ROLE OF DYNAMIC SONOGRAPHY IN ULNAR NERVE ENTRAPMENT AT ELBOW

An Essay

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Dedication

To the soul of my father.

And to my mother, family and friends with love

for their never ending-support.

Salwa

Abstract

The development of high resolution ultrasound has allowed evaluation of normal and abnormal ultrasound appearance of the ulnar nerve. Ultrasound provides a unique method for evaluation of the ulnar nerve at the elbow because it allows direct imaging of nerve as well as changes in nerve shape, size, echo texture & position during dynamic sonographic study of the nerve.

The high resolution dynamic ultrasound helps in evaluation of the ulnar nerve during the extension & different degrees of elbow flexion. It has the ability to follow nerve over a long distance in a limb. The color and power Doppler improve the ability to evaluate the nerve by evaluation of nearby vessel.

Entrapment neuropathy of the ulnar nerve at elbow is a disorder results from injury to a nerve as it travels through cubital osteofibrous tunnel.

Ultrasound provides a unique opportunity for clinicians to discover anatomic correlation for clinical and electrophysiological findings in patients with nerve entrapment. The US proved efficacy both as a first-line and in the follow-up period. US revealed morphological information about the exact location, intensity and extent of nerve entrapment.

Key word:

1. Ultrasound
2. nerve entrapment
3. upper limb

List of Contents

List of Abbreviations

UNE	**Ulnar Nerve Entrapment syndrome**
EN	**Entrapment Neuropathy**
PN	**Peripheral Nerve**
UN, UL	**Ulnar Nerve**
MSUS	**Musculoskeletal Ulrasound**
HRUS	**High Resolution Ultrasound**
US	**Ultrasonography**
FCU	**Flexor Carpi Ulnaris muscle**
CSA	**Cross Sectional Area**
FR	**Flattening Ratio**
BDR	**Breadth Depth Ratio**
HNPP	**Hereditary Neuropathy with liability toPressure Palsies**
CI	**Confident Interval**
MCL	**Medial Collateral Ligament**
ME	**Medial Epicondyle**
LE	**Lateral Epicondyle**
OLE, OL	**Olecranon process**
MRI	**Magnetic Resonance Imaging**
CT	**Computed Tomography**
MCP	**Metacarpophalangeal joint**
IP	**Interphalangeal joint**
TM	**Triceps muscle**
BM	**Body Mass Index**

List of Tables

List of Figures

INTRODUCTION

Ulnar nerve Entrapment at elbow is the second most common entrapment neuropathy after the median nerve entrapment at the wrist, is relatively common clinical syndrome characterized by neurologic manifestations caused by mechanical or dynamic compression of the ulnar nerve at elbow. Radiologists are often required to evaluate ulnar nerve entrapment at elbow to rule out soft tissue lesions as a potential cause of the syndrome **(Beltran and Rosenberg 1994).**

The diagnosis of ulnar nerve entrapment at cubital osteofibrous tunnel relies primarily on clinical and electrodiagnostic findings. Electrodiagnostic technology has evolved at a slower pace than imaging and if the trends continue imaging could begin to supplant some current forms of diagnostic evaluation of nerve function **(Walker et al., 2004).**

High-resolution ultrasonography (HRUS) can be used to clarify a suspected diagnosis of ulnar nerve entrapment (UNE) neuropathy at the elbow using assessments of nerve shape, echogenicity and the appearances of the surrounding anatomy. A small number of studies have provided evidence that HRUS measurements of the ulnar nerve diameter and cross-sectional area can discriminate between individuals with and without UNE. Therefore, HRUS measurements offer potential quantitative tools for the diagnosis of UNE.

The refinement of high-frequency broadband transducers with a range of 5–15 MHz, sophisticated focusing in the near field and sensitive color & power Doppler technology have improved the ability to evaluate the ulnar nerve entrapment in cubital osteofibrous tunnel with high resolution ultrasonography **(Martinoli et al., 2000).**

High-resolution ultrasound is a rapidly developing technique that is gaining popularity for the evaluation of the ulnar nerve, especially the entrapment neuropathy. The refence values obtained in this study could be used for the ultrasonographical diagnosis and follow-up of the ulnar nerve lesions. The analyzed relations of nerve cross-sectional area, flattening ratio as well as width & depth of cubital groove during elbow extension & different degrees of elbow flexion will be particularly helpful to interpret the reference values according to individual confounding factors.

Electrodiagnostical evaluation of ulnar nerve lesions sometimes could be a challenging deal even for the experienced electrophysiologist. Nerve conduction studies may fail to localize and diagnose ulnar nerve lesions with purely sensory fibers involved or lesion with selective fascicular involvement. Also, ulnar nerve displacement at the elbow could cause errors in distance measurement and also overestimation of nerve conduction velocity. This overestimation may cause false-negative diagnosis. It is stated that when electrodiagnostic evaluation is normal, patients with clear symptoms of ulnar neuropathy and ulnar nerve displacement probability should be considered and ultrasonography would be beneficial for further research **(Bayrak et al., 2010).**