

(5) distal onset latency of the compound muscle action potential (DL-M).

Carpal tunnel syndrome was defined as being present when ulnar nerve studies were normal and median nerve studies met one of the following criteria for abnormality based on normal values obtained and used in our laboratory: (1) DL-S > 3.7 ms; (2) DL-M > 4.4 ms; and (3) CV-S < 49 m/s.

All subjects were investigated for sensory nerve conduction velocity (SNCV) of affected and unaffected side median nerves and the same side ulnar nerve. Amplitude, SNCV and distal sensory latency were assessed antidromically using a pair of ring surface electrodes on the index finger and little finger.

Motor nerve conduction of affected and unaffected side median nerves and the same side ulnar nerve using surface electrode were also assessed. Also needle EMG study of affected side abductor pollicis and abductor digit minimi muscles were done.

Examination was done with EMG/NCS apparatus Micro Med with setting for sensory studies were: Frequency: 100 Hz-10KHz. Sweep speed: 2 ms/Division. Sensitivity: 10 μ V/Division, and for motor studies was: Frequency: 100-500 Hz. Sweep speed: 5 ms/Division. Sensitivity: 200 μ V/Division. Diagnosis of CTS was based on the criteria of the American Association of Electrodiagnostic Medicine (AAEM) on getting 2 out of 3 following criteria ⁽⁵⁾.

1) Antidromic sensory conduction velocity for index digit segment less than 48.2 m/sec.

2) The difference between median and ulnar sensory nerve distal latencies with recording from the fourth digit (recording-stimulation distance was kept 14 cm) exceeding 0.5 ms.

3) Distal motor latency to abductor pollicis brevis muscle greater than 4.2 ms.

CTS severity was classified into mild, moderate and severe CTS according to the modified Padua Criteria ⁽⁶⁾: Mild CTS: Prolongation of median distal sensory latency > 3.5 ms or relative prolongation of median compared to ulnar distal sensory latencies over identical distances. Moderate CTS: Reduced median SNAP amplitude

(< 50% compared to unaffected side or < 10 μ V are considered abnormal) or prolonged median motor distal > 4.5 ms.

Severe CTS: Reduced median CMAP amplitude (< 50% compared to unaffected side or < 4 mV), denervation of median innervated muscles on needle exam. After that the results of the presence of the Tinel's and Phalen's sign were correlated with each step of severity of the CTS using one way Anova test. Then each step of severity was correlated with presence of the provocative tests using one way Anova test.

Statistical analysis was done using graph pad software (Quick calc online calculator for Scientist) with P value less than 0.05 was the cutoff point of significant differences.

Results

Isolated Positive Tinel's sign only was seen in 33 out of 133 (25%) and Positive Phalen's maneuver only in 37 out of 133 (28%). Coexistent Tinel's sign and Phalen's maneuver positive at the same time were seen in 63 out of 133 (47%), (See Table 1). So the total patients who had Tinel's sign was 96 (33+63) out of 133 hands (72%) and total patients who had positive Phalen's sign was 100 (37+63) out of 133 (75%). Mild, moderate and severe CTS was seen in 51/133 (38%), 54/133 (41%) and 28/133 (21%) out of the total number of the studied patients. Both signs positive was seen in 25/63 (40%), 26/63 (41%), and 12/63 (19%), in mild, moderate and severe CTS respectively.

Table 1. The percentage of Tinel's and Phalen's signs

Provocative test	Total
+ ve Tinel's sign only	33 (25%)
+ ve Phalen's only	37 (28%)
Both + ve at the same time	63 (47%)
Total	133

Phalen's sign only was seen in 12/37 (32%), 15/37 (41%) and 10/37 (27%) in mild, moderate and severe CTS respectively. Tinel's sign only was seen in 14/33 (42.3%), 13/33 (39.4%) and