

CARPAL TUNNEL SYNDROME

AGE, NERVE CONDUCTION SEVERITY AND DURATION OF SYMPTOMATOLOGY

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ABSTRACT - Median sensory and motor distal latencies (SDL/MDL) were correlated with age and duration of symptomatology in 1498 carpal tunnel syndrome (CTS) patients (17-90 years old, 87.6% female). Patients were distributed in four groups according to distal latencies severity. There was an increase in age as long as SDL/MDL became more severe, ranging from 47.5 to 67 years old (mild to severe-absence potentials in both hands groups, respectively). There was a less dramatic increase in duration of complaints as long as SDL/MDL became more severe, ranging from 12 to 30.7 months (mild to severe-absence potentials in both hands groups, respectively). Aging correlates more positively than duration of complaints with severity of SDL/MDL in CTS. The effects of increasing median blockage in CTS are more severe as long as patients become older regardless duration of symptomatology.

KEY WORDS: carpal tunnel syndrome, median nerve, entrapment neuropathy, compression neuropathy, nerve conduction study.

Síndrome do túnel do carpo: correlação de idade, anormalidade de condução nervosa e tempo de sintomatologia

RESUMO - Latências distais sensitivas e motoras (LDS/LDM) do nervo mediano foram correlacionadas com idade e duração da sintomatologia em 1498 pacientes com síndrome do túnel do carpo (STC); a idade variou de 17 a 90 anos e 87,6% eram do sexo feminino. Os casos foram distribuídos em quatro grupos de acordo com a gravidade das latências distais. Houve aumento de idade proporcional ao aumento de LDS/LDM, variando de 47,5 a 67 anos nos grupos leve e grave-ausência de potenciais nas duas mãos, respectivamente. Houve aumento menos dramático na duração da sintomatologia proporcional ao aumento de LDS/LDM, variando de 12 a 30,7 meses nos grupos leve e grave-ausência de potenciais nas duas mãos, respectivamente. O aumento da idade correlaciona-se melhor que a duração da sintomatologia com o aumento de LDS/LDM. Os efeitos do aumento do bloqueio do nervo mediano no STC são mais graves com o avanço da idade, independentemente da duração da sintomatologia.

PALAVRAS-CHAVE: síndrome do túnel do carpo, nervo mediano, neuropatia compressiva, condução nervosa.

Carpal tunnel syndrome (CTS) is the most common nerve entrapment in upper extremities¹⁻³. Median nerve is compressed in carpal tunnel, 2-4 cm distal to wrist groove where it passes together with nine flexor tendons; the thick transverse carpal ligament covers it and usually the focal demyelination occurs at the distal border.

Nerve conduction studies have been used to assess nerve compression for more than 30 years^{4,5} but unfortunately, in spite of many papers, little is known about nerve conduction severity, age and

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duration of complaints. Does increase in age represent an additional risk for CTS nerve conduction severity or just follows the increase in symptomatology duration being the patients obviously older?

The purpose of this study is to correlate median sensory and motor distal latencies abnormalities with age and duration of symptomatology in 1486 CTS patients.

METHOD

From January 1989 to September 1998, 1498 CTS patients were selected from electrodiagnostic data of the author's clinic. The age ranged from 17 to 90 years old and 87.6% (1301 patients) were female. All cases were symptomatic, the most frequent being nocturnal hands numbness/paraesthesia.

Nerve conduction studies, done in all cases and used at the present study included: 1. Median segmental sensory distal latency (SDL), wrist to index finger, 140 mm, onset-measured; 2. Median motor distal latency (MDL), wrist to thenar region (abductor pollicis brevis muscle) and 80 mm fixed distance. All tests were done by the author at the same EMG instrument; room temperature was controlled to be above 20°C and under 28°C and hands were warmed by immersion on hot water when necessary; percutaneous stimuli were delivered until supramaximal response obtained; pulse duration were 0.05 ms for sensory and 0.2 ms for motor stimulation; filters were set at 10 Hz and 10 kHz; the sweep speed was set at 2 ms per division; one-centimeter disc recording, either platinum or disposable electrodes, were used for motor studies and ring electrodes for sensory studies; ground was placed with Velcro around forearm.

According to median SDL as described above, patients were put in four groups: 3.0 to 3.5 ms (mild CTS), 3.6 to 4.5 ms (moderate CTS), above 4.5 ms (severe CTS) and absence of sensory nerve action potential (severe-abs CTS).

According to median MDL as described above, patients were put in four groups: 3.8 to 4.5 ms (mild CTS), 4.6 to 6.0 ms (moderate CTS), above 6.0 ms (severe CTS) and absence of compound muscular action potential (severe-abs CTS).

The variables analyzed on groups were: side, either right and left, number of hands, age (range, mean, median and standard deviation) and duration of complaints in months (range, mean, median and standard-deviation).

RESULTS

All variables analyzed and correlated with the SDL and MDL severity groups are shown on Tables 1-4.

Table 1. Groups of median SDL (index finger, 14 cm, onset-measured) severity correlated with age.

	L (ms)	Hands	Age-Range	Mean	Median	SD
Right	3-3.5	520	17-90	48.5	49	12.2
Left	3-3.5	452	17-82	48.5	49	11.9
Right	3.6-4.5	350	19-82	48.4	48	11.7
Left	3.6-4.5	290	19-81	50.1	50	12.4
Right	> 4.5	112	25-77	51.1	52	11.5
Left	> 4.5	81	29-93	52.5	52	12.5
Right	unrec	180	17-93	56.2	56	13.1
Left	unrec	117	21-90	58.7	59	13.6
Right + Left	unrec	68	21-88	59.1	60	14.1
Total		2102	17 - 93			

SDL, sensory distal latency; L, latency; ms, milliseconds; unrec, unrecordable; SD, standard deviation.

Table 2. Groups of median SDL (index finger, 14 cm, onset-measured) severity correlated with duration of symptomatology.

	L (ms)	Hands	Months-Range	Mean	Median	SD
Right	3-3.5	448	1-120	29.9	12	36.8
Left	3-3.5	361	1-120	31.0	12	38.6
Right	3.6-4.5	335	1-120	37.5	18	41.8
Left	3.6-4.5	266	1-120	36.3	12	44.2
Right	> 4.5	112	1-120	52.0	24	48.2
Left	> 4.5	75	1-120	45.0	24	46.6
Right	unrec	175	1-120	43.8	24	45.9
Left	unrec	115	1-120	40.7	18	45.2
Right + Left	unrec	66/R	1-120	53.1	31.5	49.0
Right + Left	unrec	66/L	1-120	52.4	30	49.6
Total		1887				

SDL, sensory distal latency; L, latency; ms, miliseconds; unrec, unrecordable; SD, standard deviation.

Table 3. Groups of median MDL (thenar, 8 cm) severity correlated with age.

	L (ms)	Hands	Age – range	Mean	Median	SD
Right	3.8-4.5	452	19-81	47.4	47	12.0
Left	3.8-4.5	501	17-79	47.9	48	11.4
Right	4.6-6.0	531	17-93	49.3	49	12.4
Left	4.6-6.0	395	20-82	49.9	50	12.0
Right	> 6.0	260	17-88	51.0	50.5	12.1
Left	> 6.0	203	19-93	54.0	53	14.5
Right	unrec	41	21-78	61.0	61	12.4
Left	unrec	18	40-78	62.0	60.5	10.7
Right + Left	unrec	10	52-78	65.4	67	9.8
Total		2401	17-93			

MDL, motor distal latency; L, latency; ms, miliseconds; unrec, unrecordable; SD, standard deviation.

There was a clear increase in age (median) as long as SDL and MDL were becoming more severe: mild, 49 and 47.5 years old (sensory and motor respectively); moderate, 49 and 49.5; severe, 52 and 51.7; severe-abs, 57.5 and 60.7 and severe-abs (both hands), 60 and 67.

There was also a clear but much less dramatic increase in duration of complaints (median) as long as SDL and MDL were becoming more severe: mild, 12 months (sensory and motor); moderate, 15 and 14.2 (sensory and motor respectively); severe, 24 and 23.5; severe-abs, 21 and 23.5 and severe-abs (both hands), 30.7 and 30.5.

Table 4. Groups of median MDL (thenar, 8 cm) severity correlated with duration of symptomatology

	L (ms)	Hands	Months - range	Mean	Median	SD
Right	3.8-4.5	376	1-120	26.9	12	35.9
Left	3.8-4.5	366	1-120	31.1	12	39.1
Right	4.6-6.0	492	1-120	35.6	16.5	40.6
Left	4.6-6.0	352	1-120	33.8	12	41.3
Right	> 6.0	256	1-120	47.6	24	47.0
Left	> 6.0	195	1-120	42.4	23	46.1
Right	unrec	41	1-120	45.5	24	46.5
Left	unrec	18	3-120	43.9	23	46.9
Right + Left	unrec	10/R	3-120	51.2	32	50.4
Right + Left	unrec	10/L	3-120	50.6	29	50.7
Total		2096				

MDL, motor distal latency; L, latency; ms, miliseconds; R, right; L, left; unrec, unrecordable; SD, standard deviation.

From mild to severe-abs (both hands) there was an increase (median) of 11 years (132 months) in age for SDL and 19.5 years (234 months) for DML.

From mild to severe-abs (both hands) there was an increase in duration of complaints (median) of 18.7 months for SDL and 18.5 months for MDL.

DISCUSSION

Carpal tunnel syndrome natural history is not completely understood. We may suppose that as a compressive neuropathy the focal abnormality, mostly nodal or paranodal demyelination, tends to deteriorate with time. If this concept is true we would expect a positive correlation between increasing in duration of complaints, severity of SDL/MDL and age.

Age is a known factor of increasing distal sensory/motor latencies but the published data has shown slight increased values and always recordable nerve action potentials. SDL goes from 2.5 to 2.9 and MDL from 3.2 to 3.6 ms between young and elderly⁶. Aging does not lead to unrecordable median sensory/motor action potentials. Radecki⁷ studying 1472 patients concluded that age and anthropometric measurements were the major determinants of median and ulnar nerve latency variability at the wrist but again no reference is done about unrecordable nerve action potentials or even great increase in distal latencies. The groups of this work have increasing latencies values that could not be explained only by aging (mild group with SDL less than normal described in elderly).

The relationship between severity of symptoms and severity of nerve conduction abnormalities is not clear⁸ and there are few reports correlating duration of symptoms and severity of nerve conduction abnormalities⁹. In accordance with the results here, both aging and duration of complaints increase positively with severity of median SDL and MDL but a dramatic difference was observed between them with a striking increase in age. Patients with severe nerve SDL/MDL have a median duration of symptoms about 24 months (1 year increased from mild ones) and a median age about 59 years old (10-11 years increased from mild ones).

The conclusion is that in CTS, aging correlates more positively than duration of complaints with severity of nerve conduction studies (SDL/MDL). The effects of increasing nerve compression are more severe as long as patients become older, regardless duration of symptomatology.

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