- Limitations:
 - Subjects in this study did not have clinical signs and symptoms of CTS. It is possible that US measurements of the median nerve in patients with CTS would not correlate with MRI measurements.
 - Potential that MRI is an imperfect reference standard.
 - Only one specific site of median nerve was measured (at the level of the pisiform), therefore potential for other sites to show less correlation between US and MRI.