

ROMANIAN  
NEUROSURGERY

Vol. XXXVI | No. 1      March 2022

A clinico-radiological study of diagnostic accuracy of special clinical tests in diagnosing compressive myelopathy in patients of early cervical spondylitis symptoms along with its radiological correlation

Anshul Galav



# A clinico-radiological study of diagnostic accuracy of special clinical tests in diagnosing compressive myelopathy in patients of early cervical spondylitis symptoms along with its radiological correlation

Anshul Galav

Department Of Neurosurgery. St. John's Medical College Hospital, Bengaluru. Kota Medical College, Kota, INDIA

## ABSTRACT

**Background.** Cervical spine myelopathy occur due to compression of the spinal cord is present is quite common with a prevalence of around 90. Diagnosis of in the early stages of the condition, the patient may be symptomatic as neck pain, myelopathy or radiculopathy signs clinical examination findings, correlated by MRI findings.

**Aims and objectives.** To study the clinic-radiological correlation between these clinical signs and radiological imaging in patients with early cervical spondylotic symptoms.

**Methods and measures.** A minimum of 100 cases shall be considered in this study. All the patients of either sex above the age of 12 years with early cervical spondylotic symptoms of SJMCH during the study period will be considered in this study Thorough clinical history including past medical, treatment and personal history is taken. The following clinical signs are assessed in them: clonus, Hoffman's, Trömner, Wartenberg's sign, Deep tendon reflexes, Plantar reflexes The results of these tests are tabulated. MRI cervical spine is performed and cervical myelopathy is graded. MRI findings are correlated with the clinical signs and thus sensitivity, specificity and accuracy of each of these tests is calculated.

**Results.** Four clinical diagnostic tests were found to have been quite reliable. None of the tests was self-diagnostic. Among various diagnostic tests Babinski, clonus sign has the highest specificity but low sensitivity.

**Conclusion.** This study denotes those 6 tests used to diagnose myelopathy are interdependent, none is fully diagnostic.

## INTRODUCTION

Degenerative cervical spondylitic myelopathy (CSM) is a progressive disease of the spinal cord. The clinical signs, symptoms and radiology play a key role in diagnosis.<sup>1</sup> In the early stages diagnosis is difficult due to subtle signs . various clinical test considered for diagnostic purpose. MRI cervical spine is considered the best method for diagnosis

**Keywords**  
myelopathy,  
Wartenbergs,  
spondylitis,  
Hoffmann,  
tromner.  
radiculopathy,  
interforaminal



Corresponding author:  
Anshul Galav

St. John's Medical College Hospital,  
Bengaluru,  
India

dranshul33@gmail.com

**Copyright and usage.** This is an Open Access article, distributed under the terms of the Creative Commons Attribution Non-Commercial No Derivatives License (<https://creativecommons.org/licenses/by-nc-nd/4.0/>) which permits non-commercial re-use, distribution, and reproduction in any medium, provided the original work is unaltered and is properly cited. The written permission of the Romanian Society of Neurosurgery must be obtained for commercial re-use or in order to create a derivative work.

ISSN online 2344-4959  
© Romanian Society of  
Neurosurgery



First published  
March 2022 by  
London Academic Publishing  
[www.lapub.co.uk](http://www.lapub.co.uk)

of cervical stenosis, cord compression, or myelomalacia elements. Spondylosis is common ageing process seen between age of 25 to old age. Most patients are asymptomatic most common symptoms are: neck pain, cervical radiculopathy, and cervical myelopathy.

Neck pain may be due to degenerative disc or facet changes. Cervical radiculopathy can be acute, subacute, or chronic. Radiculopathy may be due to disc or osteophyte which causes motor or sensory deficits. Cervical myelopathy due to long tracts involvement due to various static, dynamic factors and ischemic changes. Early subtle signs like hyperreflexia, Babinski's sign, Hoffman's reflex, Tromner's sign and/or clonus. Other characteristic signs and symptoms include weakness of the hands, hand paresthesia, gait disturbances, bowel and bladder involvement. Signs of LMN at site of lesion and UMN at below level.

#### CLINICAL TESTS

Various clinical tests have been used to diagnose cervical myelopathy – hyperreflexia, Hoffman's, Tromner's, the Babinski sign, Wartenberg's sign, clonus.<sup>3</sup> Controversy is there regarding reliability of these tests. Sensitivity and specificity of these tests depends on various factors like inter observer variation, stage of disease, age of patient, associated comorbidities. Positivity of these tests in normal people not known. Combination of these tests are more reliable than single test.

Hoffmann's sign<sup>4</sup> - stabilise proximal ip joint followed by flicking nail with thumb positive response is flexion of fingers and thumb.

Deep tendon reflex tests - In Biceps tendon testing, the patient is in sitting position, examiner strikes bicep tendon on his thumb normal response is flexion of elbow.

Babinski sign<sup>5</sup> - patient in sitting position, strike foot from lateral to medial, positive response is fanning of fingers and dorsiflexion of thumb.

Tromner sign – on flicking volar aspect of middle finger flexion of thumb and index finger.

Wartenberg sign<sup>6</sup> - involuntary abduction of little finger when hands are outstretched due to unopposed action of extensor muscles digiti minimi, digitorum communis.

Clonus<sup>7</sup> - on rapid passive dorsiflexion of foot, repetitive foot movement due to stretch on Achilles tendon.

#### RADIOLOGICAL STUDIES

The radiological diagnostic workup often includes static or dynamic plain cervical x-rays, magnetic resonance imaging (MRI) [8].

#### Magnetic Resonance Imaging (MRI)

MR is useful for evaluating the spinal canal diameter, spinal cord, intervertebral discs, and vertebral ligaments. Signal changes on T2-weighted MRI scans at the level of spinal compression are often increased in patients with cervical spondylotic myelopathy. This represents edema, inflammation, ischemia, myelomalacia, or gliosis.<sup>9</sup>

In DCM, the following are 3 key characteristics that indicate the severity of disc degeneration: loss of T2WI hyperintensity of the nucleus pulposus and resulting loss of delineation between the nucleus pulposus and annulus fibrosus on T2WI, narrowing of the IVD space, and migration of disc material into the spinal canal.<sup>10</sup>

#### METHODS

This is a descriptive prospective study conducted in the department of neurosurgery at SJMCH Bengaluru and KMC, Kota.

Study period: 2018 to 2020

Study Population/Sample Size/

Inclusion/Exclusion Criteria

Minimum of 100 cases shall be considered in this study. All the patients of either sex above the age of 12 years with early cervical spondylotic symptoms during the study period will be considered in this study. Children less than 12 yrs and other non spondylotic cause of myelopathy.

#### Procedure

Patients presenting with symptoms of neck pain, radiating pain to upper limbs, paraesthesia, weakness & stiffness in the limbs and fulfilling the inclusion criteria are included in this study. Thorough clinical history including past medical, treatment and personal history is taken. The following clinical signs are assessed in them: clonus, Hoffman's, Tromner, Wartenberg's sign, Deep tendon reflexes, Plantar reflexes.

The results of these tests are tabulated. MRI cervical spine is performed and extent of cervical myelopathy changes are graded. MRI findings are

correlated with the clinical signs and thus sensitivity, specificity, accuracy of each of these tests is calculated. The following parameters will be assessed - Patients age and sex, Occupation, Complete Symptomatology, Co morbidities like HTN, DM, thyroid disorder, RA, AS etc MRI cervical spine and assessing for degree of cord compression. Correlating MRI findings with the clinical signs.

### Statistical Evaluation

As this is a descriptive study, all the mentioned data will be collected and analysed using the parameters described above. Specificity and sensitivity of the clinical tests analysed through the collected data.

### RESULTS

100 Patients studied from 2018 to 2020, who satisfied inclusion criteria confirmed by MRI. MRI taken on basis of presence of clinical signs. Among total patients majority 55 females and 45 males, with 35 patients associated with various comorbidities. 1 patient included having symptoms of radiculopathy, myelopathy, and cervical strains. 73% admitted with complains of neck pain, 64% admitted with diagnosis hand numbness and gripping weakness and 45% admitted with gait disturbances.

Four tests are highly diagnostic: Hoffmann's sign, deep tendon reflexes, Tromner and clonus sign. Other 2 Wartenbergs and Babinski sign have moderate diagnostic capacity. Most frequent level affected in MRI are C5-C6 and C6-C7 levels. Combining clinical examination tests provided significant improvements in the diagnostic accuracy of the clinical tests. Patient associated with various comorbidities has higher positive value of sensitivity and specificity of clinical tests.

Age	Gender	Presence Of Comorbidities {35 Patients}
30 TO 80 YRS	Male =46	Male =15
Mean Age 50	Female =54	Female=20

Neck pain	73
Loss of hand dexterity and medial numbness	64
Clumsiness while walking and gait disturbances	45

Clinical test	Sensitivity	Specificity
Hoffmann Test	43	76
Tromners Sign	45	77
Deep Tendon Reflex	43	70
Babinski Reflex	32	93
Clonus	15	96
Wartenberg Sign	18	78

### DISCUSSION

There is high level of agreement for these clinical tests in two examiners. Among these 4 tests highly substantiates diagnosis and other 2 with moderate efficacy. MRI is used to confirm diagnosis, presence of myelomalacia, cord signal changes are highly diagnostic. Tromner sign more sensitive to Hoffman as Hoffman elicited by nipping of nail having no nerve endings while Tromner elicited by tapping volar aspect of skin at terminal phalanx of middle finger.<sup>11</sup> As more nerve endings present at volar aspect, most widely accepted explanation for clonus is that it is hyperactive tendon reflexes caused by self excitation. It is caused by interruption of UMN fibres, having low sensitivity but high specificity.

Babinski sign having low sensitivity but high specificity indicates high chances of correctly diagnose cervical myelopathy. Wartenberg sign also have low sensitivity value but good specificity.<sup>12</sup>

### CONCLUSION

Our various clinical test shows moderate reliability to diagnose cervical myelopathy. This means these tests may be false negative in presence of myelopathy. There accuracy may be increased by using multiple tests for diagnosis.

### LIMITATIONS

There are chances of interobserver variability of diagnosing clinical sign, some interpretations may be wrong. There are chances of variability of signs according to age, some signs may be more ominous with old age. There is variability in timing of MRI in different patients with different symptom profile.

## REFERENCES

1. Batzdorf U, Flannigan BD. Surgical decompressive procedures for cervical spondylotic myelopathy. A study using magnetic resonance imaging. *Spine*. 1991;16:123-127.
2. Bednarik J, Kadanka Z, Dusek L, et al. Presymptomatic spondylotic cervical cord compression. *Spine*. 2004;29:2260-2269.
3. Berger JR, Fannin M. The "bedsheet" Babinski. *South Med J*. 2002;95:1178-1179.
4. Bossuyt PM, Reitsma JB, Bruns DE, et al. Towards complete and accurate reporting of studies of diagnostic accuracy: The STARD Initiative. *Ann Intern Med*. 2003;138:40-44.
5. Braga-Baiak A, Shah A, Pietrobon R, Braga L, Neto AC, Cook C. Intra- and inter-observer reliability of MRI examination of intervertebral disc abnormalities in patients with cervical myelopathy. *Eur J Radiol*. 2008;65:91-98. <http://dx.doi.org/10.1016/j.ejrad.2007.04.014>.
6. Brennan PF, Hays BJ. The kappa statistic for establishing interrater reliability in the secondary analysis of qualitative clinical data. *Res Nurs Health*. 1992;15:153-158.
7. Browder DA, Erhard RE, Piva SR. Intermittent cervical traction and thoracic manipulation for management of mild cervical compressive myelopathy attributed to cervical herniated disc: a case series. *J Orthop Sports Phys Ther*. 2004;34:701-712.
8. Estanol BV, Marin OS. Mechanism of the inverted supinator reflex. A clinical and neurophysiological study. *J Neurol Neurosurg Psychiatry*. 1976;39:905-908.
9. Fujiwara K, Yonenobu K, Ebara S, Yamashita K, Ono K. The prognosis of surgery for cervical compression myelopathy. An analysis of the factors involved. *J Bone Joint Surg Br*. 1989;71:393-398.
10. Fukushima T, Ikata T, Taoka Y, Takata S. Magnetic resonance imaging study on spinal cord plasticity in patients with cervical compression myelopathy. *Spine*. 1991;16:S534-538.
11. Ghosh D, Pradhan S. "Extensor toe sign" by various methods in spastic children with cerebral palsy. *J Child Neurol*. 1998;13:216-220.
12. Glaser JA, Cure JK, Bailey KL, Morrow DL. Cervical spinal cord compression and the Hoffmann sign. *Iowa Orthop J*. 2001;21:49-52.