

High incidence of absent nerve conduction in older patients with bilateral carpal tunnel syndrome

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ABSTRACT

INTRODUCTION Carpal tunnel syndrome has been reported by some to have a less satisfactory outcome in older patients following surgery. However, this impression is not supported by other investigators but no objective explanation has been suggested for these differences. In our department, such patients are routinely treated with night wrist splints and, if this is unsatisfactory, they are investigated with nerve conduction studies prior to surgery.

PATIENTS AND METHODS This paper reports the neurophysiological outcome in a young (< 40 years of age) and an older (> 60 years of age) group of patients with clinical bilateral carpal tunnel syndrome who did not benefit from splints.

RESULTS The results showed that both the motor and sensory conduction speeds are significantly lower in the older age group. More importantly in the older group, half had one or more hands where the sensory conduction was absent. In four out of these 10 patients this finding was bilateral and three patients had unilateral absent motor conduction. In the younger group, no patient had absent conduction.

CONCLUSIONS Poor surgical outcome in some older patients may be because of irreversibly damaged nerves prior to surgery and pre-operative neurophysiology is, therefore, recommended both for clinical and medicolegal reasons.

KEYWORDS

Carpal tunnel syndrome – Bilateral – Neurophysiology – Older – Conduction-blocks – Medicolegal

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Carpal tunnel syndrome is common in the general population with approximately 1% incidence but can often be treated with simple night wrist splints.¹ For those patients who do respond satisfactorily to conservative measures, surgical decompression is often successful.² However, some investigators have reported that older patients can have a less satisfactory outcome after surgery,³ though this impression is not universally shared.^{4,5} To the author's knowledge, no objective explanation has been suggested for these observations. As the symptoms for carpal tunnel syndrome include wrist pain, paresthesia and weakness in grip strengths, a number of medical conditions can produce a similar clinical picture; therefore, as standard practice, our department investigates these patients with neurophysiology before a surgical treatment strategy is considered if conservative treatment is unsatisfactory. This is particularly relevant if the condition is bilateral.⁶ However, the author acknowledges that neurophysiological diagnosis prior to surgery for carpal tunnel syndrome is a controversial issue and that many surgeons operate on clinical grounds only. The aim of this paper was, therefore, to see if there was a significant difference in sensory or motor conduction speeds between a group of patients younger than 40 years

and a group of patients older than 60 years who presented with bilateral carpal tunnel syndrome which was resistant to conservative treatment with night wrist splints.

Patients and Methods

From a specialist hand surgical clinic, 10 patients below 40 years of age and 20 patients above 60 years of age with a clinical diagnosis of bilateral carpal tunnel syndrome who had not benefited from conservative treatment with night wrist splints were evaluated with nerve conduction studies. The length of the standard conservative treatment period was 3 months from the time they were first seen in the clinic until they were reviewed in the clinic and referred for pre-surgical neurophysiology confirmation if they wanted surgical release due to insufficient subjective improvements of their complaints. Patients with previous surgical treatment for carpal tunnel syndrome were excluded. Median nerves in both hands were tested across the wrist and conduction speeds were calculated for both motor and sensory nerves. The Mann-Whitney non-parametric test was used for the statistical evaluation.

Table 1 Gender, age and conduction speed data for patients aged over 60 years

Number	Gender	Age (years)	Conduction speed			
			Motor		Sensory	
			Right	Left	Right	Left
1	F	63	48	47	0	0
2	F	81	50	48	41	38
3	F	85	0	56	0	0
4	M	82	40	47	0	45
5	F	96	46	46	0	0
6	F	60	55	53	31	48
7	M	65	53	50	35	40
8	F	72	55	51	0	36
9	F	82	0	46	0	44
10	F	63	56	59	44	40
11	F	65	52	49	47	38
12	F	77	62	0	0	25
13	F	77	41	41	28	18
14	F	60	59	58	39	39
15	F	75	47	39	27	30
16	F	61	55	55	51	49
17	F	65	53	49	35	30
18	F	78	46	46	35	0
19	F	67	54	50	44	0
20	M	65	42	42	0	0
Mean		72	45.7	46.6	22.85	26
SD			16.69258	12.18886	19.98756	18.91811

Table 2 Gender, age and conduction speed data for patients aged under 40 years

Number	Gender	Age (years)	Conduction speed			
			Motor		Sensory	
			Right	Left	Right	Left
1	F	39	51	50	39	39
2	M	30	62	52	44	30
3	F	38	51	53	29	30
4	F	34	57	55	49	49
5	F	33	59	61	24	27
6	F	34	57	60	34	38
7	F	39	56	53	33	35
8	F	36	48	50	41	41
9	F	38	59	59	41	43
10	F	39	52	58	45	41
Mean		36	55.2	55.1	37.9	37.3
SD			4.467164	4.121758	7.766738	6.815831

Results

The patient profiles and conduction speeds are shown in Table 1 (> 60 years) and Table 2 (< 40 years). Nine of the 10 patients under 40 years of age and 18 of the 20 patients over 60 years of age were females. In the younger group, none was under 30 years of age and in the older group the oldest was 96 years of age. In the older group, 10 of 20 patients had at least one hand where the sensory conduction was so damaged that no conduction speed could be measured; in four of these, this finding was bilateral. Three patients had unilateral absent motor conduction. In the younger group, no patient had absent sensory or motor conduction.

Statistical evaluation

There was no significant difference between the right and left side's motor or sensory conduction speeds in either age group. The combined conduction speeds from the right and left hands in the two age groups were significantly different ($P = 0.0002$ for the motor and $P = 0.015$ for the sensory values).

Discussion

Porter *et al.*⁵ reported that carpal tunnel surgery in older patients has worse results than in younger patients and Hobby *et al.*⁵ reconfirmed that older patients were more troubled postoperatively by reduced sensation compared with younger patients. Our results would suggest that the explanation for some of the patients in the older group having less satisfactory outcomes following surgery may be found in the statistically more severely affected conduction speeds both for the motor as well as the sensory conduction. The reason for a more severely affected conduction speed could also be an indirect consequence of a reduced pain sensitivity with age,⁷ that may delay the older patient from seeking treatment at an earlier and less severe stage of the compression; in turn, this may lead to a more severe compression to be manifest when surgery is considered. In the most extreme cases this could lead to a complete conduction block explaining why it is only in the older group that there are cases of complete absence of conduction. However, some of these differences could also be attributed to a lowering of conduction speed as a result of age by itself as reported by Tanosaki *et al.*⁸ As the conservative treatment period in this study was standardised to 3 months from when the patients were first seen in the clinic, this eliminated the possibility that the neurophysiological differences between the two groups could be due to differences in the length of the splint treatments. Dissatisfaction with surgery in patients without conduction blocks could also be caused by an age-related decline in sensory nerve function causing poor wound repair as stated by Khalil *et al.*;⁹ however, the cellular mechanism for this decline in function with age is not well understood. An interesting paradox was shown by Zheng *et*

*al.*¹⁰ that, although the pain sensitivity is reduced in advanced age,⁷ this does not stop older individuals from developing more prolonged hyperalgesia compared with younger individuals that can lead to a protracted post-surgical recovery and again lower satisfaction with surgery. Furthermore, Calderon *et al.*¹¹ found that patient dissatisfaction after carpal tunnel syndrome release was directly correlated with depression which is also more prevalent with advanced age and the post-surgical pain syndrome as mentioned above can obviously further aggravate this.

Conclusions

The conduction results suggest that one of the reasons that older patients with carpal tunnel syndrome may have inferior satisfaction following surgical release may be that there is a high likelihood of irreversible peripheral nerve damage in the medial nerves prior to surgery, to the extent that there is a complete conduction block. This does not seem likely in patients under the age of 40 years. It is, therefore, suggested that, for the benefit of both the patient and the surgeon, a pre-surgical nerve conduction study is carried out for older patients who choose to have surgery as it allows for a comparison between the pre- and post-surgical conduction speeds if the surgery has not satisfied the patient and there is consideration whether a peri-operative nerve injury has occurred or if re-operation should be considered.

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