

Role of vitamin- D in carpal tunnel syndrome

Shailesh Gupta^{1*}, Ravindra Gupta²

¹Consultant, Gupta Hand Surgery Centre, Indore, Madhya Pradesh, ²Assistant Professor, Index Medical College, Indore, Madhya Pradesh

***Corresponding Author:**

Email: guptahandsurgery@gmail.com

Abstract

In order to evaluate the effect of vitamin D3 we have evaluated around 50 patients in whom vitamin D deficiency was found & were suffering from CTS. They were all given deep intramuscular 6 lakhs unit of vitamin D. Out of this 12 patients had a substantial relief to full relief in whom surgery was deferred. The idea of writing this paper was a further study is warranted to prove its larger role in many compressive neuropathies & metabolic neuropathies if it can lead to clinical improvement in patients & can save some of them from surgery.

Keywords: Carpal Tunnel Syndrome; Cholecalciferol

Introduction

Carpal Tunnel Syndrome: First described by Paget in 1854⁽¹⁾ Carpal Tunnel Syndrome (CTS) is a type of compressive neuropathy. It is a mononeuropathy or radiculopathy caused by mechanical distortion of median nerve produced by a compressive force at the wrist.^(2,3)

CTS is the most common median nerve entrapment⁽³⁻⁸⁾ {accounts for 90% of all entrapment neuropathies}.⁽⁹⁾ CTS is a neuropathy caused by entrapment of the median nerve at the level of the carpal tunnel, delimited by nonflexible or not stretchable structures {carpal bones and by the transverse carpal ligament}.⁽²⁾ Physiologically CTS is increased pressure within the carpal tunnel, and therefore decreased function of the median nerve at that level.⁽³⁾

CTS may be classified into three stages:

- **Mild:** less than 1 year duration with absent weakness & atrophy with normal two point discrimination & EMG & NCV
- **Moderate:** duration may be less than or more than 1 year. Minimal presence of weakness & atrophy. Possible abnormality in two point discrimination examination. No to mild denervation in EMG test. No to mild decrease in velocity in NCV testing.
- **Severe:** duration is more than 1 year. Marked presence of weakness & atrophy. Marked abnormality in two point discrimination on examination. Significant denervation on EMG & marked decrease in velocity in NCV testing.

On examination CTS can be diagnosed by night-time or morning symptoms with abduction weakness, thenar atrophy & hyperalgesia. Tinel sign & phalen's maneuver usually are positive.

Risk factors: CTS is most commonly is an idiopathic syndrome. But risk factors can be physiological like prolonged postures in extremes of wrist flexion or extension, repetitive use of the flexor muscles, and

exposure to vibration.⁽¹¹⁻¹⁴⁾ Risk factors can be medical related like pregnancy, obesity, menopause, renal failure, hypothyroidism, the use of oral contraceptives, congestive heart failure, tumours and tumour-like lesions, aftermath of fractures of the distal radius, directly or *via* post-traumatic arthritis.⁽¹⁵⁾ Neuropathic factors, such as diabetes, alcoholism, vitamin toxicity or deficiency, and exposure to toxins can play a role in eliciting CTS symptoms.

Differential diagnosis can be Carpometacarpal arthritis of thumb, Cervical radiculopathy (C6), Flexor carpi radialis tenosynovitis, Ulnar or cubital tunnel syndrome, Volar radial ganglion, Wrist arthritis, Median nerve compression at elbow, Raynaud phenomenon, thoracic outlet syndrome, traumatic or radiation induced brachial plexopathy, mononeuritis multiplex etc.

Till now there is no documented literature available about therapeutic role of vitamin D in carpal tunnel syndrome. Vitamin D3 may improves myelination & recovery after nerve injury.⁽¹⁶⁾ Vitamin D could repair nerve damage in multiple sclerosis. A protein activated by vitamin D could be involved in repairing damage to myelin in people with multiple sclerosis (MS).⁽¹⁰⁾ The author who is 45yr/m himself was suffering from typical CTS for about 12 months for that he was taking night splints with neck releasing exercises, neural gliding exercises with symptomatic relief. There was no associated diabetes, hypothyroidism, renal problems & rheumatoid disorders which are common predisposing factors. His EMG & NCV studies done were suggestive of mild to moderate degree of CTS.

During 1st author's yearly regular health check-up a deficiency of vitamin D was diagnosed. His level was 7 (normal reference range 30 to 100). So 1st author took an injection of 6 lakh unit of vitamin D3 (cholecalciferol) deep intramuscular. To author's surprise the tingling & numbness disappeared suddenly. Till now 1.5 year has been passed & he is still asymptomatic.

Considering this observation we have conducted a trial in our 50 patients who visited author's clinic & has been diagnosed as patients of CTS by history, clinical evaluation, vitamin D3 level & in some cases EMG/NCV. EMG/NCV is mostly useful in diagnosing severity of median nerve neuropathies in diagnosed cases of CTS and to differentiate CTS from C5- C6 neuropathies. Patient can have asymptomatic mononeuropathies of median nerve but these are not known as CTS. In order to evaluate the effect of vitamin D3 we have evaluated around 50 patients in whom vitamin D deficiency was found & were suffering from CTS. They were all given deep intramuscular 6 lakh unit of vitamin D. Out of this 12 patients had a substantial relief to full relief in whom surgery was deferred.

Materials & Methods

Patients who had clinically symptomatic CTS with deficiency of vitamin D & were not having motor loss. All patients at the time of first consultation were assessed for carpal tunnel syndrome by clinical examination, cervical spine X-ray; TSH, sugar, creatinine, urine R/M, CBC, RA factor, vit-B12 & vit-D3 & in some cases with EMG/NCV.

Out of 50 patients not all were subjected to EMG & NCV as with the experience the author is realising that if effect of vitamin D3 has to come then the response is immediate & secondly cost consideration was also a important factor in local population. All patients were also given night splintage.

Out of 50 patients:

- 20 patients had EMG; NCV
- M/F ratio was 2:3
- All patients were between 40 to 56 yr of age
- Duration of symptoms was 1 month to 1 year (avg 6 months)
- Associated medical illness: hypothyroidism in 4 patients & diabetes in 9 patients.
- Not responding to other kind of conservative management for at least 3 weeks to 1 month period

All patients were diagnosed clinically having carpal tunnel syndrome by following criteria's

- Nocturnal pain of hand, sensory disturbances within distribution of median nerve.
- Early morning awakening.
- Atypical presentation in which patient can present with tingling, numbness in hand not necessarily in median nerve distribution with whole hand involvement or just hand pain or clumsiness.

Authors feel that NCV/EMG are not necessary in diagnosing the cases of CTS; hence was not advised in all cases.

Observation

	Male	Female
Total Patients	18	32
Lost to Follow	5	6

Mean Age	47yr	53yr
Improved	4(~30%)	8(~30%)

Outcome: Out of 50 patients 12 patients had complete relief of all symptoms. It was a very good outcome according to author's experience because previously almost all patients presenting with carpal tunnel they ultimately required surgery as conservative management was not much satisfactory.

Rest 38 patients

- 11 patients lost to follow up
- 19 patients had no significant relief but for now they opted for conservative management (inj corticosteroid with night splints in 11 patients & only night splints in 8 patients)
- 8 patients ultimately underwent surgery to get relief from symptoms
- Prevalence of vit-D deficiency was more common in age matched females. But in vitamin D deficient population response to treatment was same in males and females.

Conclusion

The idea of writing this paper was a further study is warranted to prove its larger role in many compressive neuropathies & metabolic neuropathies if it can lead to clinical improvement in patients & can save some of them from surgery. However in all those patients who came with motor neurological deficit despite giving vitamin D & waiting for improvement surgical decompression was done without delay.

References

1. Paget J. Lectures on surgic pathology. Philadelphia: Lindsay and Blakiston; 1854.
2. Alfonso C, Jann S, Massa R, Torreggiani A. Diagnosis treatment and follow-up of the carpal tunnel syndrome: a review. *Neurolog Sci.* 2010;31(3):243–52. [PubMed]
3. American Academy of Orthopaedic Surgeons Work Group Panel. Clinical guidelines on diagnosis of carpal tunnel syndrome. 2007.
4. Amirlak B, Upadhyaya K, Ahmed O, Wolff T, Tsai T, Scheker L. [Accessed: 24/10/2011]; Median Nerve Entrapment. 1-11-2010. Internet Communication. 2011.
5. Padua L, Lo Monaco M, Padua R. Neurophysiological classification of carpal tunnel syndrome assessment of 600 symptomatic hands. *Ital J Neurol Sci.* 1997;18:145–50. [PubMed]
6. INAIL: Italian Worker's Compensation Authority, Annual Report 2000. Available at: <http://www.inail.it/cms/multilingua/inglese/rapportoannuale2001/RappAnn2000RelPresInglese.pdf>. [Accessed: 24/10/2011].
7. Lo SL, Raskin K, Lester H, Lester B. Carpal tunnel syndrome a historical perspective. *Hand Clin.* 2002;18(2):211–7. [PubMed]
8. Pfeffer GB, Gelberman RH, Boyes JH, Rydevik B. The history of carpal tunnel syndrome. *J Hand Surg Br.* 1988;13(1):28–34. [PubMed]
9. Aroori S, Spence RA. Carpal tunnel syndro. [Review] [135 refs] *Ulster Medical J.* 2008;77(1):6–17. [PMC free article] [PubMed]

10. Published December 7, 2015 // JCB vol. 211 no. 5 **975-985**
The Rockefeller University Press,
doi: 10.1083/jcb.201505119© 2015 de la Fuente et al.
11. Chell J, Stevens A, Davis TR. Work practices and histopathological changes in the tenosynovium and flexor retinaculum in carpal tunnel syndrome in women. *J Bone Joint Surg Am.* 1999;81(5):868–70.[PubMed]
12. Martin S. Carpal tunnel syndrome a job-related risk. *Am Pharmacy.* 1991;31(8):21–4. [PubMed]
13. Nathan PA, Meadows KD, Doyle LS. Occupation as a risk factor for impaired sensory conduction of the median nerve at the carpal tunnel. *J Hand Surg Br.* 1988;13:167–70. [PubMed]
14. Pelmeur PL, Taylor W. Carpal tunnel syndrome and hand-arm vibration syndrome. A diagnostic enigma. [Review] [45 refs] *Arch Neurol.* 1994;51(4):416–20. [PubMed]
15. MacDermid JC, Doherty T. Clinical and electrodiagnostic testing of carpal tunnel syndrome a narrative review. *J Orthop Sports Phys Ther.* 2004;34(10):565–88. [PubMed]
16. Chabas et al. Published: May 31, 2013
<http://dx.doi.org/10.1371/journal.pone.0065034>.