International Journal of Innovative Research in Medical Science (IJIRMS)
Volume 06, Issue 07, July 2021,
https://doi.org/10.23958/ijirms/vol06-i07/1157

Original article

Prognosis Factors of Csm; Experience of Military Hospital of Rabat/Morocco about 107 Cases

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Received 20 June 2021; Accepted 08 July 2021; Published 18 July 2021

Abstract

Background: The surgery outcome of cervical spondylotic myelopathy (CSM) for some authors depend to the clinical signs (obesity, smoking, sex, age, patient's activity, and the surgery delays). Nevertheless, for others authors it's depending to the chirurgical approach (anterior or posterior or the level number of decompression in the cervical spine). There is no consensus although some arguments prevail over to others in the literature. Our study purpose was to determine the important clinical predictive factors of surgical outcome in patients with CSM. It's a retrospective study of 107 patients admitted to the Mohamed V hospital in Rabat over 06 years from January 2013 to December 2018 for cervical spondylotic myelopathy (CSM). Surgery act was performing for all and They were following up for 1year. Their neurological status pre and postoperative was assessed using the Japan Orthopedic Association (JOA) score and others prognostics factors such as sex, age, duration of symptoms, Cobbs angle, number of discs compressed, MODIC class were studying . (P value <0.05) was statistically significant. Patients were classified into 02 groups, youngers patients in group 1 = G1 (<60 years of age; n = 70) and olders patients group = G2 (>/=60 years of age; n = 37). The mean age = 52.72 years [42.27-63.16], men 64.5% against 35.5% of women, a sex ratio = 2/1 in favor of men. In G1, mean age X1= 45.6 years. In G 2, mean age X2 = 61.85 years. The average delays before surgery = 11.28 months [6-18.19]. In G1 it was 10.30 months and 16.34 months in G2. The pre operatory JOA score (JOA PREO) = 9.87 +/- 2.033. JOA PREO score was 11 and 7 respectively in G1 and G2. The prevalence of MODIC (MC) = 52.23% and type 2 of MC was predominant in both groups, with p> 0.05. G1 patients underwent an ACDF in 82% and laminectomy in 18%. In G 2, laminectomy was performing in 50% and the anterior discectomy in 21.73%, corporectomy in 28.27%. After surgery, JOA score passed to severe to moderate 13.48 and 13.27 after 1year of following up in G1 and G2. In conclusion those factors such as sex, number of discs involved, and Cobbs angle on prognosis were not statistically significant (P>0.05) but patient's age and duration of symptoms < 1 year predict to have more neurologic improvement (P<0.05) according to the JOA score.

Keywords: ***cervical spondylotic myelopathy (CSM); Japanese Orthopaedic Association (JOA); MODIC class; Cobb s angle***

Introduction

Cervical spondylotic Myelopathy (CSM) includes all chronic suffering of the spinal cord regardless of the etiologies, disc degeneration and osteoarticular pathology. But the term cervical myelopathy is more restrictive and should be reserved for chronic suffering of the spinal cord in connection with the decrease in the dimensions of the cervical spinal canal whose main cause is cervicarthrosis or spondylotic [1].

CSM is a progressive degenerative disease. It is the most common cause of cervical spinal cord dysfunction after fifty years [1,2,3]. It is responsible for disability if the treatment is not early and

efficient, which can lead to considerable morbidity responsible for socio-economic disorder. However, it can be prevented by knowledge of its pathophysiology and its early management.

The objective of this study; define the prognostic factors by studying the clinical epidemiological profile (pre-and post-operative JOA score) and Radiological profile of patients operated for CSM.

Materials and Methods

This is a retrospective study of 107 patient files operated for CSM in the neurosurgery department of Mohamed V military hospital in Rabat over a period of 06 years from January 2013 to December 2018.

Patients were admitted through the consultation or emergency room. Patient files are presenting to the daily medical staff. The various indications have been discussing and validated after having signed and informed consent paper by patients. The majority of patients were active or retired military personnel.

All patients received cervical X-ray classified in Cobb's angle (**Figure 1**), cervical CT scans, MRI of spine.

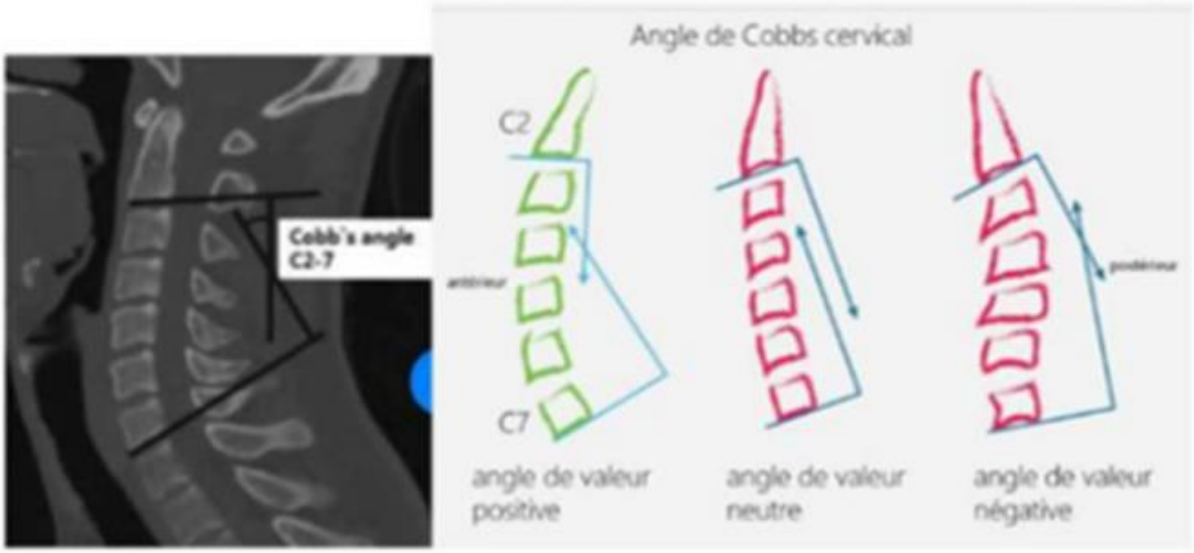


Figure 1: Cobb's angle

We studied socio-demographical data of the patients, the clinical signs of CSM according to Japanese Orthopedic Association (JOA) pre and post-operative.

Several scales exist, but the classification of JOA is better to follow neurological status and the improvement component after surgery. (coef = post-operative JOA-pre-operative JOA / 17-pre-operative JOA) x 100 is the most used to evaluate clinical impact of cervical myelopathy on long pathways and sensitivity pathway in the international literature [4].

Cervical MRI scan in T1 and T2 weighted imaging showed the lesion level, the MODIC (MC) score, signal of myelopathy, and the etiological diagnosis.

In postoperative period, patient receive immediately a cervical spine X-ray control, to check the decompression of the spine canal, to visualize the location and the state of the graft or osteosynthesis material. Secondary patient receive physiotherapy sequences and neurosurgical control with MRI control in three months, six months and twelve months after surgery.

Statistical analysis

The datas were recording by computer and the statistical was performed using the software SPSS (Statistics for Social sciences, version 18.0).

Results are presenting as mean with standard deviation for continuous values. For categorical variables, they're presenting with their frequency and percentage. Student's t-test was performed for independent samples, Mann-Whitney's U-test was used for numerical data, and Fisher's exact test was used to identify differences in the frequency of nominal variables between groups. P Value < or = 0.05 was considered statistically significant.

Our Results; The mean age of patients was 52.72 years [42.27-63.16] in favour of men (64.48%), 69 versus 38 women (35.5%) and a sex ratio = 2/1 in favour of men.

The distribution into two groups of age: Group1 (young subjects) G1, age < 60 years n=70 patients (65.42%), with a mean of 45.6 years [26-59]. The second Group (olders) = G2, age > or = 60 years, n=37patients (34.57%), with an average of 61.85 years [60-77years].

Clinical symptoms

Clinical delays was 11.28 months [6,18,19]. In Group 1, the delay was 10.30 months [1-120] compared to 16.34 months [1 -36 months] in G 2.

Clinical presentation of CSM

In G 1; cervico-brachial neuralgia associated to limb weakness and pyramidal syndrome with sphincter disorders were present in 58.52% of cases, followed by cervico-brachial neuralgia only in 13.92% of cases.

In G 2; symptoms were cervico-brachial neuralgia with tetraplegia or paraplegia or walking disorder, and pyramidal syndrome with sphincter disorder in 54.68 %, followed by cervico brachial neuralgia and weakness of limb only in 8.61%.

The mean preoperative JOA score of the study (JOA PREO) = 9, 87 +/- 2,033/17. The JOA PREO between group G1 and G2 was 11/17 and 7/17. These scores were badly, according to the JOA score (inferior than 12/17).

In the postoperative period after several physiotherapy sessions, The JOA score was performed two days after the surgery (JOA PO), 01month later (JOA PO1), after 03 months postoperative

(JOA PO3), 06 months later (JOA POS6), and finally 12 months or 1 year later (JOA POS12). We note a rapid improvement of the neurological status according to JOA coefficient going from 89% two days after surgery to 78% one month later, moderate after 6 months from 89% to 73% and low from 79% to 54% respectively in Groups 1 and 2 after 1 year (**Table I**).

Table I: JOA SCORE JOA pre operatory (JOA PREO) and post operatory immediately (JOA PO); one month after surgery (JOA PREO), 03 month later surgery (JOA PO3), 06 month after surgery (JOA POS6), 12 months after surgery (JOA POS12)

		JOAPREO	JOAPOS1	JOAPOS3	JOAPOS6	JOAPOS12
N	Valid	107	107	107	107	107
	Missing	0	0	0	0	0
Mean		9.8692	10.8318	12.6636	13.3551	13.4112
Median		10.0000	11.0000	13.0000	14.0000	14.0000
Std. Deviation		2.03314	1.73470	1.24343	1.19947	1.23589
Percentiles	25	9.0000	10.0000	12.0000	13.0000	13.0000
	50	10.0000	11.0000	13.0000	14.0000	14.0000
	75	11.0000	12.0000	14.0000	14.0000	14.0000

The JOA score improves from bad (11/17 and 7/17) to moderate (13.48 and 13.27) after 12 months of follow-up of in Groups 1 to 2.

In both groups and whatever the surgical performing, we found that a rapid improvement post-operative neurological status in the first three months or six months according of the JOA score (figure 2). (With P = 0.05, (khi 2 test calculated = 0,148 compared to the theoric khi 2 test =9, 48), we can say that age influences the JOA score.)

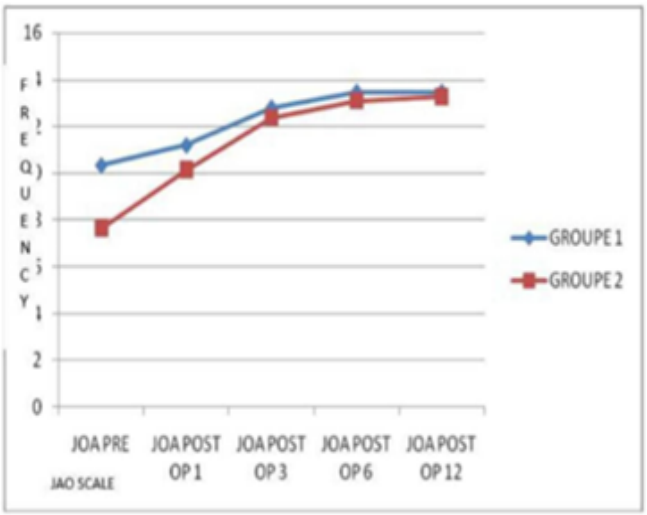


Figure 2: Cure of JOA score

Concerning the cervical Cobb's angle we described three aspects. The angle was neutral if equal 180 °, the cervical spine is straight. The positive angle or cervical spine in lordosis is less than 180°. When this is greater than 180°, it's negative and the cervical spine is in kyphosis (Figure1). The preoperative COBB'S angle was neutral in 42.05% or 45 patients, positive or lordosis angle in 25.23% (27 patients) and finally a negative angle or kyphosis 32.71% (35 patients).

In addition, 55 patients (51.40%) presented only one level achieved, 27 (25, 23%) presented 02 levels achieved and 13 patients (12.14%) more than 2 levels (**Table II**).

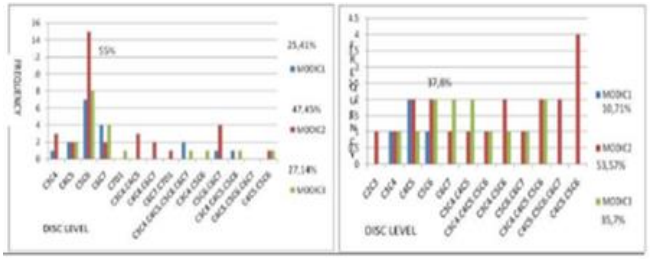
Table II: Level spine injury and Cobbs angle pre operatory

1LEVEL			23	10	8	41
			9	3	20	32
2LEVEL			4	4	3	11
			2	1	7	10
MORE THAN 2LEVELS			2	2	2	6
			3	6	2	11
Total			31	23	34	70
			21	4	27	52
	Total		45	27	25	137

With P>0.05 this study suggests that age is not a determining factor in Cobb's angle

The study of Cobb's angle, 03 months later showed a neutral angle in 39.25%, improvement of 28.34%. The positive angle or lordosis was 25.23% improvement of 100%, the Cobb's index negative or in kyphosis for 35.51% and 3 patients worsened their neurological condition and radiological in 2.8%.

The levels C5C6, C6C7, C4C5 were the most reached respectively of 39 %, 12.6% and 10.3%. The C5C6 level was most reached in 55% of cases in G1 versus 37.8% in G2 (**Figure 3**).



Group 1 **Group 2**

Figure 3: MODIC class by level according to each group

A prevalence of MC was 52.23% (56 patients). MC stage 1 = 21.42 % (N=12), MC stage 2 = 48.21% (n=27), MC 3 = 30.35% (N=17). In Group 1, MC stage 2 = 44.45% (N=12), followed by MC stage 1 = 29.62% (N=8), and MC stage 3= 27.14% (N=7). In Group 2, MC stage 2 = 51.72% (N=15), followed by stage 3 of MC =34.44% (n=10), and Stage 1 to 13.79% (n=4) and the most common spine cervical level affected was C5-C6 (figure 3). With P = 0.05, (khi 2 test calculated = 2,128 compared to the theoric khi 2 test =5, 99), we can say that age influences the MODIC score.

The type 2 of MC translating body disc degeneration was predominant in both groups with P < 0.05 (Kruskal Wallis test) and P was significantly. We concluded that it better reflect the discal corporeal state and prevents stenosis of the spinal canal responsible in part for CSM.

Concerning to the diagnosis in G 1 (70 patients), the cervical disc degenerative herniation or discopathy was founded in 49 patients (70%), in 07 patients (07%). Association cervical disc herniation + cervical osteoarthritis were founding in 14 or 20%.

In G 2, (37 patients) the diagnosis was degenerative cervical disc herniation in 10 patients (27.02%), in 19 patients (51, 35%). The association cervical disc herniation (CDH) + cervical osteoarthritis were founding in 8 patients or 21.62%.

Surgical management (Figure 4)

In G 1, anterior discectomy and fusion were performing in 42 patients (60%) with iliac graft or cage, and laminectomy in 28 patients or 40%.

In G 2, laminectomy was performed in 18 cases or 48.64%, anterior discectomy in 8 patients (21.63%), and corpectomy with iliac bone graft in 8 cases (21.63%). Laminectomy and discectomy were performed in 3 or 8.10%.

Figure 4: MRI scan cervical showed disc herniation and CSM disc herniation C3-C4 and C6C7 and OLLP C3 C4 and MODIC 3, the patient benefited from an ACDF + CAGE

Men 61 years admitted to cervico-brachial neuralgia C6-C7 since 7 months with tetraparesia and sharp reflexes without gait disturbance

Discussion

Cervical myelopathy is a chronic pathology, a clinical syndrome in connection with the decrease in the dimensions of the spinal canal. This is the most common myelopathy after 50 years [1-5].

In addition to the acquired degenerative processes, congenital stenosis of the cervical spine is also widely recognized as a significant predisposing factor for the development of CSM. For Bajwa and all, the congenital stenosis can be defined relative to the cervical spine X-rays, when the diameter of the canal divided by the diameter of the vertebral body is less than 0.82 [6]. For them clinically stenosis should be referencing to the size of spinal cord. Other degenerative processes in the intervertebral disc, articular facets, ossification of the yellow ligament and the posterior ligament can also decrease the size of the cervical canal responsible for compression on the marrow [7-8]. These degenerative processes can lead to static compression and increased pressure of the spinal cord during dynamic movements. These factors are responsible for axonal lesions associated with stretching of spinal cord, the ischemia and venous congestion [9].

Symptoms characteristic of CSM can occur insidiously and include loss of manual dexterity, weakness of limbs, cervical stiffness, increased urinary urgency, spasticity of extremities and walking dysfunction, including stiff or spasmodic gait [10-11].

In our study we founded a male predominance in 64.48%, (69) versus 38 women (35.5%) and a sex ratio = 2/1 in favour of men. The mean age was 51.7 years [26 to 77 years] in according to the studies of Brunon and Djoubairou [1-12]. In our study, most of patients are active or retired soldiers. It is an exclusively male function.

The analysis of the circumstances of CSM reveals that 60% of patients were admitting an advanced stage of the pathology with a complete symptomatology. The delay before surgery is 10, 30 months [1-120months]. Other nonspecific signs of discovery of CSM represent 40% of cases. These nonspecific signs are cervico-brachial neuralgia and or urinary disorders. These early signs should be carefully take care. Indeed, these symptoms can be mistakenly confused with rheumatic pathologies or prostatic in the patient whose age is over 60 years. The same observation was founded by Brunon [1], Djoubairou [12]. These symptoms are present in patients with advanced age, which may explain the delay in surgical management a little high. In according to Fujiwara K and al, Jiangbo Bai [13,14] age is an important prognostic factor that can guide clinicians in dealing with this pathology.

In our study the causes of CSM in young patients are cervical degenerative disc in 49 patients or 70% and the association of cervical disc herniation + degenerative of facet joint, posterior common ligament in 14 or 20%. On the other hand, in the group 2, cervical osteoarthritis or spondylosis were found in 51.35% of the cases. Association of cervical disc herniation (HDC) and cervical osteoarthritis represents 27.02% followed by cervical disc degenerative herniation in 8 patients (21.62%) with $P < 0.05$ we can say that age is a factor in the occurrence of CSM. Tobias Mattei and all, [15] and several authors found the same diagnosis with similar proportions. The constitutional stenosis is being an aggravating factor and the high mobility of the spine in young subjects is responsible for a discopathy then secondarily a CSM. Aging of the articular system in addition to osteophytic disc disease, inflammatory osteoarthritis and sclerosis are responsible for cervical spinal deformation and then CSM [6].

The levels C5C6, C6C7, C4C5 were the most reached respectively with 39 %, 12.6% and 10.3% in our study. The C5C6 level was highest in 55% of Group 1 compared to 37.8% of G 2.

Djoubairou [12] found the lesion level C5C6 in 31.85 % was most achieved according to Jiangbo Bai study [13]. They found 45,8% for the level C5C6 and 33,3% for the level C6C7. These results were similar to our study.

Analysis of cervical MRI shows that it's possible to predict the degrees of degeneration of spine according to the classification of MC. Thus, we found a prevalence of 53.23% with for MC 1 = 21.42%, MC 2 = 48.21%, MC 3 = 30.35%.

Kyung Tag Kang [16] found a predominance of Type MC II (84.8%) and vertebral level C5-6 (34.8%) were the predominant categories. In addition, these patients have a herniated disc and loss

of overall cervical lordosis compared to patients without signs of degeneration (p <0.01).

Furthermore, Jingbo bai and all [13] in their study on Prevalence of and risk factors for MC change in patients with symptomatic cervical spondylosis: an observational study found the prevalence of (MC) of 9.24% with the predominance of MC 2 (64.6%), MC 1 (31.2%), and MC 3 (4.2%). Cervical myelopathy was more common at the C5–6 level (45.8%), followed by C6C7 (33.3%), C4C5 (16.7%), and C3-4 (4.2%).

Jingbo bail [13] found the proportion of MC1 in patients with cervicalgia was significantly higher than patients without cervicalgia (46.2% vs 13.6%, p = 0.027). Through the study of the risks factors of cervical degeneration such us age, body mass index (BMI), weight, smoking, activity concluded that only age was the determining factor in the occurrence of cervical degeneration. Our study concluded the same by comparing the two different age groups and the MC class with P <0.05. Our observations also reveals that 60% of patients were admitting an advanced stage of the pathology with a complete symptomatology in group 2.

Sudhir Singh and al [17], Yamazaki [5] noted that age and occupation are also risk factors for cervical myelopathy. Thus, the identification of risk factors would help clinicians to identify patients at risk and implement preventive measures before the advanced stage of cervical myelopathy.

The preoperative JOA score of 11/17 and 7/17, respectively, for G 1 and 2, were improving in postoperative period after functional rehabilitation. JOA scale improvement score was rapid at 89% and 78% severe one month, then moderate at 6 months at 89% and 73% and low at 79% and 54% for G 1 and 2, respectively. Brunon [1] and Silber JS [18] found the same scores. These observations were noted by Yamazaki and all [5]. In this study, the recovery rate was parameter used to evaluate treatment and post-operative follow-up. Indeed, the post-operative JOA score in elderly patients was lower than youngers, but no significant difference it's finding in regarding the recovery rate. This clinical neurological condition could be explaining by the severity of preoperative spinal cord compression and the duration of the symptomatology. Especially in our study, surgery was performing generally 10,30 months [1 to 120 months] later of the first patient's complaints.

Indeed, several authors [4-13] have found that the prognostic factors of a good outcome of CSM were:

- The grading score of JOA in preoperative, the delay of evolution of the CSM symptomatology
- The intensity of spinal cord compression
- The quality of the surgical decompression

For Fujiwara. K and, Yamazaki T [5-13], a transverse lesion of less than 30mm² and an evolution time more than 12 months was the most important factor in clinical recovery.

On the other hand, Bakhsheshian and all, Pavlov H and all [19,20] dealing with prognostic factors noted several factors;

- Such as the chronicity of cervical degenerative disease,
- Patient's age moment of the surgery act.
- However, the transverse area of the cord at the level of maximum compression provide the most reliable and complete parameter of prediction.

We also noted that the most common cause of CSM in young patient was CDH. On the other hand, in patients over 60 years old, cervical osteoarthritis was founding to be the most important etiology. Tobias [15] and most authors found the same diagnoses with similar proportions. The constitutional stenosis being a factor aggravating the mobility of the cervical spine in the youngers is responsible for a discopathy then secondarily a CSM.

Surgical treatment is the standard goal in the management of CSM. This involves decompressing the cervical marrow and widening the vertebral foramen either by the anterior or posterior approach, then stabilizing the spine and restoring the cervical lordosis as physiological as possible [19].

In our series, surgery was performed for all patients, anterior approach in 71% with number of level reached less than 2. The surgical act consisted of a discectomy and cage or bone graft with plaque when compression was anterior. In 29% of the patients were operated by posterior approach when more than three discs. It could affected as well as significant spinal deformation type Cobb's index negative. Bakhsheshian agrees with the same indications (19) and our results are supposable with those of Ben Ousman [12].

Conclusion

Spondylotic cervical myelopathy is the leading cause of severe disability in the population with an average age of fifty years, it cause a health problem with an incidence of 1.60 / 100000 inhabitants [20]. Prognostic factors, clinical delay, advanced age, and constitutional stenosis as well as Modic class are to be take into account in surgical management.

Our study shown that factors such as sex, number of disks involved, and cobbs angle on prognosis were not statistically significant (P>0.05). However, patients age, with duration of symptoms <1 year were predicted with (P< 0, 05) to have more neurologic improvement after surgery.

Author contributions

All the authors contributed to the writing of this manuscript, they have read and approved the final version of this work.

Niamien Patrice Koffi. Dr corresponding author,
Kouakou Franck. Dr, performed in researching of patient recording
Drs Laaguili Jawad, Mandour Cherkaoui performed the study of statistics tests
Prs, El Mostarphid Brahim, Gazzaz Miloud, , have read and approved the final version

Conflict interest

The authors declare no conflict of interest relevant to this article

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