

– Abstract –

Retrograde Degeneration of Median Nerve in Carpal Tunnel Syndrome – Comparison of Orthodromic and Antidromic Forearm Median Nerve Action Potential –

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Objectives : To clarify the retrograde degeneration and its extent in the median nerve of carpal tunnel syndrome by measuring forearm nerve action potential orthodromically and antidromically.

Methods : Thirty one hands of carpal tunnel syndrome(CTS) and 23 hands of normal controls were studied. Orthodromic forearm median nerve action potential(Orth) was recorded at antecubital fossa by stimulating the median nerve at wrist, and antidromic forearm median nerve action potential(Anti) was recorded vice versa. Baseline to peak amplitude and onset latency of Orth and Anti were measured, and the ratio of Anti to Orth was evaluated. Correlation between amplitude of Orth and Anti and forearm conduction velocity was also evaluated.

Results : There was no difference at the latency of Anti and Orth both in CTS(Orth 2.84 ± 0.23 msec vs Anti 2.96 ± 0.32 msec) and control(Orth 2.92 ± 0.32 sec vs Anti 3.17 ± 0.49 msec). The amplitude of Anti was low in CTS($32.19 \pm 19.16 \mu V$) compared to that of control($59.72 \pm 35.38 \mu V$), and the amplitude of Orth was also low in CTS($31.76 \pm 15.21 \mu V$) compared to that of control(Orth $45.30 \pm 24.54 \mu V$) significantly. The ratio of Anti to Orth amplitude was significantly low in CTS(1.04 ± 0.50) compared to that in control(1.57 ± 0.59). Forearm median nerve conduction velocity well correlated with both Anti and Orth amplitude in CTS.

Conclusion : Retrograde degeneration of median nerve do occur and may be extended to elbow level, so that it could play a role in reduced forearm nerve conduction velocity in CTS.

Key Words : Carpal tunnel syndrome, Forearm median nerve action potential, Retrograde degeneration, Forearm nerve conduction velocity

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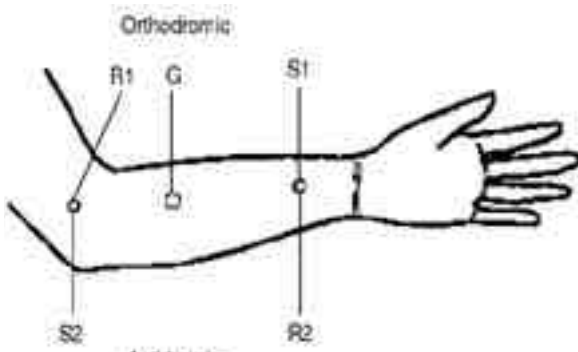


Fig. 1. Orthodromic and antidromic method
 R1,R2: active recording electrode
 S1,S2: stimulator
 G: ground electrode
 R2,S1: 3cm proximal to wrist crease
 R1,S2: antecubital fossa

3.

student t-test

paired t-test
 가

Pearson correlation test

$54.73 \pm 5.86\text{m/sec}$

$(59.53 \pm 3.77\text{m/sec})$
 $(p < 0.05).$

가 $2.92 \pm 0.32\text{msec}$

$3.17 \pm 0.49\text{msec}$

$2.84 \pm 0.23\text{msec}$

$2.96 \pm 0.32\text{msec}$

가 $(p > 0.05).$

$45.30 \pm 24.54 \mu\text{V},$

$31.76 \pm 15.21 \mu\text{V}$

$59.72 \pm 35.38 \mu\text{V},$

32.19

$\pm 19.16 \mu\text{V}$

1.57 ± 0.59

1.04 ± 0.50

(Table 1).

0.383

가

(Fig. 2),

0.387

가

(Fig. 3).

가

$(p > 0.05).$

Table 1. Comparison of Orthodromic and Antidromic Forearm Median Nerve Action Potential Amplitude between Carpal Tunnel Syndrome Patient and Control

| | CTS ⁴⁾ | control | p value |
|--------------------------------------|-------------------|-------------------|---------|
| Orth ¹⁾ (μV) | 31.76 ± 15.21 | 45.30 ± 24.54 | 0.028 |
| Anti ²⁾ (μV) | 32.19 ± 19.16 | 59.72 ± 35.38 | 0.000 |
| Anti/Ortho ³⁾ | 1.04 ± 0.50 | 1.57 ± 0.59 | 0.002 |

p value by student t-test

1) Orth: orthodromic forearm median nerve action potential amplitude

2) Anti: antidromic forearm median nerve action potential amplitude

3) Anti/Ortho: the ratio of antidromic forearm median nerve action potential amplitude to orthodromic forearm median nerve action potential amplitude

4) CTS: carpal tunnel syndrome

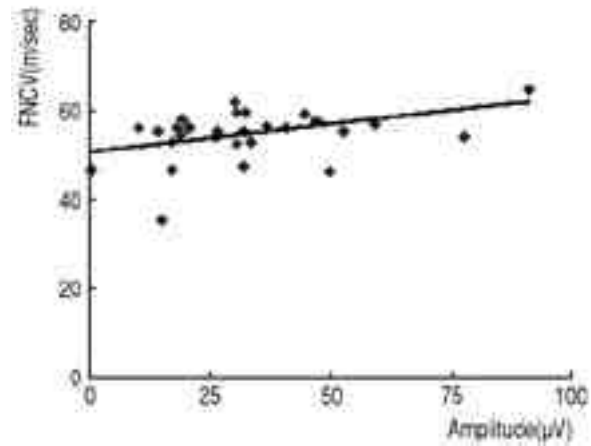


Fig. 2. Correlation between forearm median nerve conduction velocity and orthodromic forearm median nerve action potential amplitude

Pearson correlation coefficient = 0.383

$p = 0.040$

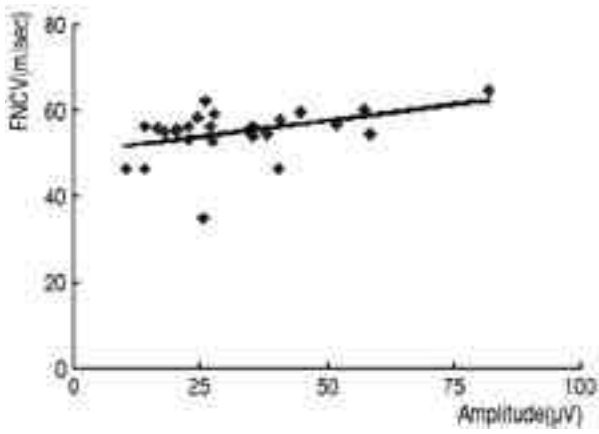


Fig. 3. Correlation between forearm median nerve conduction velocity and antidromic forearm median nerve action potential amplitude
 Pearson correlation coefficient = 0.387
 p = 0.038

가
 가
 가
 5cm
 1990 Pease¹⁰
 4cm
 Stoehr⁹
 가

가

가
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가
 가
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 가
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가
 , Fox Bangash⁴ 18%, Buchthal⁵ 20.3%
 가
 1994 1998 159
 18% 29

Anderson⁷ guinea-pig
 1970
 15~20mm

가
 Wallerian
 가
 1985 Devor⁸

가
 5
 가
 가
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 가

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