



Original Article

Clinical outcome of anterior vs posterior approach for cervical spondylotic myelopathy



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ABSTRACT

Objective: The aim is to demonstrate whether there is clinical difference between posterior vs anterior decompression in cervical spondylotic myelopathy.

Methods: Forty-two patient database was obtained from the Centro Medico Nacional de Occidente in Mexico, those who underwent surgical treatment for cervical myelopathy with a mean 1.4 year follow-up.

Results: Patients were divided; group A (45%) anterior approach and group B (55%) posterior approach, for mJOA, group A had a lower score compare with group B. While in the Nurick score group B got a higher score compare with group A.

Conclusions: Posterior decompression resulted in better functional outcomes ($p < 0.05$).

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The term cervical spondylotic myelopathy (CSM) was published in 1952, Brain et al. discovered the neurological signs and symptoms associated to medullar lesions secondary to vascular compromise.¹ CSM is caused by the chronic compression of neurological elements, which together with spinal canal stenosis by ossification of the posterior longitudinal ligament forms the 2 most frequent causes of CSM. Patients with progressive neurological deterioration have surgical treatment indication, 50–75% will show neurological recovery in the first 6 months follow-up.^{2,3}

The choice of treatment in CSM can be anterior, posterior or combined approaches. The decision to choose an approach will depend on important factors: the cause of neurological compression (anterior structures, posterior structures or both), the number of affected segments, sagittal cervical balance and the surgeons experience in the surgical approach. Traditionally the anterior compression pathologies, either by disc herniation or bone spur formation in the posterior wall of the vertebral body, have been managed by anterior approach with corpectomy and fusion or discectomy and fusion. When there are 2 or 3 segments affected the posterior approach is recommended with laminectomy or

laminoplasty. Realizing anterior approach, when there are 2 or more segments affected, raises the risk of no-union, stress in adjacent segments, cervical degeneration is augmented and swallowing can be difficult.^{2,4}

Regarding cervical sagittal balance, there is evidence that the anterior approach offers better results than the posterior approach. There are various scales available to measure neurological function in patients with SCM, of which the most relevant are the modified Japanese Orthopedic Association scale and Nurick's scale (Tables 1 and 2). These scales can be used to evaluate results in neurological function after a posterior and anterior cervical decompression, comparing them at 1.4-year follow-up (Table 3).^{2,4–6}

1. Materials and methods

Between 2013 and 2014, 42 patient database was obtained from the spine surgery module in Centro Medico Nacional de Occidente in Guadalajara, Mexico, these patients underwent multilevel decompressive surgery for CSM with a mean 1.4 year follow-up. Patients were localized by home phone numbers and follow-up appointments. Latest patient imagery was not evaluated.

Nineteen patients underwent an anterior decompression with corpectomy followed by placement of an expandable titanium

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Table 1
Modified Japanese Orthopaedic Association (mJOA) Score.

Motor dysfunction score of the upper extremities	
Inability to move hands	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
Motor dysfunction score of the lower extremities	
Complete loss of motor and sensory function	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	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 rail	5
Mild lack of stability but walk unaided with smooth reciprocation	6
No dysfunction	7
Sensation	
Complete loss of hand sensation	0
Severe sensory loss or pain	1
Mild sensory loss	2
No sensory loss	3
Sphincter dysfunction	
Inability to urinate voluntarily	0
Marked difficulty with micturition	1
Mild to moderate difficulty with micturition	2
Normal micturition	3

Table 2
Nurick scale.

Grading	Nurick clinical scale
Grade 0	Signs and symptoms of root involvement but without evidence of spinal cord disease
Grade 1	Signs of spinal cord diseases but no difficulty walking
Grade 2	Slight difficulty in walking which does not prevent full-time employment
Grade 3	Extreme difficulty in walking that requires assistance and prevents full-time employment and occupation
Grade 4	Able to walk only with someone else's help or with the aid of a walker
Grade 5	Chairbound or bedridden

Table 3
Distribution.

Gender	No. (#)	Age (years %)
Feminine	16	74
Anterior approach	7	73
Posterior approach	9	75
Masculine	26	76
Anterior approach	10	74
Posterior approach	16	75
History of	No. (#)	(%)
DM	8	19
6 women		37
2 male		7
BHP	5	11
4 male		15
1 women		6

Patient distribution. DM, diabetes mellitus; BHP, blood higher pressure.

cage to reconstruct the anterior column adding anterior cervical plate, and 18 patients underwent a posterior decompression with laminectomy followed by posterior instrumentation with lateral mass screws and 5 patients with laminoplasty. For a more accurate comparison with the anterior group, patients, who underwent a laminectomy greater than 4 levels, were excluded from the posterior group.

Thus, 42 patients were included in the study: 19 in the anterior group and 23 in the posterior group. These patients suffered from degenerative cervical spinal canal stenosis, and underwent decompressive surgery of the cervical spine sometime between 2013 and 2014. The primary symptom in all patients was myelopathy (CSM). In total, there were 26 men (10 anterior group, 16 posterior group) and 16 women (9 anterior group, 7 posterior group) who underwent operations. The patients' ages at operation ranged from 64 to 84 years old, with a mean of 75 years. The posterior group (77 ± 8.8 years) was significantly older than the anterior group (69 ± 8.1 years; $p = 0.01$).

The reasons for using the anterior approach were spondylosis in 13 patients, ossification of the posterior longitudinal ligament in 5, degenerative kyphosis in 1. The reasons for using the posterior approach were spondylosis in 19 patients, and ossification of the posterior longitudinal ligament in 4. All patients were refractory to conservative treatment. The decision to use the chosen procedure depended on 3 main factors: direction of spinal cord compression, preoperative cervical alignment and the number of affected levels. Radiological examinations included plain radiography, MR imaging, and CT scan. Stability was assessed in the anterior and posterior groups. Latest patient imagery was not evaluated.

The 19 patients in the anterior group were treated using a corpectomy followed by placement of an expandable titanium cage to reconstruct the anterior column and cervical plate was added in all. In the posterior group, a 2- to 4-level laminectomy followed by posterior instrumentation with lateral mass screws was performed in 18 cases and 5 with laminoplasty (open door with sutured to the spinous process to avoid closure). Follow-up was 1.4 years. Clinical outcome was assessed before and after surgery using the Nurick score and the mJOA scale score. The chi-square test, and *t*-test were used for statistical analysis of data. Results were considered significant at a *p* value <0.05 . The analyses were performed using SPSS statistical software, version 20 (SPSS Inc.).

Institutional review board approval was not required, as patients were treated with approved diagnostic and therapeutic procedures according to generally accepted standards of care.

2. Results

There were 19 patients in the anterior group and 23 patients in the posterior group. A presurgical comparison showed that there was no statistical difference ($p 0.05$) between patients, who underwent anterior and posterior surgeries. Length of stay in hospital for patients, who underwent anterior surgery, was on average 1.7 days shorter than those who underwent posterior surgery (3.7 vs 5.4 , $p < 0.05$).

In the anterior group (group A), corpectomies were performed in 14 patients at the C-5 level, and 5 patients C-4 level. The follow-up period in this group was 1.2 years. The implantation of the expandable cages was performed without complications and the adjustment of the height could be performed in situ. There were no complications reported during surgery and no infections, dysphagia or migration of the expandable cage during follow-up.

In the posterior group, all laminoplasty and laminectomies and instrumentation were performed at multiple levels. Involving 2 levels in 1 case (C3-4), 3 levels in 6 cases (C3-5 in 4 cases, and C4-6 in 14 cases), and 4 levels in 2 cases (C4-7 in 1 case, and C1-4 in 1 case). The follow-up period in this group was 1.3 years.

Clinical evaluation revealed significant improvement of both groups following spinal cord decompression according to scores on the mJOA scale and Nurick ($p < 0.05$). The comparison between the anterior and posterior groups shows a difference statistical for the posterior approach. After the operations according to the Nurick and mJOA scale score ($p < 0.05$) No complications, deep venous

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