



## Clinical Evaluation of Cervical Spondylotic Myelopathy in Pre and Post op Period

Authors

**R Srinivas, Shikhil Uppal Andan\*, YS Chandan, P Rajmane**

Department of Surgery, Sri Ramachandra Institute of Higher Education and Research,  
Formerly Sri Ramachandra University, Porur, Chennai, India

### Abstract

*In this present study, we evaluated the clinical signs and symptoms of 30 patients with cervico-spondylo-myelopathy in pre and post-operative period for a span of 3 months with the help of modified Japanese orthopaedic association score. Cervico-spondylo-myelopathy were confirmed by neurological examinations and imaging studies (X-ray, CT and MRI). All patients underwent anterior cervical discectomy with titanium cage fusion. We used modified JOA scoring system for cervical myelopathy and a score of less than 12 indicates severe disability. No mortality was noted after surgery and the surgical technique reveal clinical improvement in 50 % patient after 3 months time. Majority of the patients had a better outcome at 3 months 23 (76%) had a score of more than 12. Any gross improvement can be expected only after 3 months and the surgical technique has a very low morbidity and mortality rate.*

**Keywords:** Anterior cervical discectomy, preoperative, post operative period, cervical spondylosis.

### Introduction

Cervical spondylosis is a very common condition occurs in aged people mostly affecting the bone joints and discs in cervical spine .It is wear and tear of cervical cartilage and formation of bony osteophytes leading to Cervical spondylosis causes multifactorial degenerative changes in spinal canal and neural foramina contributing narrowing of cervical spine (Baptiste & Fehlings 2006). This condition may not have symptoms in most of times and in few cases it shows symptoms like weakness, paresthesia, hyperesthesia, atrophy, and hyperlagesia (Shedid & Benzel 2007).

Cervical spondylosis has three sub types according to affected region and symptoms, which are cervical myelopathy, cervical radiculopathy and acute or chronic neck pain (Yoshor et al

2005). Cervical radiculopathy is characterised by herniated nucleus pulposus (HNP) or osteophytic lesion indicating sign of spinal nerve root problem (Bakhsheshian et al. 2017; Yoshor et al 2005). Cervical myelopathy causes severe pain due to sensory or motor changes such as electrical shock sensation, numbness, and paraesthesia. It is mainly characterized of ischaemia causing due to small vessel obstruction and degeneration of the spinal cord. It also appears to thicken ligamentum flavum and cause narrowing of the spinal canal. Static factors may cause compressed neural structure directly and radiculopathy and/or myelopathy sign and symptoms could be visible. In few cases it is also able to compress the vascular structure, causing apoptosis of the neural structure (Bakhsheshian et al. 2017). The other

cervical spondylosis associated effects include congenital degenerative osteophyte growth, canal stenosis, ossification of posterior longitudinal ligament (OPLL), disc herniation, and ligamentum flavum hypertrophy (Baptiste & Fehlings 2006; Nouri et al. 2015).

There are various approaches for cervical spondylosis treatment such as cervical interbody fusion approaches, clowards technique of iliac crest bone graft for cervical interbody fusion (Nouri et al. 2015; Bakhsheshian et al. 2017) and very recent materials like interbody cylindrical, perforated cages with plasmapore coating and PEEK CAGES are being used. People who are suffering from such symptoms for a period of 2 years or more and diagnosed for cervical spondylosis are mostly subjected to surgery (Boni et al. 1994; Park et al. 2013). The Japanese Orthopaedic Association (JOA) score is widely used to assess the severity of clinical symptoms in patients with cervical compressive myelopathy and is currently accepted as the standard tool for assessment in Western countries (Kato et al. 2015).

In this present study, we evaluated the clinical symptoms of 30 patients with cervico-spondylo-myelopathy in pre and post-operative period for a span of 3 months with the help of Japanese orthopaedic association score.

## Materials and methods

### Ethics statement

It was a prospective study designed and approved by Ethics Committee of the Sri Ramachandra Institute of Higher Education and Research, formerly Sri Ramachandra University in Chennai, India and patient consent was obtained before the surgery procedure. Decision to perform surgery as treatment of cervical spondylosis was carried out in accordance with the approved guidelines. Patient information was anonymized during analysis.

### Study design and patient population

This prospective study was conducted during January 2017 to December 2017. Patients with

confirmed symptoms of cervico-spondylo-myelopathy were included in this study. Diagnosis of cervico-spondylo-myelopathy were confirmed by neurological examinations and imaging studies, including routine radiographs (X-ray, C spine AP/lateral), computed tomography (CT) and MRI (1.5-T system (Magnetom Symphony, Siemens Medical Solutions, Malvern, PA, USA). Patients confirmed for cervico-spondylo-myelopathy alone were taken into consideration. None of traumatic spinal injuries were included. Clinical evaluation of all 30 cases during pre and post-operative period for a span of 3 months with the help of modified Japanese orthopaedic association score was assessed.

### Surgical technique

All patients underwent anterior cervical discectomy with of cylindrical titanium cage fusion. Most of the patients had disc osteophyte complex which was removed and the appropriate size of cage of number 8mm, 10 mm and 12 mm were used. No morbidity was noticed, except for one patient, who had a wound infection.

Surgical images



**Image 1** Preoperative MRI of cervical spine

Study Questionnaire Format



Image 2 Pre operative MRI axial cuts

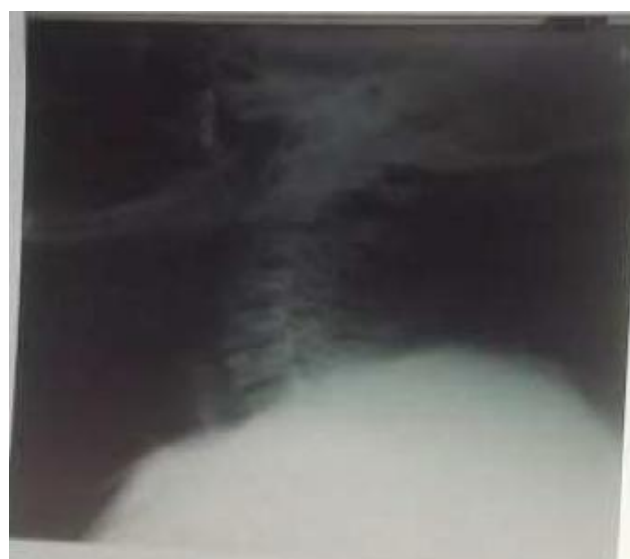


Image 3 Preoperative x ray of cervical spine



Image 4 Postoperative X ray of cervical spine

The mJOA questionnaire			
Name:	DOB:	Surgery Date:	Today's Date:

Modified Japanese Orthopaedic Association (mJOA) score	
<b>I. Motor dysfunction score of the upper extremities</b>	
Inability to move hands	Circle one 0
Inability to eat with a spoon but able to move hands	1
Inability to button shirt but able to eat with a spoon	2
Able to button shirt with great difficulty	3
Able to button shirt with slight difficulty	4
No dysfunction	5
<b>II. Motor dysfunction score of the lower extremities</b>	
Complete loss of motor and sensory function	Circle one 0
Sensory preservation without ability to move legs	1
Able to move legs but unable to walk	2
Able to walk on flat floor with a walking aid (i.e., cane or crutch)	3
Able to walk up and/or down stairs with hand rail	4
Moderate to significant lack of stability but able to walk up and/or down stairs without hand rail	5
Mild lack of stability but walk unaided with smooth reciprocation	6
No dysfunction	7
<b>III. Sensation</b>	
Complete loss of hand sensation	Circle one 0
Severe sensory loss or pain	1
Mild sensory loss	2
No sensory loss	3
<b>IV. Sphincter dysfunction</b>	
Inability to urinate voluntarily	Circle one 0
Marked difficulty with micturition	1
Mild to moderate difficulty with micturition	2
Normal micturition	3

mild myelopathy	mJOA from 15 to 17
moderate myelopathy	mJOA from 12 to 14
severe myelopathy	mJOA from 0 to 11.

Neurological assessment through Japanese orthopaedic association score

We used modified JOA scoring system for cervical myelopathy and the maximum score of 18 or above indicates normal function. We also estimated postoperative improvement of symptoms based on the recovery rate (RR) = (postoperative JOA score – preoperative JOA score) / (max score – preoperative JOA score) × 100%. A score of 75 to 100% was designated as excellent, 50 to 74% as good, 25 to 49% as fair and 0 to 24% as poor (Kato et al. 2015).

Results

During the period of one year we enrolled 30 cases of cervical spondylosis myelopathy, including 22 men and 8 women, ranging in age from 40 to 70 years, with a mean age of 54.5 years. The mean follow-up period was 3 months. X ray revealed all patients with canal diameter less than 12 mm had features of myelopathy.

Similarly inter pedicular distance of less than 23 mm had features of myelopathy (figure 1 & 2). Based on modified JOA score, all the patients were classified into mild moderate and severe

myelopathy The tabular column below denotes the number of patients and the pre op and post op score .

**Table 1.** Modified Japanese orthopaedic association (JOA) score of 30 enrolled cases Pre operative and post operative course.

Score	Pre-operative status	Post-operative status 3MONTHS(NUMBER OF PATIENTS)
MILD MYELOPATHY(15-17)	7	SCORE (15 -18) 14
MODERATE MYELOPATHY(12-14)	10	SCORE (12-14) 11
SEVERE MYELOPATHY(0-11)	13	SCORE (0-11)5

Calculation Of Recovery Rate: (Hirabayashi method)

$$\text{Recovery Rate (\%)} = \frac{(\text{POSTOPERATIVE SCORE} - \text{PREOPERATIVE SCORE})}{(18 - \text{PREOP SCORE})} * 100$$

$$= \frac{(14.43 - 12.1)}{18 - 12.1} * 100$$

Recovery rate calculated in 30 of our patients is 39.49%

## Discussion

Cervical spondylosis myelopathy (CSM) is one of major cause of disability in elderly people and early treatment is essential for optimal outcomes before there is onset of spinal cord damage (Park et al. 2013; Tracy et al. 2010). Conservative treatments include pharmacologic treatments, neck immobilization, lifestyle modifications, and physical modalities. Various poor prognostic factors are associated with conservative treatment, which often results with the progression of symptoms, presence of myelopathy for more than 6 months (Bakhsheshian et al. 2017). Although various approaches for CSM treatment are being used, surgery is the final resolution for that case who is suffering for more than 6 month and more with no improvement through conservative treatments methods. Prognosis factors post conservative treatment are decision making for surgical intervention and to make final decision to perform surgery depends upon degree of spinal cord dysfunction, duration of symptoms, degree of functional deterioration, general health of the patient, and radiographic findings. The ultimate goal of surgery is to decompress the cord with expansion of the spinal canal, while stabilizing

and restoring cervical lordosis. Post surgery a high-quality clinical care of patients and follow up for long-term is required (Mummaneni et al. 2009; Liu et al. 2012).

Various studies have been done to appreciate an optimal surgical approach, though it is not always clear to select one above other (Kadanka et al. 2002; Sampath et al. 2000; Yoshimatsu et al. 2001; Rhee et al. 2013). An anterior approach offers advantages like direct decompression of pathologies in the anterior cervical spine, a muscle sparing dissection which minimal postoperative pain, negligible rate of infection. Generally surgeons prefer anterior approaches with CSM of level 1 or 2 and posterior oapproaches with level 3 or more as in such case risk involved are more if anterior approaches used. The posterior approach allows a wider decompression and offers the prospect to avoid procedural problems resulted from a short neck, barrel chest, or previous anterior cervical surgery during anterior procedure (Bakhsheshian et al. 2017).

## Conclusions

- 1) Most of the patients were of male population .mean age was 55years.

- 2) As per the modified JOA maximum number of people had increase score was 2.it was found in 50 percent of patients.
- 3) Most of the patients operated in the study group had severe myelopathy in pre operative period.
- 4) The concluding point is that we had 14 of 30 patients who could have a JOA score of 15-18 in post op period .it was found 50 percent of our study group benefited by the procedure.
- 5) Though there was a minimal increase in score of 2 in few patients as per JOA we could analytically get an approximate of 40 percent improvement found in clinical status in our study.

6. Liu Y, Hou Y, Yang L, Chen H, Wang X, Wu X, Gao R, Wang C, Yuan W. Comparison of 3 reconstructive techniques in the surgical management of multilevel cervical spondylotic myelopathy. *Spine*. 2012 Nov 1;37(23):E1450-8.
7. Mummaneni PV, Kaiser MG, Matz PG, Anderson PA, Groff MW, Heary RF, Holly LT, Ryken TC, Choudhri TF, Vresilovic EJ, Resnick DK. Cervical surgical techniques for the treatment of cervical spondylotic myelopathy. *Journal of Neurosurgery: Spine*. 2009 Aug;11(2):130-41.
8. Nouri A, Tetreault L, Singh A, Karadimas SK, Fehlings MG. Degenerative cervical myelopathy: epidemiology, genetics, and pathogenesis. *Spine*. 2015 Jun 15;40(12):E675-93.
9. Park SJ, Kim SB, Kim MK, Lee SH, Oh IH. Clinical features and surgical results of cervical myelopathy caused by soft disc herniation. *Korean Journal of Spine*. 2013 Sep;10(3):138.
10. Rhee JM, Shamji MF, Erwin WM, et al. Nonoperative management of cervical myelopathy: a systematic review. *Spine (Phila Pa 1976)*. 2013;38(22 suppl):S55-S67.
11. Sampath P, Bendebba M, Davis JD, Ducker TB. Outcome of patients treated for cervical myelopathy. A prospective, multicenter study with independent clinical review. *Spine (Phila Pa 1976)*. 2000;25:670-676.
12. Shedid D, Benzel EC. Cervical spondylosis anatomy pathophysiology and biomechanics. *Neurosurgery*. 2007 Jan 1;60(suppl\_1):S1-7.
13. Tracy JA, Bartleson JD. Cervical spondylotic myelopathy. *The neurologist*. 2010 May 1;16(3):176-87.
14. Yoshor D, Klugh III A, Appel SH, Haverkamp LJ. Incidence and characteristics of spinal decompression

## References

1. Baptiste DC, Fehlings MG. Pathophysiology of cervical myelopathy. *The Spine Journal*. 2006 Nov 1;6(6):S190-7.
2. Bakhsheshian J, Mehta VA, Liu JC. Current diagnosis and management of cervical spondylotic myelopathy. *Global spine journal*. 2017 Sep;7(6):572-86.
3. Boni M, Cherubino P, Denaro V, Benazzo F: Multiple subtotal somatectomy. Technique and evaluation of a series of 39 cases. *Spine (Phila Pa 1976)* 9(4):358-362, 1984.
4. Kadanka Z, Mares M, Bednanik J, et al. Approaches to spondylotic cervical myelopathy: conservative versus surgical results in a 3-year follow-up study. *Spine (Phila Pa 1976)*. 2002;27: 2205-2210.
5. Kato S, Oshima Y, Oka H, Chikuda H, Takeshita Y, Miyoshi K, Kawamura N, Masuda K, Kunogi J, Okazaki R, Azuma S. Comparison of the Japanese Orthopaedic Association (JOA) score and modified JOA (mJOA) score for the assessment of cervical myelopathy: a multicenter observational study. *PLoS One*. 2015 Apr 2;10(4):e0123022.

surgery after the onset of symptoms of amyotrophic lateral sclerosis. Neurosurgery. 2005 Nov 1;57(5):984-9.

15. Yoshimatsu H, Nagata K, Goto H, et al. Conservative treatment for cervical spondylotic myelopathy. prediction of treatment effects by multivariate analysis. Spine J. 2001;1:269-273.