Carpal Tunnel Syndrome

ABSTRACTS

Atisook R., 1995. Carpal tunnel syndrome during pregnancy: prevalence and bloodlevel of pyridoxine.
Branco K., 1999. Carpal tunnel syndrome: clinical outcome after low-level laser acupuncture, microamps transcutaneous electrical nerve stimulation, and other alternative therapies--an open protocol study.
Dammers JW., 1999. Injection with methylprednisolone proximal to the carpal tunnel: randomized double blind trial.
Ellis J. 1981. Therapy with vitamin B6 with and without surgery for treatment of patients having the idiopathic carpal tunnel syndrome.
Ellis J., 1979. Clinical results of a cross-over treatment with pyridoxine and placebo of the carpal tunnel syndrome.
Folkers K., 1990. Successful therapy with vitamin B6 and vitamin B2 of the carpal tunnel syndrome and the need for determination of the RDAs for vitamins B6 and B2 for disease states.
Folkers K., 1984. Enzymology of the response of the carpal tunnel syndrome to riboflavin and to combined riboflavin and pyridoxine.
Fuhr JE., 1989. Vitamin B6 levels in patients with carpal tunnel syndrome.
Kasdan ML., 1987. Carpal tunnel syndrome and vitamin B6.
Smith KJ., 1999. Demyelination: the role of reactive oxygen and nitrogen species.

SUGGESTED READING.

Atcheson SG., 1999. Carpal tunnel syndrome: is it work-related?
Bernstein AL., 1993. Brief communication: effect of pharmacologic doses of vitamin B6 on carpal tunnel syndrome, electroencephalographic results, and pain.
Carneiro RS., 1999. Carpal tunnel syndrome: the cause dictates the treatment.
Harter BT Jr, 1993. Carpal tunnel syndrome: surgical and nonsurgical treatment.
Holm G., 2003. Carpal tunnel syndrome: current theory, treatment, and the use of B6.
Kouyoumdjian JA., 1999. [Carpal tunnel syndrome. Current approaches]
Solomon DH., 1999. Nonoccupational risk factors for carpal tunnel syndrome.
Valente R., 1994. Chiropractic manipulation in carpal tunnel syndrome.

Carpal tunnel syndrome during pregnancy: prevalence and bloodlevel of pyridoxine.

Atisook R, Benjapibal M, Sunsaneevithayakul P, Roongpisuthipong A Department of Obstetrics and Gynaecology, Faculty of Medicine, Siriraj Hospital, Mahidol University, Bangkok, Thailand.

J Med Assoc Thai 1995 Aug;78(8):410-4

The prevalence of CTS in third trimester pregnant women in the study in 28 per cent. With the use of NCS it was able to detect nearly 80 per cent of them who had no symptoms or signs. There was no association between the level of vitamin B6 or B6 deficiency and CTS. Since CTS may result in a permanent disability if undiagnosed or left untreated it is essential to make an early diagnosis and treat it especially older women and those who are edematous.

Carpal tunnel syndrome: clinical outcome after low-level laser acupuncture, microamps transcutaneous electrical nerve stimulation, and other alternative therapies--an open protocol study.

Branco K, Naeser MA Acupuncture Healthcare Services, Westport, Massachusetts, USA.

J Altern Complement Med 1999 Feb;5(1):5-26

OBJECTIVE: Outcome for carpal tunnel syndrome (CTS) patients (who previously failed standard medical/surgical treatments) treated primarily with a painless, noninvasive technique utilizing red-beam, low-level laser acupuncture and microamps transcutaneous electrical nerve stimulation (TENS) on the affected hand; secondarily, with other alternative therapies.

DESIGN: Open treatment protocol, patients diagnosed with CTS by their physicians.

SETTING: Treatments performed by licensed acupuncturist in a private practice office.

SUBJECTS: Total of 36 hands (from 22 women, 9 men), ages 24-84 years, median pain duration, 24 months. Fourteen hands failed 1-2 surgical release procedures.

INTERVENTION/TREATMENT: Primary treatment: red-beam, 670 nm, continuous wave, 5 mW, diode laser pointer (1-7 J per point), and microamps TENS (< 900 microA) on affected hands. Secondary treatment: infrared low-level laser (904 nm, pulsed, 10 W) and/or needle acupuncture on deeper acupuncture points; Chinese herbal medicine formulas and supplements, on case-by-case basis. Three treatments per week, 4-5 weeks.

OUTCOME MEASURES: Pre- and posttreatment Melzack pain scores; profession and employment status recorded.

RESULTS: Posttreatment, pain significantly reduced ($p < .0001$), and 33 of 36 hands (91.6%) no pain, or pain reduced by more than 50%. The 14 hands that failed surgical release, successfully treated. Patients remained employed, if not retired. Follow-up after 1-2 years with cases less than age 60, only 2 of 23 hands (8.3%) pain returned, but successfully re-treated within a few weeks.

CONCLUSIONS: Possible mechanisms for effectiveness include increased adenosine triphosphate (ATP) on cellular level, decreased inflammation, temporary increase in serotonin. There are potential cost-savings with this treatment (current estimated cost per case, $12,000; this treatment, $1,000). Safe when applied by licensed acupuncturist trained in laser acupuncture; supplemental home treatments may be performed by patient under supervision of acupuncturist.

Injection with methylprednisolone proximal to the carpal tunnel: randomized double blind trial.

Dammers JW, Veering MM, Vermeulen M Department of Neurology, Medical Centre Alkmaar, 1800 AM Alkmaar, Netherlands. J.Dammers@mca.alkmaar.nl

BMJ 1999 Oct 2;319(7214):884-6

OBJECTIVE: To assess the effect of a 40 mg methylprednisolone injection proximal to the carpal tunnel in patients with the carpal tunnel syndrome.

DESIGN: Randomised double blind placebo controlled trial.

SETTING: Outpatient neurology clinic in a district general hospital.

PARTICIPANTS: Patients with symptoms of the carpal tunnel syndrome for more than 3 months, confirmed by electrophysiological tests and aged over 18 years.

NTERVENTION: Injection with 10 mg lignocaine (lidocaine) or 10 mg lignocaine and 40 mg methylprednisolone. Non-responders who had received lignocaine received 40 mg methylprednisolone and 10 mg lignocaine and were followed in an open study.

MAIN OUTCOME MEASURES: Participants were scored as having improved or not improved. Improved was defined as no symptoms or minor symptoms requiring no further treatment.

RESULTS: At 1 month 6 (20%) of 30 patients in the control group had improved compared with 23 (77%) of 30 patients the intervention group (difference 57% (95% confidence interval 36% to 77%)). After 1 year, 2 of 6 improved patients in the control group did not need a second treatment, compared with 15 of 23 improved patients in the intervention group (difference 43% (23% to 63%). Of the 28 non-responders in the control group, 24 (86%) improved after methylprednisolone. Of these 24 patients, 12 needed surgical treatment within one year.

CONCLUSION: A single injection with steroids close to the carpal tunnel may result in long term improvement and should be considered before surgical decompression.

Therapy with vitamin B6 with and without surgery for treatment of patients having the idiopathic carpal tunnel syndrome.

Ellis J, Folkers K, Levy M, Takemura K, Shizukuishi S, Ulrich R, Harrison P

Res Commun Chem Pathol Pharmacol 1981 Aug;33(2):331-44

Blood samples from four patients at the time of surgery to relieve the compression of the carpal tunnel syndrome, which was diagnosed by clinical and electromyographic evaluation, were differentially assayed to determine the specific activities and the % deficiencies of the erythrocyte glutamic oxaloacetic transaminase (EGOT). The data from these assays revealed that these four patients had a severe deficiency of vitamin B6. These data, in conjunction with previous biochemical and clinical results over five years, underscore the desirability, and even necessity, of testing by the EGOT analysis for the presence of a severe deficiency of vitamin B6 in all such patients before surgery. Treatment with vitamin B6 (pyridoxine) for a minimum period of 12 weeks, depending upon the duration and severity of the symptoms, has been effective without exception. Surgery may relieve compression, but does not correct a deficiency of vitamin B6. Surgery in addition to therapy with vitamin B6 should be reserved for those patients who have had the deficiency for so many years that much tissue damage is irreversible by pyridoxine, and additional relief from pain can be achieved through the surgery.

Clinical results of a cross-over treatment with pyridoxine and placebo of the carpal tunnel syndrome.

Ellis J, Folkers K, Watanabe T, Kaji M, Saji S, Caldwell JW, Temple CA, Wood FS

Am J Clin Nutr 1979 Oct;32(10):2040-6

Clinical evaluation was made of cross-over treatments by pyridoxine and a placebo of patient 22 having the carpal tunnel syndrome. Extraordinary monitoring of the specific activities of the erythrocyte glutamic oxaloacetic transaminase proved a severe vitamin B6 deficiency, which was partially corrected by the Recommended Dietary Allowance of 2 mg, and completely corrected by 100 mg. The severity of the syndrome diminished on the Recommended Dietary Allowances and the patient was asymptomatic at the higher dosage. On placebo, both the vitamin B6 deficiency and syndrome reappeared. Retreatment with 100 mg again corrected both the deficiency and syndrome. Measurements (total n = 19) of flexion of proximal interphalangeal joints of the index fingers by a goniometer, and of pinch by the Preston gauge revealed objective normalization. Scores of 17 symptoms revealed reductions at both the 2- (P less than 0.01) and 100-mg (P less than 0.001) dosages. Conduction through the carpal tunnels had improved by electromyography. These and previous data on a total of 22 patients showed the concomitant presence of a deficiency of vitamin B6 and the carpal tunnel syndrome; a causal relationship is apparent.

Successful therapy with vitamin B6 and vitamin B2 of the carpal tunnel syndrome and the need for determination of the RDAs for vitamins B6 and B2 for disease states.

Folkers, K., Ellis, J.

Ann. N.Y. Acad. Sci. 1990; 585: 295-301.

No abstract available

Enzymology of the response of the carpal tunnel syndrome to riboflavin and to combined riboflavin and pyridoxine.

Folkers K, Wolaniuk A, Vadhanavikit S.

Proc Natl Acad Sci U S A 1984 Nov;81(22):7076-8

Differential enzymic analyses of the erythrocyte glutamic-oxaloacetic transaminase and the erythrocyte glutathione reductase of a patient with a 3-yr history of the carpal tunnel syndrome (CTS) revealed high deficiencies of both vitamin B-6 and riboflavin as based on approximately equal to 30% levels of the specific activities of these enzymes. Riboflavin for 5 months caused nearly complete disappearance of the CTS and caused no change in the specific activity of erythrocyte glutamic-oxaloacetic transaminase. Combined riboflavin and pyridoxine treatment increased (P less than 0.001) the specific activities of erythrocyte glutathione reductase and erythrocyte glutamic-oxaloacetic transaminase to normal levels with total disappearance of the CTS. Objectively, the strength of pinch of both hands increased (P less than 0.001) on treatment with riboflavin and further increased (P less than 0.001) on the combined treatment. For the first time, a significant riboflavin deficiency has been found to be related to CTS. Riboflavin therapy was effective biochemically, subjectively, and objectively, and riboflavin and pyridoxine were even more effective when concomitantly administered.

Vitamin B6 levels in patients with carpal tunnel syndrome.

Fuhr JE, Farrow A, Nelson HS Jr Department of Medical Biology, University of Tennessee Medical Center, Knoxville, TN 37920.

Arch Surg 1989 Nov;124(11):1329-30

Vitamin B6 levels were determined in patients with idiopathic carpal tunnel syndrome. Results from this limited study strongly

suggest that vitamin B6 deficiency may accompany carpal tunnel syndrome. This study did not address the question of the causal relationship between vitamin B6 status and development of symptoms.

Carpal tunnel syndrome and vitamin B6.

Kasdan ML, Janes C

Plast Reconstr Surg 1987 Mar;79(3):456-62

We reviewed 1075 patients presenting over a 12-year period with symptoms of carpal tunnel syndrome. A total of 994 had a final diagnosis of carpal tunnel syndrome. There were 444 male and 550 female patients with a mean age of 42 years. Three-hundred and ninety-five related symptoms to their job. Surgery was performed in 27 percent of the total diagnosed cases with approximately 97 percent relief of symptoms. Satisfactory alleviation of symptoms was obtained in 14.3 percent of patients treated conservatively prior to 1980, with one or a combination of splinting anti-inflammatory agents, job or activity change, and steroid injections. In 1980, vitamin B6 (pyridoxine) was added as a method of conservative treatment. Satisfactory improvement was obtained in 68 percent of 494 patients treated with a controlled dosage (100 mg b.i.d.). While our findings were not the result of a controlled scientific study, we feel they suggest that regulated use of vitamin B6 may be helpful in treating many cases of carpal tunnel syndrome.

Demyelination: the role of reactive oxygen and nitrogen species.

Smith KJ, Kapoor R, Felts PA Department of Clinical Neurological Sciences, Guy's, King's and St. Thomas' School of Medicine, London. k.smith@umds.ac.uk

Brain Pathol 1999 Jan;9(1):69-92

This review summarises the role that reactive oxygen and nitrogen species play in demyelination, such as that occurring in the inflammatory demyelinating disorders multiple sclerosis and Guillain-Barre syndrome. The concentrations of reactive oxygen and nitrogen species (e.g. superoxide, nitric oxide and peroxynitrite) can increase dramatically under conditions such as inflammation, and this can overwhelm the inherent antioxidant defences within lesions. Such oxidative and/or nitrative stress can damage the lipids, proteins and nucleic acids of cells and mitochondria, potentially causing cell death. Oligodendrocytes are more sensitive to oxidative and nitrative stress in vitro than are astrocytes and microglia, seemingly due to a diminished capacity for antioxidant defence, and the presence of raised risk factors, including a high iron content. Oxidative and nitrative stress might therefore result in vivo in selective oligodendrocyte death, and thereby demyelination. The reactive species may also damage the myelin sheath, promoting its attack by macrophages. Damage can occur directly by lipid peroxidation, and indirectly by the activation of proteases and phospholipase A2. Evidence for the existence of oxidative and nitrative stress within inflammatory demyelinating lesions includes the presence of both lipid and protein peroxides, and nitrotyrosine (a marker for peroxynitrite formation). The neurological deficit resulting from experimental autoimmune demyelinating disease has generally been reduced by trial therapies intended to diminish the concentration of reactive oxygen species. However, therapies aimed at diminishing reactive nitrogen species have had a more variable outcome, sometimes exacerbating disease.

SUGGESTED READING

Carpal tunnel syndrome: is it work-related?

Atcheson SG Arthritis Specialists of Northern Nevada, USA.

Hosp Pract (Off Ed) 1999 Mar 15;34(3):49-56; quiz 147

The reported incidence of work-related carpal tunnel syndrome has skyrocketed; however, many cases have an underlying systemic cause. A methodical investigation--including appropriate imaging studies and laboratory testing--can differentiate symptoms that are primarily occupational from those with associated medical illness or obesity.

Brief communication: effect of pharmacologic doses of vitamin B6 on carpal tunnel syndrome, electroencephalographic results, and pain.

Bernstein AL, Dinesen JS. Department of Neurology, Kaiser Permanente Medical Center, Hayward, CA 94545.

J Am Coll Nutr 1993 Feb;12(1):73-6

The role of vitamin B6 as a therapeutic agent in the treatment of carpal tunnel syndrome was examined by monitoring both the standard clinical and electrophysiological parameters for entrapment neuropathy at the wrist. Electroencephalogram (EEG) studies

were done in an attempt to identify patients most likely to benefit from B6 treatment. EEGs did not prove useful as predictors of clinical response to vitamin B6. Our patients, however, did not show any abnormalities prior to treatment, and no changes occurred during the treatment period. Motor latency, while the most common screening test for carpal tunnel syndrome, was not significantly changed during the course of treatment. It did not prove to be a useful test for monitoring clinical effectiveness of the treatment. Parameters showing the greatest changes were pain scores and sensory latency, which most closely paralleled clinical assessments. Pain scores, more than any other parameters, were improved in these patients following vitamin B6 treatment. Vitamin B6 has been shown to change pain thresholds in clinical and laboratory studies. This may be the basis of the significant improvement in pain scores when electrophysiologic data showed only mild improvement. This study suggests that vitamin B6 deficiency may not be a cause of carpal tunnel syndrome in spite of the observed therapeutic effect, without toxicity, of vitamin B6 treatment.

Carpal tunnel syndrome: the cause dictates the treatment.

Carneiro RS Department of Plastic Surgery, Cleveland Clinic, Florida, USA.

Cleve Clin J Med 1999 Mar;66(3):159-64

Mild carpal tunnel syndrome should be conservatively treated and severe carpal tunnel syndrome usually requires surgery; however, management of moderate carpal tunnel syndrome is more complex. Usually, the treatment is dictated by the cause, which may be occupational injury, acute trauma, systemic diseases such as diabetes, hypothyroidism, or rheumatoid arthritis, or other causes.

Carpal tunnel syndrome: surgical and nonsurgical treatment.

Harter BT Jr, McKiernan JE Jr, Kirzinger SS, Archer FW, Peters CK, Harter KC

Hand Surg [Am] 1993 Jul;18(4):734-9

A retrospective study was performed to evaluate treatment for carpal tunnel syndrome. Two hundred sixty-five patients were treated over a 4 1/2-year period. Only patients in whom studies showed abnormal nerve conduction (a median nerve sensory latency greater than 3.6 msec or a median distal motor latency greater than 4.3 msec) were included in the evaluation. Nonsurgical treatment consisted of patient education, wrist splinting, B vitamins, nonsteroidal anti-inflammatory medication, steroid injections, and job change or modification when possible. A follow-up history, physical examination, and repeat nerve conduction studies were performed at 3- to 9-month intervals, depending on the severity of symptoms and the degree of abnormal latencies. Surgery was performed on 77 patients and 95 hands. The remaining 188 patients were treated nonsurgically. Both surgically and nonsurgically treated patients considered the results to be satisfactory.

Carpal tunnel syndrome: current theory, treatment, and the use of B6.

Holm G, Moody LE. University of South Florida, USA. dr.g.holm@usfaccess.com

J Am Acad Nurse Pract 2003 Jan;15(1):18-22

PURPOSE: To present the current state of the science of pathophysiology, assessment and treatment of carpal tunnel syndrome, including the use of pyridoxine (B6). DATA SOURCES: Selected research articles, texts, Websites, personal communications with experts, and the authors' own clinical experience. CONCLUSIONS: Much is yet to be learned about carpal tunnel syndrome. While the basic treatment of NSAIDs and nighttime splints seems universally accepted, much controversy remains. The use of vitamin B6 as a treatment is one such controversy requiring further investigation. IMPLICATIONS FOR PRACTICE: Current treatment for carpal tunnel syndrome should include NSAIDs, nighttime splinting, ergonomic workstation review, and vitamin B6 200 mg per day.

[Carpal tunnel syndrome. Current approaches]. [Article in Portugese]

Kouyoumdjian JA Departamento de Ciencias Neurologicas, Faculdade de Medicina de Sao Jose do Rio Preto, Sao Paulo, Brasil. jaris@zaz.com.br

Arq Neuropsiquiatr 1999 Jun;57(2B):504-12

A clinical, epidemiological and nerve conduction studies report on carpal tunnel syndrome was done after electrophysiological author's experience on 668 cases and literature review. The median nerve underwent focal (nodal) or segmental demyelination after compression on carpal tunnel, 3-4 distal to wrist fold. The symptomatic complex includes nocturnal hands numbness and paraesthesia, mostly bilateral and between 40-60 years old. Familial cases are described and the gene could encode thick transverse carpal ligament. Anthropomorphic findings could also bring about an additional risk, but with low significance. Magnetic

resonance could be a useful tool for selected atypical cases. Conservative treatment and controversies on surgery timing are discussed. Classical conduction studies on median nerve reveal a prolonged distal segmental sensory latency and also on distal motor latency. Increasing sensitivity may be reach using additional methods such as, median mixed mid-palm latency, comparative mid-palm latency median/ulnar, comparative sensory latency median/radial and median/ulnar, inching method from wrist to palm recording on index/middle finger and comparative motor median/ulnar recording on lumbrical/interosseous muscle.

Nonoccupational risk factors for carpal tunnel syndrome.

Solomon DH, Katz JN, Bohn R, Mogun H, Avorn J Division of Pharmacoepidemiology and Pharmacoeconomics, Department of Medicine, Brigham and Women's Hospital, Harvard Medical School, Boston, Mass. 02115, USA.

J Gen Intern Med 1999 May;14(5):310-4

OBJECTIVE: To examine the relation between selected nonoccupational risk factors and surgery for carpal tunnel syndrome.

DESIGN: Case-control study using an administrative database.

PARTICIPANTS: Enrollees of New Jersey Medicare or Medicaid programs during 1989 to 1991.

MEASUREMENTS: The outcome of interest was open or endoscopic carpal tunnel release. We examined the relation between carpal tunnel release and diabetes mellitus, thyroid disease, inflammatory arthritis, hemodialysis, pregnancy, use of corticosteroids, and hormone replacement therapy.

MAIN RESULTS: In multivariate models, inflammatory arthritis was strongly associated with carpal tunnel release (odds ratio [OR] 2.9; 95% confidence interval [CI] 2.2, 3.8). However, corticosteroid use also appeared to be associated with a greater likelihood of undergoing carpal tunnel release, even in the absence of inflammatory arthritis (OR 1.6; 95% CI 1.2, 2.1). Diabetes had a weak but significant association with carpal tunnel release (OR 1.4; 95% CI 1.2, 1.8), as did hypothyroidism (OR 1.7; 95% CI 1.1, 2.8), although patients with hyperthyroidism did not have any change in risk. Women who underwent carpal tunnel release were almost twice as likely to be users of estrogen replacement therapy as controls (OR 1.8; 95% CI 1.0, 3.2).

CONCLUSIONS: Although inflammatory arthritis is the most important nonoccupational risk factor for carpal tunnel release, these data substantiate the increase in risk associated with diabetes and untreated hypothyroidism. Further investigation in detailed clinical studies will be necessary to confirm whether changes in corticosteroid use and hormone replacement therapy offer additional means of risk reduction for this common condition.

Chiropractic manipulation in carpal tunnel syndrome.

Valente R, Gibson H Department of Chiropractic Principles and Practice, Cleveland Chiropractic College and Clinic, Kansas City, MO.

J Manipulative Physiol Ther 1994 May;17(4):246-9

OBJECTIVE: To determine if chiropractic manipulation could relieve carpal tunnel syndrome (CTS).

CLINICAL FEATURES: A 42-yr-old female suffered from pain, tingling and numbness in the right wrist. Paresthesia along the C6 dermatome, a positive Phalen's test and Tinel's sign was present. EMG testing confirmed the clinical diagnosis of CTS.

INTERVENTION AND OUTCOME: Chiropractic manipulations were rendered 3 times per week for 4 wk, to the subject's cervical spine, right elbow and wrist using a low amplitude, short lever, low force, high velocity thrust. Significant increase in grip strength and normalization of motor and sensory latencies were noted. Orthopedic tests were negative. Symptoms dissipated.

CONCLUSION: In this case study, chiropractic made a demonstrable difference through objective and subjective outcomes. Further investigations using double-blind, cross-over designs with larger samples are warranted.

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