

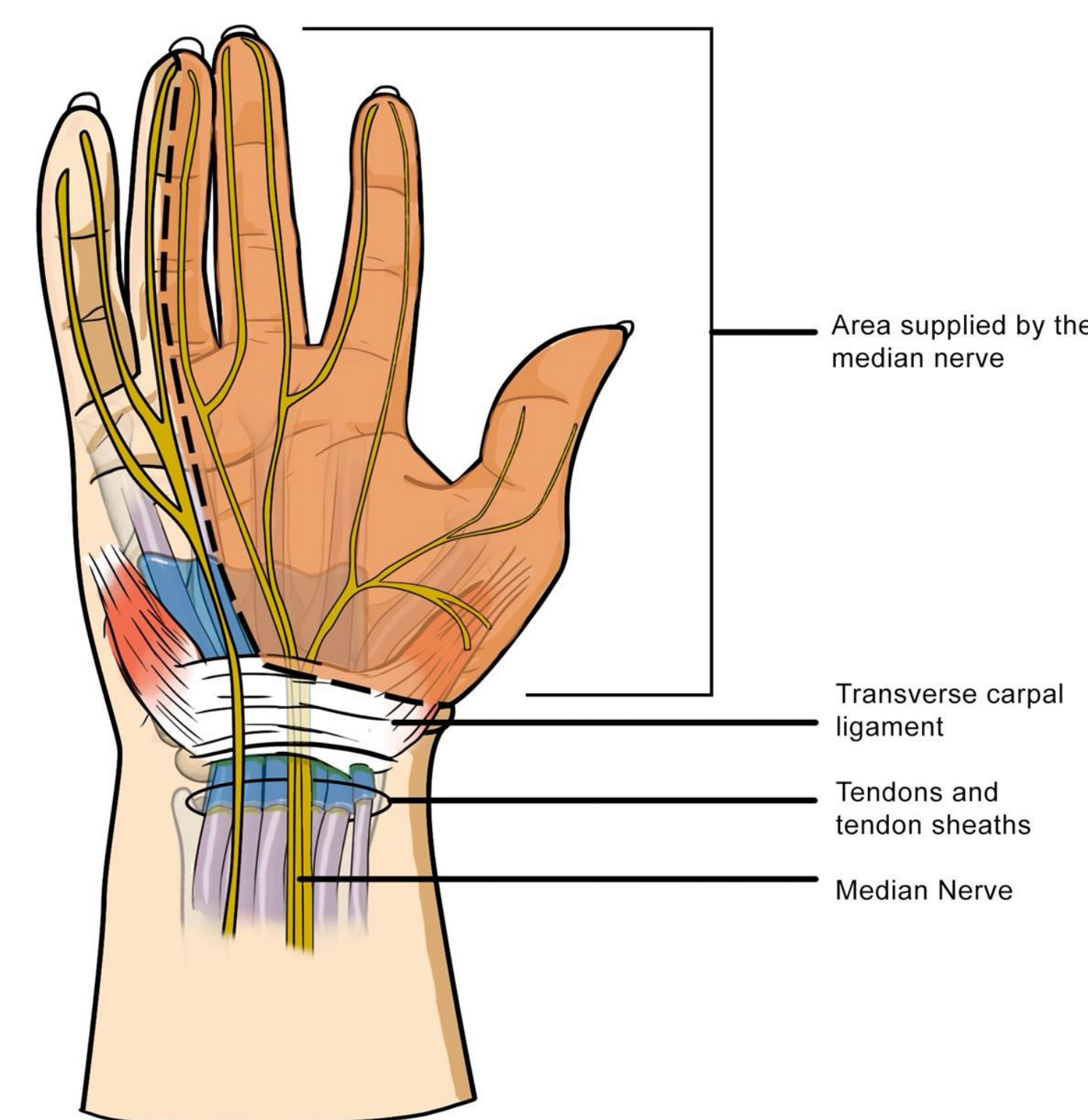
Introduction

Multiple diagnostic modalities are useful for the evaluation and treatment of upper extremity peripheral nerve pathologies. Ultrasound has emerged as a particularly useful tool for the evaluation of carpal tunnel syndrome (CTS).

CTS occurs as a result of compression of the median nerve leading to paresthesia in a specific hand distribution. While nerve conduction studies and electromyography remain the gold standard for CTS diagnosis, ultrasound has emerged as a promising adjunctive tool.

Objective

The aim of this observational study was to record and analyze ultrasound measurements evaluating median nerve cross sectional area (CSA) at three distinct levels: pre-tunnel (level of the lunate), intra-tunnel (level of the hook of the hamate), and post-tunnel (prior to the distal median nerve split)

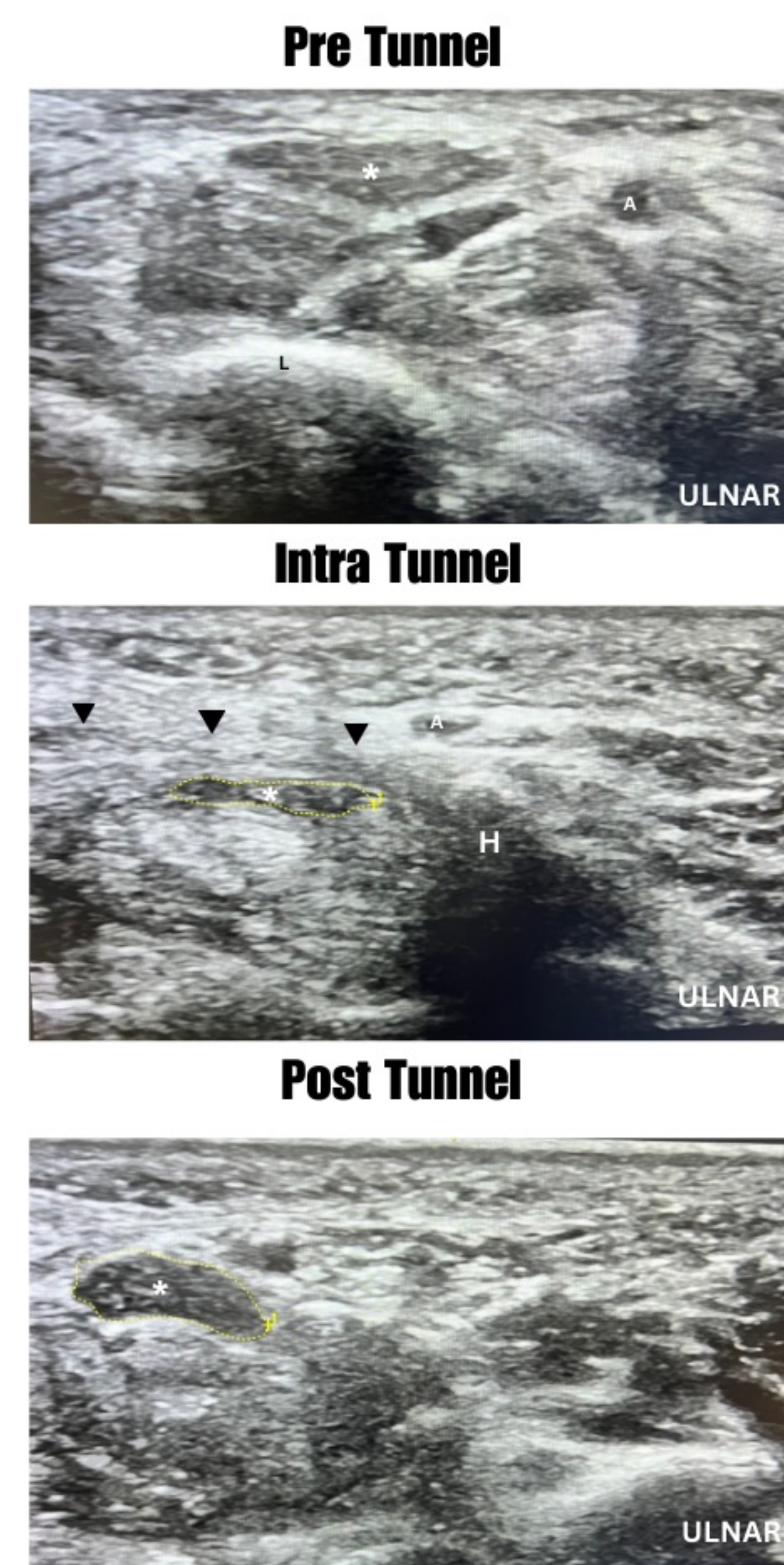


Methods

An observational study was conducted on patients diagnosed with CTS. Sonography was performed using a GE Logiq 12 MHz linear transducer.

Median nerve CSA was measured at the specified levels below and statistical analysis was performed to determine percentage change in median nerve CSA.

Figure 1: Ultrasound Images



KEY
 Asterisk: Median Nerve
 A: Ulnar Artery
 L: Lunate
 Black Triangles: Transverse Carpal Ligament
 H: Hamate

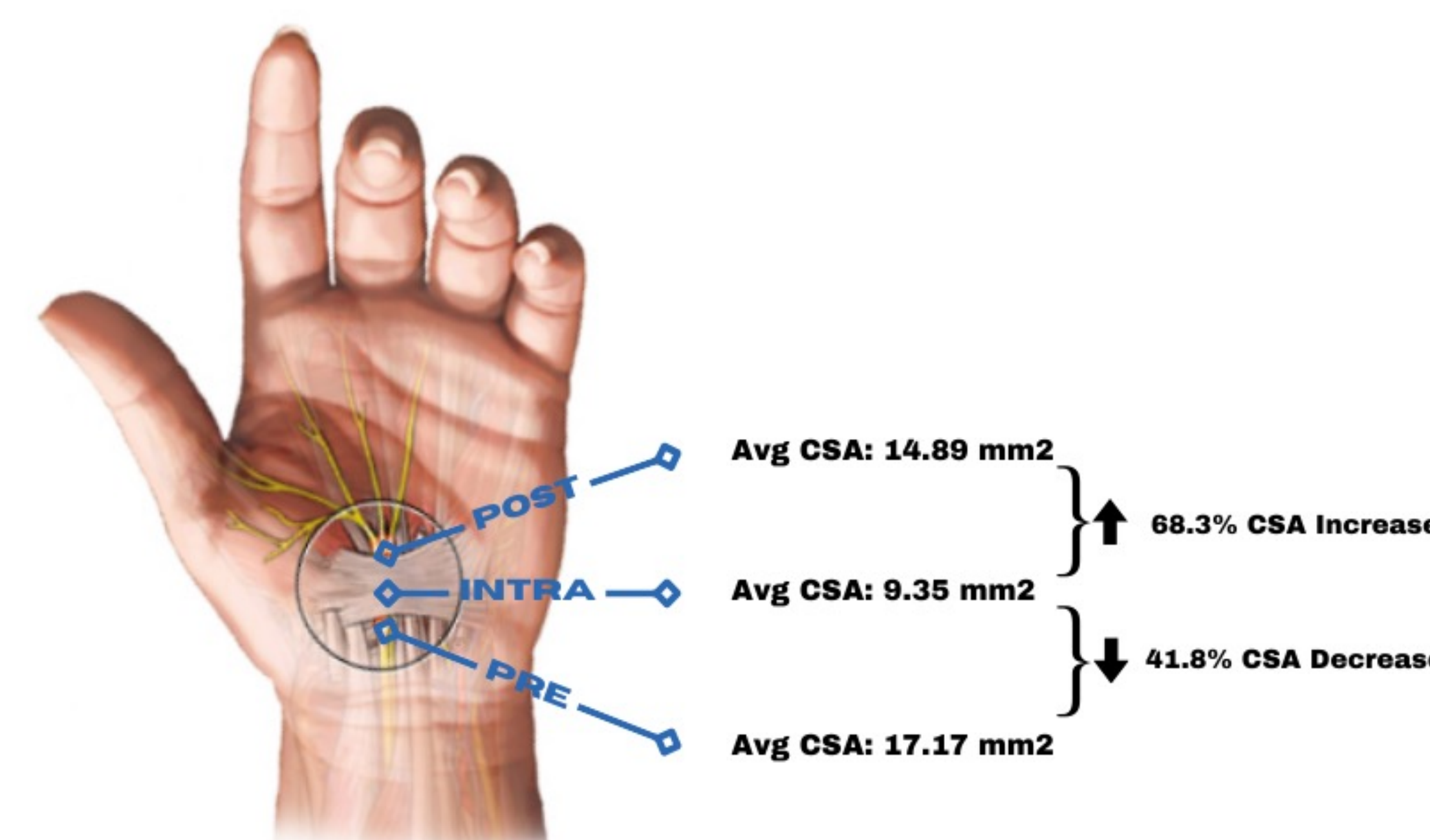
Results

Thirty-five patients (21 female, 14 male; mean age 60.7 years) were included, with 54 symptomatic wrists evaluated.

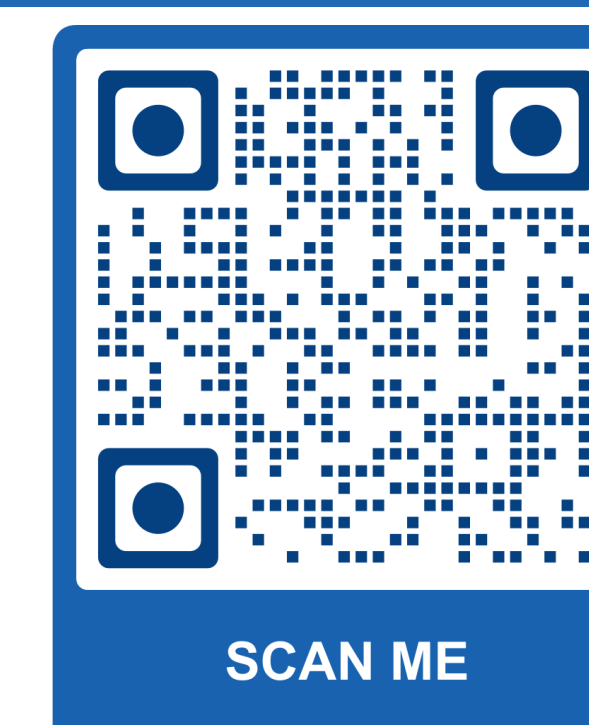
Mean pre-tunnel and intra-tunnel median nerve CSA measurements were $17.17\text{mm}^2 \pm 5.9\text{mm}^2$ and $9.35\text{mm}^2 \pm 2.9\text{mm}^2$, respectively. Post-tunnel median nerve CSA mean measurement was $14.89\text{mm}^2 \pm 4.2\text{mm}^2$.

Statistical analysis revealed a 41.8% reduction in median nerve CSA between pre-tunnel and intra-tunnel levels and a 68.3% increase from intra-tunnel to post-tunnel.

Figure 2: Measurements



Presentation QR



Conclusion

Median nerve CSA measurements as it courses through the anatomical carpal tunnel demonstrated compression of 41.8% upon entering the tunnel and enlargement of 68.3% while exiting. Specifically, this post-tunnel enlargement phenomenon was observed and has not been described in the literature.

Significance

Given the clinical utility and increasing use of portable ultrasound, sonography has the potential for improved management of CTS. The observed post-tunnel enlargement with future studies could potentially streamline diagnostic pathways and reduce reliance on additional testing. Specifically, it could provide useful quantifiable data that may allow for a reduction in additional testing such as electromyography studies and nerve conduction studies leading to improved time to treatment and cost benefits for patients.

Future Studies

Future studies include gathering data on control wrists that do not have CTS and to analyze median nerve CSA enlargement with well established screening questionnaires such as the Carpal Tunnel Questionnaire (CTQ) to see if correlation exists between CSA and scores.