

## Comparative Analysis of 100 Patients with Clinical Diagnosis of Carpal Tunnel Syndrome and EMG-ENG for Confirmation. Comparison of Distal Motor Latencies of the Median Motor in Relation to The Classic "Comparison of Interpeptic Sensory Latencies Between The 4<sup>th</sup> Median-Ulnar Antidromic Finger". Relationship Between Both Values

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**Figure 1:** Courtesy of the book "ELECTROMIOGRAPHY AND NEUROMUSCULAR DISORDERS" David Preston and Barbara E. Shapiro. Edition 2. Editorial Elsevier.

### Abstract

In this study, we would like to emphasize the comparison of the 4<sup>th</sup> median-ulnar finger antidromic technique recognized and used in a large number of neurophysiology laboratories worldwide, in addition to other determinations and relate these values to the motor latency of the median.

According to the Spanish EMG manual of Dr. Jimenez [1,2] in his "Manual of clinical electromyography". The comparison in the antidromic sensory conduction of the median and ulnar nerves between the wrist and the 4th finger where the driving distance is about 14 cm in both cases, interim latency values greater than 0.35 msec. and the latency of the start of the sensory potential greater than 0.43 msec. they are abnormal, the higher value corresponding to the antidromic sensitive evoked potential of the median.

**Keywords:** Comparative Analysis; Clinical Diagnosis

### Introduction

The median nerve at the level of the wrist undergoes continuous friction and microtrauma with the transverse carpal ligament, many of them motivated by work, especially in people who exercise continuous repetitive movements of dorsiflexion of the wrist, this type of movements generate a selective destruction of the myelin sheath of the nerve (neurapraxia) that, if maintained over time, also begins to generate destruction of the sensory and motor axonal fibers of the median nerve (neurapraxia-axonotmesis). This

is translated at the level of sensory and motor neurography as delay of sensory and motor latencies of the median nerve, delay of the sensory and then motor conduction velocities, temporal dispersion of the potential and finally fall of the sensory and motor amplitudes of the nerve. In this study, we would like to emphasize the comparison of the 4th median-ulnar finger antidromic technique recognized and used in a large number of neurophysiology laboratories worldwide, in addition to other determinations and relate these values to the motor latency of the median.

According to the Spanish EMG manual of Dr. Jimenez [2] in his "Manual of clinical electromyography". The comparison in the antidromic sensory conduction of the median and ulnar nerves between the wrist and the 4th finger where the driving distance is about 14 cm in both cases, interim latency values greater than 0.35 msec. and the latency of the start of the sensory potential greater than 0.43 msec. they are abnormal, the higher value corresponding to the antidromic sensitive evoked potential of the median.

### Methodology

Comparatively, 100 patients with carpal tunnel syndrome diagnosed from the clinical point of view and confirmed from the EMG-ENG point of view are analyzed comparatively. Randomized patients with values for pathological carpal tunnel syndrome, mild, moderate and severe cases, and we simply focused on the comparison of the 4th median -cubital finger and its distal motor lag of the median. The interphasic latencies are compared between the 4th median-ulnar finger and the motor latencies of the median, in order to elaborate a graph of the distribution of values, and to see the synchrony of these numerical values, their coherence and their distribution by graphs. The ages of the patients range from 18 years to 76 years. With an average of 41.4. Other associated pathologies have been excluded from the study, and patients with normal values and without CKD symptoms. All the patients have undergone the same type of neurography exploration, all have signed their corresponding informed consent for the realization of the test, and for the realization of the study, they are all patients of our sanitary area and all come via domiciliary, sent for the services of Traumatology, Neurology, Rheumatology, Rehabilitation, Pain Unit And Health Center Area Ii Of Cartagena. Murcia:

Antidromic sensory neurography of the median 2nd, 3rd and 4<sup>th</sup> finger affected hand.

Neurography of ulnar antidromic sensitive ulnar - 5th finger.

Comparison of interphasic latencies between 4th middle finger - ulna 4th finger 12 - 14 cm according to the size of the patient's hand, but always with the same stimulation distance for both nerves.

Motor neurography of the median on the wrist and elbow affected hand.

Electrodes with a cable and stickers that record the sensory and motor potential very well, very similar to the one obtained with rings, were used for recording electroneurography. With a last generation electromyograph acquired 1 year ago, from the brand NATUS-NEUROLOGY (which mixes the potential of Keypoint and

Synergy). All the patients were explored in the same way, sitting on the stretcher looking at the electromyography equipment, with an ambient temperature between 22 and 27 degrees Celsius, the studies were performed with a brand-new electromyograph NATUS-NEUROLOGY acquired in our service less than 1 year ago. December 2017.

Figure 2

Filters are used for the EMG of 10 Hz and 3000 Hz. Analysis time 2 msec / division and a sensitivity of 20 microvolts / division. The duration of the stimulus was 0.1 msec. and a supra maximum intensity. The stimulation frequency was 2 Hz. For mixed neuroimaging and antidromic sensitivity in which between 15 - 45 averages were used to obtain the sensory potential. Once the data we wanted for our study was obtained, they were submitted to an EXCEL database that was subsequently imported into our article.

I wanted to place special emphasis on the comparison, analysis and distribution of the 100 values obtained, of the 100 patients studied. Comparing this way the distal motor latency obtained with respect to the comparison 4<sup>o</sup> finger medium-ulnar sensitive antidromic.

Several authors agree in affirming the superiority of the comparative study 4<sup>o</sup> middle finger - ulnar 4<sup>o</sup> antidromic finger [3-5] with respect to other techniques, these studies showed the most relevant diagnostic accuracy of the comparison 4<sup>o</sup> middle finger - ulna between other studies comparative According to Jarvik, the sensitivity of the comparative median-cubital study in palm is 66% with a specificity of 95% and that of the median-ulnar 4th finger is 82% sensitivity and a specificity of 95%.

**Figure 3:** Median sensitive normal antidromic model in comparison 4<sup>th</sup> mid-ulnar toe.

**Figure 4:** Pathological middle sensitive antoidromic model. in comparison 4<sup>th</sup> finger medinao - ulnar. In this case, the comparison of the 4<sup>th</sup> median-ulnar antidromic finger is 1.3 msec. it is pathological if it is greater than 0.5 msec.

**Figure 5:** Medium model MOTOR The motor latency in the case above is 3.49 msec. lower than 4 msec. normal motor latency. With affectation of the sensitive potential.

The comparison 4<sup>o</sup> median finger - cubital antidromic is used by many laboratories of Neurophysiology, in this study the record of the medium sensitive 4th finger is compared with the record

of the ulnar in 4th finger at the same distance of stimulation between both records. In normal individuals there should not be a significant difference between the two inter-latencies, or start interjacentes. In fact, both latencies interpeak and start interjacentes are correlative, if one increases increases the other. The absolute latency of the median sensitive antidromic nerve is pathological when the latency exceeds 3.5 msec. and when the 4th mid-cubital finger comparison is greater than 0.5 msec.

The normal antidromic sensory nerve conduction values for the median 2nd finger is a peak latency of the negative phase less than 3.5 msec. an amplitude greater than or equal to 20 microvolts, a VCS of more than 50 m / sec at a distance of 13 cm from the recording electrode to the stimulus. The comparison in the antiaromatic sensory conduction of the median and ulnar nerves between the wrist and the 4th finger with a distance of 13 - 14 cm in both cases, has inter-latency values between the 4th median-ulnar finger greater than 0.35 msec. and a start latency value of the antidromic sensitive potential greater than 0.43 msec. Higher values are abnormal [2], the higher value corresponding to the potential sensitivity evoked in the median nerve.

It can happen that in cases of associated neuropathy in the ulnar canal or in an isolated lesion of the ulnar sensory 5th finger, this potential is not present or is pathological, with a delay of the sensitive antidromic latency, in these cases a comparison can be used alternative and validated by our society that is the comparison of interested latencies 4<sup>o</sup> finger medium-radial antidromic and is pathological if it is superior to 0.5 msec. (two). In these cases, the presence of latencies of the damaged or delayed ulnar tell us about the associated pathology of the ulnar nerve. (Syndrome Ulnar Canal).

We have 100 patients of both sexes, mostly women, and the following latency values have been obtained:

**Figure 6**

In this previous graph we can see the distribution of the 100 patients, comparing the motor latency of the median and the comparison value of the 4<sup>th</sup> median and ulnar finger, in red the values are around 0.5 - 0.9 that would be considered the light STC. In Green, values would be around 1-2 msec. which would be mild-moderate or moderate STC, dark blue would be MODERATE STC values and have comparisons around 3.0 - 4.0 msec. and in light blue, the most severe cases would be found with comparison values greater than 5 and less than 9 msec. that would correspond to severe STCs. It can be observed in the distribution graph a synchrony of the values, to more comparison more affectation of the myelin sheath of medium and more motor latency, more injury of the motor fibers. The greater the sensory involvement, the greater the motor affectation. It is seen that the table of values shows a linear distribution, that is, as the comparison of the 4<sup>th</sup> median-ulnar finger increases, the motor latencies of the nerve increased, it makes sense insofar as the lesion has different degrees, an affectation that matters Sensory goes hand in hand with an affectation also of the recurrent branch of the median to abductor pollicis brevis muscle, that increase of motor latency, which is pathological with values greater than or equal to 4 msec. It translates a more or less marked affectation of the myelin sheath of the median motor. They are therefore two values to be taken into account when issuing a diagnosis and a degree of involvement of the median nerve in the suspicion of a CTS (carpal tunnel syndrome).

**Conclusions**

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The normal antidromic sensory nerve conduction values for the median 2<sup>nd</sup> finger is a peak latency of the negative phase less than 3.5 msec., an amplitude greater than or equal to 20 microvolts, a VCS of more than 50 m / sec at a distance of 13 cm from the recording electrode to the stimulus. The comparison in the antiaromatic sensory conduction of the median and ulnar nerves between the wrist and the 4th finger with a distance of 13 - 14 cm in both cases, has inter-latency values between the 4<sup>th</sup> median-ulnar finger greater than 0.35 msec. and a start latency value of the antidromic sensitive potential greater than 0.43 msec. Higher values are abnormal [2], the higher value corresponding to the potential sensitivity evoked in the median nerve.

COMPARISON 4 <sup>th</sup> MEDIUM CUBITAL FINGER MSEC	MSEC MEDIUM DISTAL MOTOR LATENCY
	Columna2
0.4	3.2
0.6	3.3
0.7	3.1
0.8	3.0
1.5	6.2
2.3	4.6
0.7	3.1
0.6	3.1
0.7	3.0
4.2	6.7
1.3	4.1
0.7	2.9
0.5	3.0
0.6	3.0
1.4	3.7
1.5	4.1
1.3	4.2
0.5	2.8
0.5	3.0
0.8	2.7
3.49	5.3
3.0	5.4
0.8	3.2
2.4	4.6
2.9	5.5
3.4	6.2
0.7	2.9
1.5	4.8
1.6	4.7
0.9	3.8
3.4	4.1
0.7	2.9
3.4	4.1
0.7	2.9
1.2	3.5
0.6	2.8
0.5	2.7
1.5	4.4
1.6	4.5

1.7	4.1
1.2	3.9
3.0	5.6
1.1	3.5
2.5	5.9
1.6	4.2
1.7	3.9
0.9	3.8
4.7	6.7
3.4	7.1
1.9	4.9
1.4	3.7
1.7	4.7
1.3	3.7
1.4	4.0
0.8	3.6
3.3	6.0
5.3	7.5
8.1	6.8
0.5	3.0
0.7	3.1
0.6	3.2
0.8	2.7
1.7	4.2
0.9	3.5
1.9	4.0
0.8	3.1
1.5	3.4
0.6	3.0
4.0	6.7
4.7	5.7
3.3	6.0
5.3	7.5
9.4	6.8
1.7	4.7
1.4	4.0
0.8	3.6
3.3	6.0
5.36	7.5
9.4	7.8
0.5	3.0
1,7	4.2
1.9	4.06
1.5	3.4

1.0	2.9
2.0	4.4
1.7	3.8
1.5	4.2
2.2	4.2
5.8	6.7
1.15	3.7
2.7	5.9
6.4	10.6
3.3	4.6
1.15	3.8
1.4	3.9
0.5	2.6
1.9	4.0
1.3	3.5
1.5	3.8

**Table 1**

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Face to the diagnosis and the degree of involvement and prognosis would consider not only the clinic of the patient, but the comparison 4<sup>o</sup> median-ulnar finger with a sensitivity of 82% and a specificity of 95% and the motor latency of the median nerve at the level of the muscle abductor pollicis brevis.

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