

CERVICAL SPONDYLOTIC MYELOPATHY*

Ünal KIRIŞOĞLU MD. Serhat ERBAYRAKTAR MD. Saffet ERK MD.
Engin UÇAR MD. Metin GÜNER MD.

ABSTRACT :

Clinical findings and results after surgical treatment of 29 consecutive patients with cervical spondylotic myelopathy were reviewed among 322 cases that were operated due to cervical pathologies at our department since 1984. There were 23 men and 6 women; their ages ranges from 38 to 73 years. The duration of preoperative symptoms ranged from two months to four years. Preoperative evaluation of the patients were graded with Nurick Scale. Fifteen patients with primarily anterior cord compression were treated by anterior approach and 14 patients with cord compression due to spinal stenosis were treated by posterior approach. There was no surgical mortality. Of the 15 patient undergoing anterior decompression and fusion, 10 showed immediate functional improvement and 5 were unchanged. Of the 14 patients undergoing posterior decompression, 7 showed immediate functional improvement 5 were unchanged and 2 were worse. Duration of follow-up was approximately 6 months. Final functional status at last follow-up examination in the both groups was found to be unchanged.

Key words: Cervical, Spondylosis, Myelopathy, Surgical treatment.

INTRODUCTION

Cervical spondylosis is a disorder characterized by increasing degeneration of cervical intervertebral disc with subsequent changes in bones and soft tissues (3). Cervical spondylotic myelopathy (CSM) is the most common spinal cord disorder affecting people older than 55-year of age (6). Mechanical, vascular and dynamic factors are accepted to be responsible for myelopathy (6, 13, 14., 15).

Clinical diagnosis of CMS is the presence of long tract signs and segmental signs (16). Sensory deficits or radicular pain are not reliable in clinical diagnosis (15).

Plain x-rays, electromyography (EMG), somatosensory evoked potentials (SEPs), myelography, computerized tomography (CT) and magnetic resonance (MR) are current procedures for the diagnosis of CSM.

Surgical treatment of myelopathy should be directed toward the pathology rather than away from it, and in some cases both anterior and posterior approach may be needed (3). Controversy still remains on the superiority of anterior and posterior decompressive techniques (8).

Operative outcome is closely related the degree of spinal cord degeneration and duration of symptoms (6, 11).

MATERIAL AND METHOD

Twenty-nine consecutive patients with CSM underwent surgery at our department since 1984. Among these 29 patients, 23 of them were men and 6 were women. The average age was 54.2 years, ranging from 38 to 73 years.

Clinical presentation of cases are shown on Table 1. Functional severity of CSM was graded by the Nurick Scale (6) as follows: Grade 0 (signs or symptoms of root involvement but without evidence of spinal cord disease); Grade 1 (signs of spinal cord disease but no difficulty in walking); Grade 2 (slight difficulty in walking that does not prevent full-time employment); Grade 3 (difficulty in walking that prevents full-time employment or the ability to do daily tasks such as housework but is not severe enough to require help walking); Grade 4 (able to walk only with help or with a walker); Grade 5 (Chairbound or bedridden). The duration of preoperative symptoms ranged from two months to four years.

Plain x-ray was performed for preoperative and postoperative evaluation in al cases routinely. Among these 29 of cases, one of them evaluated with myelography, 11 with CT and 17 with MR.

* Dokuz Eylül University, School of Medicine, Department of Neurosurgery.

Table 1. Presenting complaints of the cases.

Presenting complaint	Number of cases
Neck pain	8
Arm pain	7
Leg pain	2
Upper extremity numbness	17
Lower extremity numbness	13
Upper extremity weakness	17
Lower extremity weakness	20
Urinary incontinence	2
Gait difficulty	20

Surgical decompression was performed either via anterior approach with Modified Cloward vertebrectomy or posterior approach with laminectomy.

Fourteen patients with cord compression due to spinal stenosis were treated by laminectomy, 2 had four levels decompressed, 5 had three, 6 had two and 1 had one level. Of the 14 patient undergoing posterior decompression, 7 showed immediate functional improvement and 5 were unchanged, 2 were worse.

Duration of follow-up was approximately 6 months. Final functional status at last follow-up examination in the both groups was found to be unchanged. There was no surgical mortality.

RESULTS

Of 29 patients, 7 of them was evaluated as grade 1, 5 was grade 2, 6 was grade 3, 8 was grade 4 and 3 of them was grade 5. Average grade was found as 2.8 preoperatively. Except 2 patients who were worsened, the others were either improved or unchanged. Average improvement was 0.6 Nurick grade.

Among 15 patients who were operated on via anterior approach, 10 (66.6%) of them improved and the rest (33.4%) unchanged. Of the 14 patients who were operated on via posterior approach seven (50.0%) improved, five (35.7%) unchanged and 2 (14.3%) worsened.

While preoperative myelography was obtained in one patient, CT was performed in 11 and MR in 17 patients. Herniated disc and spur formation toward to spinal canal was seen on CT and MR in 7 and 8 of cases respectively. While 9 cases of spinal stenosis was diagnosed with MR, 4 of cases with CT and the remainder with myelography.

Fifteen patients with primarily anterior cord compression were treated by anterior approach, 5 had one level decompression and 10 had two levels. Anterior decompression was performed in all patients using modified Cloward technique or vertebrectomy. Ten patients showed immediate functional improvement and 5 were unchanged. There was no surgical morbidity from anterior approach.

DISCUSSION

The onset of CSM is usually insidious and progressive. Ebersold et al. (6) reported that the duration of preoperative symptoms ranged from 1 month to 10 years in his study. Our results showed that the average duration of presenting symptoms was approximately 2 years.

The presence of gait abnormality with or without segmental signs is important for the diagnosis of CSM. Damage to white matter causes more problems such as long tract signs (eg. spasticity) than damage to gray matter. Sensory deficits or radicular pain are not reliable in clinical diagnosis (15). All of the cases in our series showed long tract signs. While 20 patients presented with gait abnormality, 9 of them with segmental signs.

Mechanical [stenotic cervical spinal canal, development of osteophytes or posterior bulging of annulus and hypertrophy of ligamentum flavum (9) may result in a pincher-like action upon the cord], vascular [as a result of anterior spinal artery compression or the occlusion of intramedullary vessels (7, 10, 15)] and dynamic [increased mobility of the cervical spine (1, 2, 4, 12)] factors are accepted to be responsible for myelopathy (6, 15). Beginning in the third decade, disc loses its hydration and mucopolysaccharide content with an increase in collagen resulting in decrease of disc height. Parallel to disc narrowing, osteophytes occur and the reason for its occurrence is unknown, but abnormal movement may be the reason (3). Average age in anteriorly treated patients in this study was 54.8 years which show parallelism with literature. In our opinion, vascular compression or occlusion may be a result of mechanical factors such as development of osteophytes, herniated disc or posterior bulging of annulus.

Plain x-rays are helpful to see some causes of myelopathy and to rule out the bony destruction by metastatic disease (3). We use the plain x-ray preoperatively for the differential diagnosis of congenital,

infectious, rheumatic and neoplastic diseases of the spine. Myelography is still accepted as a gold standard by some authors (15). It has an advantage of dynamic flexion and extension views (3, 15). With the development of current diagnostic procedure such as CT and MR, we restricted the usage of the invasive technique as myelography. CT scan is accepted to be the best radiological method to show the bony narrowing and the dimensions of cervical canal with bone window technique, pathological changes of the spinal cord and also useful for postoperative demonstration of the decompression (3, 15). Eleven patients were evaluated with CT in our study. Spur formation plus herniated disc was seen in 7 patients and spinal stenosis in four. Imaging of the neural structure is best performed with magnetic resonance (MR). Besides spinal canal, intrinsic cord abnormalities can also be shown (16). In this study, herniated disc was seen in 8 patients and spinal stenosis in nine. In according to our radiological findings, posterior compression of calcified disc herniation and vertebral body due to degenerative bony changes such as spur were shown better on CT, and spinal cord abnormalities such as intensity changes due to compression were best visualised by MR than CT.

Electromyography (EMG) and somatosensory evoked potentials (SEPs) though commonly employed give only indirect information in myelopathic patients (4). Therefore none of the cases was evaluated with EMG or SEP in this study. EMG is useful for the differential diagnosis of distal lesions such as entrapment neuropathies. Because of neurological evaluations were not compatible with entrapment neuropathy and radiological investigations revealed the causes of myelopathy in all cases, we did not need to use EMG.

Although, some authors believe CSM to be a benign and self-limiting disease, many of the patients were found to improve after decompression (8). When the pathology is ventral, the anterior approach is indicated either single or multilevel diseases (3). Removal of osteophyte formation reduces local increased pressure and inhibits the adverse effect of repetitive motion on the compromised segments. Different series showed from 73 to 100% improvement on vertebrectomy in multilevel cervical spondylosis (15). Parallel to clinical results, experimental studies also showed improvement in neurological function (8). Posterior approach is indicated when the spinal canal is stenotic (3). Laminectomy would have maximum effect in these pathologies (5). Outcome of posterior approach

to spinal stenosis is reported as approximately 60% (6, 15).

Fifteen patients who had primarily anterior cord compression underwent modified Cloward operation (11 of cases) or vertebrectomy (4 of cases) combined with fusion. Of these patients, 5 of them were single level and the remaining were two levels. The results showed improvement in 66.6% of cases. Our results showed that functional improvement was better in patients with multilevel compression. Posterior approach was performed in 14 of cases with diffusely multilevel stenotic spinal canal or posterior compression. Among 12 patients of multilevel disease, functional improvement was seen in 41.6%, worsening in 16.6% and the remaining were unchanged. Controversy still remains on the superiority of anterior and posterior decompressive techniques (8). In according to our results, functional outcome is better in anteriorly decompressed patients.

REFERENCES

1. Barnes MP, Saunders M: The effect of cervical mobility on the natural history of cervical spondylotic myelopathy. *J Neurol Neurosurg Psychiatry* 47: 17-20, 1984.
2. Batzdorf U, Batzdorff A: Analysis of the cervical spine curvature in patients with cervical spondylosis. *Neurosurgery* 22: 827-838, 1988.
3. Beck DW: Cervical Spondylosis: Clinical findings and treatment. *Contemporary Neurosurgery Vol. 13 No. 13*, edited by Tindall GT, Williams and Wilkins Company, Baltimore, 1991.
4. Chistyakov AV, Soustiel JF, Hafner H, Feinsod M: Motor and somatosensory conduction in cervical myelopathy and radiculopathy. *Spine* 20: 2135-2140, 1995.
5. Cusick JF, Myklebust JB: Biomechanics of cervical spondylotic myelopathy. *Contemporary Neurosurgery Vol. 9 No. 5*, edited by Tindall GT, Williams and Wilkins Company, Baltimore, 1991.
6. Ebersold MJ, Pare MC, Quast LM: Surgical treatment for cervical spondylotic myelopathy. *J Neurosurg.* 82: 746-751, 1995.
7. Fried L, Aparicio O: Experimental ischemia of the spinal cord. *Neurology* 23: 289-293, 1973.
8. Harkey HL, Al-Mefty O, Marawi I, Peeler DF, Haine DE, Alexander LF: Experimental chronic compressive cervical myelopathy; effects of decompression. *J Neurosurg* 83: 336-341, 1995.
9. Henderson CM, Hesnassy RG, Shvey Jr HM, Shackelford EG: Posterior-lateral laminectomy as an exclusive

- operation for cervical radiculopathy. A review of 846 consecutively operated cases. *Neurosurgery* 13: 504-512, 1983.
10. Hoff JT, Nishimura M, Pitts L, Vilnis V, Turek K, Lager R: The role of ischemia in the pathogenesis of cervical spondylotic myelopathy. A review and new microangiographic evidence. *Spine* 2: 100-108, 1977.
 11. Matsuyama Y, Kawakami N, Miatsu K: Spinal cord expansion after decompression in cervical myelopathy. *Spine* 20: 1157-1663, 1995.
 12. Olsson S: The dynamic factor in spinal cord compression, A study on dogs with special reference to cervical disc protrusions. *J. Neurosurg* 15: 306-321, 1985.
 13. Saunders RL, Bernini PM, Shirreffs TG, Reeves AG: Central corpectomy for cervical spondylotic myelopathy: A consecutive series with long-term follow-up evaluation. *J Neurosurg* 74: 163-170, 1991.
 14. Seifert V, Stolke D: Multisegmental cervical spondylosis treatment by spondylectomy, microsurgical decompression and osteosynthesis. *Neurosurgery* 29: 498-534, 1991.
 15. Seifert V: Anterior decompressive microsurgery and osteosynthesis for the treatment of multisegmental cervical spondylosis. *Acta Neurochir (Wien)* 135: 105-21, 1995.
 16. Wada E, Ohmura M, Yonenobu K: Intramedullary changes of the spinal cord in cervical spondylotic myelopathy. *Spine* 20: 226-2232, 1995.