INTRODUCTION

Cervical spondylotic myelopathy (CSM) is defined as a series of signs and symptoms that result in anatomical and physiological changes in the vertebral column, leading to spinal cord compression. The clinical symptoms are characterized by progressive deterioration of the spinal cord functions. Besides the signs and symptoms, for confirmation of the diagnosis, the patient must present spinal cord compression, proven by computed tomography, MRI or myelography, as well as radiographic evidence of spondylotic changes in the vertebrae, ligaments and discs. In most cases, the natural progression occurs in bursts of exacerbation of symptoms followed by periods of stability. The clinical symptoms rarely improve; however, there have been reports of cases in which this period of stability was not present, and the patient’s condition declined continuously and slowly. On the other hand, in a small number of cases, the progression may be acute and rapid.\(^\text{3,4}\)

The cause of CSM is not well-defined, but it is known that changes in the bones, ligaments and discs act as a trigger for progressive spinal cord degeneration, which leads to direct compression (dynamic or static), often associated with circulatory damage. Nearly all individuals, at around thirty years of age, present microscopic degeneration of the intervertebral discs.\(^\text{5}\) In fact, it is believed that the whole process of spondylotic changes begins with disc dehydration, which is
related to loss of proteoglycans, elasticity and disc material as well as other biochemical changes involving the keratin and chondroitin sulfate. These biomechanical changes in the discs result in reduced disc space, and this, together with the fact that the disc dehydration tends to herniate, leads to changes such as bone neof ormation in the vertebral bodies, usually subsequently, causing anterior spinal cord compression. Hyper trophy and calcification of the Yellow ligament occur, contributing to posterolateral spinal cord compression, but this mainly occurs with the posterior longitudinal ligament, exacerbating this compression. This ossified ligament becomes a thickened mass, which may be present at one level only, either in intermittent or continuous form, and in more severe cases, ossification of the dura mater also occurs, which can lead to the formation of fistulas of cerebrospinal fluid. Alongside this process, there is also facet joint hypertrophy and arthrosis of the intervertebral and zygapophysial joints, resulting in stenosis of the vertebral canal.

As a result of more severe spondylotic changes, patients often develop hyperkyphosis, further aggravating the spinal cord compression and also loss of lordotic curve, causing an increase in pressure in the anteroposterior direction. Spondylitis also causes hypermobility of the segments located above the rigid levels of the spinal cord, and is another cause of spinal cause compression. There is also also the genetic factor, which leads to congenital narrowing of the spinal cord, increasing the chances of developing the disease. The pathology may also occur due to dynamic compression; when the neck is extended, the ligamentum flavum pinches the spinal cord against the osteophytes, while flexion reduces the anteroposterior diameter, aggravating the compression against them; lateral movements compress the nerve roots leading to radicular symptoms. Finally, in addition to the above, there is also decreased blood flow, causing ischemia of the spinal cord; this decrease may also be in some important blood source, such as venous drainage, which leads to neuroschemic myelopathy, usually occurring in the anterior spinal cord. When these changes are present, the patient becomes symptomatic only when 30% of the spinal cord is affected.

The treatment of the disease is basically through decompression surgery, particularly in severe and moderate cases. However, the recovery of spinal cord functions after surgery depends on the degree of spinal cord degeneration at the time of surgery. There is also also the genetic factor, which leads to congenital narrowing of the spinal cord, increasing the chances of developing the disease. Due to the evolution, it is important to reevaluate the spinal cord degeneration every 6 to 12 months. The aim of this study was to describe the evolution of CSM through the report of clinical symptoms of patients who developed this disease, as well as presenting and discussing the possible physiotherapeutic conducts to be adopted.

METHODS

This is a case series study, approved by the Institutional Review Board of Universidade de Ribeirão Preto – UNAERP (n.044/2005), with an Informed Consent Form signed by all the participants. The medical records were analyzed of all patients with CSM who attended the Physiotherapy Clinic at the CECEB (Electro Bonini Clinical Center) of Universidade de Ribeirão Preto-UNAERP in the last ten years. Only three patients were found; only the first and final evaluations were analyzed, as well as the daily records of clinical evolution. Only the items of the evaluations that presented changes were evaluated. The disease evolution was classified using the following scales:

Nurick Scale for Cervical Myelopathy (Table 1) – Assesses the patient’s ability to walk without support, scoring from 0 to 5, where the higher the score, the better the patient’s ability to walk.

Cervical Spondylotic Myelopathy scale of the Japanese Orthopaedic Association (JOA) (Table 2) – Validated in 1976 by the JOA, scores the motor function of each upper limb (Item I) and lower limb (Item II), the sensitivity of each upper limb (Item III A), lower limb (Item III B), and trunk (Item III C) and bladder function (Item IV), according to specific functions that the patient is able to perform. The maximum score indicating normality is 15.

RESULTS

Case 1

Patient presented with onset of the pathological symptoms with degenerative processes of the spine, and progressively decreasing sensitivity and movements. Evolved to surgical treatment with placement of graft and prosthesis in the left anterolateral region of C4. Initially the lesion affected sensitivity, muscle strength, and range of movement (ROM) of the upper limbs, which subsequently progressed to include the lower limbs.

Initial evaluation: Patient arrived in a wheelchair, obtaining a grade of 5 on the Nurick scale (Table 1). Presented with elastic hypertonia of the upper and lower limbs. A decrease in sensitivity in the cervical region, upper limbs, ventral and dorsal region of the trunk, and anterolateral part of both lower limbs proximally, (Figure 1) presence of hyperreflexia in the brachial triceps muscle. The active ROM was decreased in the pinch test with the left hand, flexion of the shoulder and elbow, pronation, supination and dorsiflexion. In the evaluation of Activities of Daily Living (ADL) the patient was capable of eating independently, but was not able to turn over while lying. During the evaluation of muscle strength, it was observed that the main muscles of the upper limbs had a score of 3+, which means that the patient is able to overcome the action of gravity associated with a slight resistance. The majority of the main muscles of the lower limbs had muscle strength of grade 3, overcoming only the action of gravity. According to the evaluation of functions, the patient obtained 7 points out of a total of 17 on the Evaluation Scale of the JOA, (Table 2) The goals outlined for the treatment were: to decrease the spasticity, facilitate turning over while lying, stimulate sensitivity, improve functionality and independence in day-to-day tasks, promote relaxation of the cervical musculature, strength the gluteus and abdominals, and lengthen the muscle that was shortened due to the seated position.

Final evaluation: After 1 year and 2 months from the onset of symptoms, the patient reported that he/she no longer eats alone or turns over while lying, being dependent for all the ADLs. The hypertonia was the same in the upper and lower limbs, but at this moment, it is also present in the trunk. In relation to sensitivity, an improvement was observed. (Figure 1) The patient presented areflexia in the Achilles, bicipital, tricipital and patellar reflexes bilaterally. The muscle strength test showed evident deterioration of the overall muscle strength of the upper limbs, with the exception of the elbow flexors and extensors, and a slight improvement and maintenance of strength in the lower limbs. Muscle retraction was present in all the limbs. The patient could still move around using a wheelchair, thus obtaining the same score in the Nurick scale. (Table 1) According to the JOA Evaluation scale, the patient presented significant worsening in the score, which increased from a final score of 7 to 5. (Table 2) The goals outlined in this phase were: Preventing deformities, improving flexibility and muscle strength in general, maintaining independence, and improving trunk balance while sitting.

<table>
<thead>
<tr>
<th>Table 1. Nurick score in the 3 patients.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clinical Signs</td>
</tr>
<tr>
<td>Radicular signs, without evidence of spinal cord impairment</td>
</tr>
<tr>
<td>Signs of spinal cord impairment with normal gait</td>
</tr>
<tr>
<td>Impaired gait, able to work</td>
</tr>
<tr>
<td>Impaired gait, unable to work, but walks without support</td>
</tr>
<tr>
<td>Able to walk unaided</td>
</tr>
<tr>
<td>Wheelchair or bedridden</td>
</tr>
</tbody>
</table>
Case 2

Patient reported numbness in the right side of the body, associated with loss of sensitivity of the lower limbs. CSM was diagnosed, compatible with an incomplete lesion at level C7. The patient evolved to requiring surgery, but without changes in the condition, continuing with a physiotherapeutic diagnosis of quadriplegia. The patient complained of limited movement in the lower and upper limbs, not being able to walk, and being dependent for most ADLs. **Initial evaluation:** Patient presented with a physiotherapeutic diagnosis of spastic quadriplegia, with diffuse changes in sensitivity in the lower and upper limbs. (Figure 2) In the evaluation of the ADLs the patient was dependent for most of them, and could move around using a wheelchair, thus scoring 5 on the Nurick scale (Table 1), but was not able to turn over while lying. As for the deep reflexes, the right patellar was decreased and the left normal; the right bicipital and tricipital areflexia on the right. Tests for changes in sensitivity found changes in the right lower limb, with preservation of the other areas. (Figure 3) Patient presented incomplete range of movement only in the right wrist, hand and fingers, and also in the right shoulder abduction, left elbow flexion, left hip flexion, flexion, and extension of the left and right knees, and left plantar flexion; the remainders were incomplete. In the assessment of muscle strength, the patient presented grade 3 for overall strength; only the adductor and abductor muscles of the hip showed grade 2 bilaterally, and the wrist extensors of the right upper limb presented grade 0. Moderate shortening was observed of the upper and lower limbs. In the evaluation of functions using the JOA scale, the patient obtained a final score of 6 points. (Table 2) The treatment goals were: to gain range of movement and strength in the upper and lower limbs, to promote an improvement in trunk balance and coordination, and to improve functionally, overall and in the wheelchair.

**Final evaluation:** After 4 years, the patient presented minimal functional movements, reported that he/she could eat independently, but did not touch the wheelchair, remaining with the same Nurick score (Table 1). Patient presented with a flexor pattern of the upper limbs and started to “roll on a block” with help. Presented worsening of sensitivity in the lower limbs. (Figure 2) With regard to the deep reflexes, the patellar and bicipital showed increases bilaterally.

The patient presented incomplete passive and active ranges of movement of the shoulder, elbow, wrist, and limbs, bilaterally. With respect to muscle strength, there was a visible reduction in overall muscle strength, with preserved strength only in the elbow flexor muscles, hip adductor and hip abductor, all bilaterally. There was an improvement in movement in the right wrist extensors, from grade 0 to grade 1. The shortening of the upper and lower limbs went from moderate to severe. Due to the worsening of sensitivity in item III B of the JOA Evaluation scale, the patient presented a decreased final score, from 6 to 5. (Table 2) The goals outlined in this phase were: postural orientation, diaphragmatic respiratory rehabilitation, and maintenance of quality of life.

Case 3

The symptoms started with the patient presenting difficulty walking, and reports of weakness of the left lower limb. He/she was diagnosed with CSM, and 7 months after the diagnosis, underwent surgical correction by means of a laminectomy, without any complications, but with continued loss of function of the left lower and upper right limbs. The patient had a previous history of stroke and acute myocardial infarction, followed by minimal sequelae. **Initial evaluation:** Patient walking with support, but only for short distances, presenting hemiparetic gait with short steps, thus classified as Nurick grade 4. (Table 1) In the ADL, he/she had difficulty sitting down and standing up, and it was observed that the patient could not turn over while lying. The temperature in the left lower limb was lower than that of the other members. Normal tropism was seen in the limbs, trunk and face, with hypotonia in the right upper limb and left lower limb. The Babinski reflex was positive on the right and absent on the left. Patellar and Achilles areflexia on the left and bicipital and tricipital areflexia on the right. Tests for changes in sensitivity found changes in the right lower limb, with preservation of the other areas. (Figure 3) Patient presented incomplete range of movement only in the right wrist, hand and fingers, and also in the left knee, ankle, foot and toes. Patient had severe limitation in all movements of the cervical spine, and moderate limitation in the lumbar region. In the evaluation of muscle strength, grade 3 was found in most of the major muscles of the upper limbs, bilaterally.

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**Figure 1.** Sensory maps of patient 1 in the initial and final evaluations.
with the exception of the elbow flexor and shoulder extensor muscles, both on the right side. In the lower limbs, muscle strength is diffusely decreased. In the evaluation of function according to the JOA scale, the patient obtained a final score of 9, this being the best score found in this study. (Table 2) The treatment goals outlined were: to promote functional reeducation, maintain and/or gain range of movement, promote balance, and improve gait.

**Final assessment:** After 2 and a half years, the patient was able to walk with a one-point cane, remaining with a Nurick score of 4. (Table 1) He/She presented mild hypertonia in upper limb and moderate in the lower. Significant improvements were observed in the changes in sensitivity of both the upper limbs and the right lower limb, persisting only in the ankle and foot regions. (Figure 3) Regarding the reflexes, patellar and Achilles hyporeflexia were observed. The ranges of movement were incomplete in the hand pinch movement, in the right elbow and in supination. Left dorsiflexion was not performed. The patient was independent in performing ADLs, and was already able to turn over alone while lying, but needed the help of a cane to sit down and stand up. In the assessment of muscle strength, an improvement was seen on the right side in the adductor and abductor muscles of the shoulder when compared with the initial assessment. As for the lower limbs, an improvement was found in the hip flexors on the left side, and a worsening in the hip extensors and plantar flexors and extensors, also on left side. There was an improvement in the JOA score, where the patient in this evaluation obtained total score of 10 points due to an improvement in

### Table 2. Cervical Spondylotic Myelopathy scale of the JOA applied in the 3 patients.

<table>
<thead>
<tr>
<th>I Upper extremity function</th>
<th>Patient 1</th>
<th>Patient 2</th>
<th>Patient 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Evaluation 1</td>
<td>Evaluation 2</td>
<td>Evaluation 1</td>
</tr>
<tr>
<td>1</td>
<td>Possible to eat with spoon, but not with chopsticks</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>Possible to eat with chopsticks, but inadequately</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>Possible to eat with chopsticks, but awkwardly</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>Normal</td>
<td>2</td>
<td>0</td>
</tr>
</tbody>
</table>

#### II Lower extremity function

<table>
<thead>
<tr>
<th>0</th>
<th>Impossible to walk</th>
<th>Evaluation 1</th>
<th>Evaluation 2</th>
<th>Evaluation 1</th>
<th>Evaluation 2</th>
<th>Evaluation 1</th>
<th>Evaluation 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Needs cane or aid on flat ground</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Needs cane or aid only stairs</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>Possible to walk without cane or aid, but slowly</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>Normal</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>1</td>
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<td>1</td>
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</tbody>
</table>

#### III Sensory function

**A. Upper extremity**

<table>
<thead>
<tr>
<th>0</th>
<th>Apparent sensory loss</th>
<th>Evaluation 1</th>
<th>Evaluation 2</th>
<th>Evaluation 1</th>
<th>Evaluation 2</th>
<th>Evaluation 1</th>
<th>Evaluation 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Minimal sensory loss</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Normal</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>0</td>
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</table>

**B. Lower extremity**

<table>
<thead>
<tr>
<th>0</th>
<th>Apparent sensory loss</th>
<th>Evaluation 1</th>
<th>Evaluation 2</th>
<th>Evaluation 1</th>
<th>Evaluation 2</th>
<th>Evaluation 1</th>
<th>Evaluation 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Minimal sensory loss</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Normal</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
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</tbody>
</table>

**C. Trunk**

<table>
<thead>
<tr>
<th>0</th>
<th>Apparent sensory loss</th>
<th>Evaluation 1</th>
<th>Evaluation 2</th>
<th>Evaluation 1</th>
<th>Evaluation 2</th>
<th>Evaluation 1</th>
<th>Evaluation 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Minimal sensory loss</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Normal</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

#### IV Bladder function

<table>
<thead>
<tr>
<th>0</th>
<th>Complete retention</th>
<th>Evaluation 1</th>
<th>Evaluation 2</th>
<th>Evaluation 1</th>
<th>Evaluation 2</th>
<th>Evaluation 1</th>
<th>Evaluation 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Severe disturbance</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>-1</td>
<td>Inadequate evacuation of the bladder</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>-2</td>
<td>Straining</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>-3</td>
<td>Dribbling of urine</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Mild disturbance</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>-1</td>
<td>Urinary frequency</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>-2</td>
<td>Urinary hesitancy</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>Normal</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>
Figure 2. Sensory maps of patient 2 in the initial and final evaluations.

Figure 3. Sensory maps of patient 2 in the initial and final evaluations.
item III A (Table 2). The treatment goals outlined in this phase were:
to promote improvement of gait pattern, and to gain range of mo-
vement and muscle strength.

DISCUSSION

According to the cases presented here, the three patients re-
ceived the diagnosis of CSM through complementary exams, which
evidenced spondylotic changes associated with spinal cord dege-
neration. The most common changes found in CSM are: posterior
terminal neuroformation that contribute to anterior spinal cord compres-
sion, hyper trophy and ligament calcification, which contributes to
posterior-lateral compression and impairment of the intervertebral
and zygapophyseal joints, causing stenosis of the vertebral canal,
as well as the hypermobility of the segments above the damaged levels,
which also causes spinal cord compression. These changes,
besides explaining the clinical cases found, also highlight the fact
that the disease has no typical pattern of progression, with wide
variation occurring among patients, both in severity, and in locations
where there is loss of spinal cord function.

Comparing the figures with the dermatome maps, it is conclu-
ded that patients 1 and 3 showed an improvement in sensitivity
after the surgery and physiotherapeutic treatment. Paradoxically,
the symptoms of patient 2, who also had surgery and physiothera-
py, worsened after the treatment. Considering the specific role of
physiotherapy, there are few published studies on the conservative
treatment of patients with myelopathy, partly due to the fact that the
clinical symptoms of this patient tended to evolution of neurological
symptoms, where to avoid such progression, the surgical procedure
is performed early on as a measure to stabilize the patient.

Matsumoto et al. conducted a study in which 27 patients with
CSM received conservative treatment for at least 6 consecutive mon-
ths. According to the study, 63% of their patients had positive results
to the treatment and approximately 59% of patients experienced
spontaneous reduction of cervical disc herniation. Persson et al. conducted a study comparing 110 patients with CSM between
conservative surgical treatment and a cervical collar, and found no
statistically significant difference between the groups even after 12
months of treatment, but an improvement in pain, functionality
and humor of the patients was observed when comparing each group
before and after the intervention.

In the conduct of treatment performed by the above studies, we
found the use of the cervical collar for at least 8 hours continuously,
for 3 months, reducing the time of use throughout the treatment,
combined with rest when carrying out activities in general. Passive
therapies were also performed for pain relief, such as massage and
ice in the cervical region, application of transcutaneous electrical
nerve stimulation (TENS), and ultrasound. Exercises were perfor-
moved to strengthen and stretch the muscles of the neck, shoulder
and upper extremities, as well as aerobic exercises to improve the
patient’s oxygen consumption. Instructions on ergonomic and pos-
tural corrections were given, in order to prevent complications, and
during the treatment, gentle traction and mobilization of the cervical
spine were performed.

The resources and interventions used in this study include:
1) ability to turn over while lying and forms of independent loco-
motion as far as possible, 2) functional muscle strengthening,
3) lengthening of the muscles that have potential for retraction,
and those that have already retracted, 4) passive mobilization of
the articulations with little or no active movement, 5) sensory
stimulation, 6) preventative and curative respiratory therapy,
7) relaxation of spastic or tense muscles, 8) pain relief, 9) postural
reeducation aimed at control of the head and trunk, along with the
balance training, and 10) use of activities adapted to the functions
involved. It is important to highlight that there were some differen-
tes in the treatment conducts between all of the studies cited here,
an ours. This was expected, as the disease evolution does not
occur in the same way in every case. 2. It was also seen that the
patients in the studies presented received care only in upper limb.
In our study, given that it is a review of the patients’ records over
the past 10 years of services provided in our clinic, we recorded
all the procedures that were performed in the services, including
those involving the lower limbs and trunk.

Such approaches should vary according to the level of commit-
tment and the evolution of symptoms of each individual patient.
Matsumoto also states that the physical treatment to be given
should be carefully chosen, and even if the treatment is only con-
servative, it should considered in patients with a score of 2 or
more in item II of the JOA scale, or a score of 2 on the Nutrick
scale. Thus, constant reassessments are important, in order to
adjust the proposed treatment, guidelines and adaptations for the
patient with CSM.

It is clear that physiotherapy affects each patient differently, de-
pending on the disease evolution and the individual’s needs. The
aim, though, is always to seek the greatest functionality possible
because, as mentioned above, during the disease progression
there may be times when the evolution of the spinal cord dege-
neration is stable, with improvement or maintenance of the signs
and symptoms. For this reason, there are no treatment protocols
in the literature, which is coherent, but there is a lack of texts
detailing the disease, the possible clinical symptoms, and the
physiotherapeutic interventions.

It is important to highlight the limitations of this study; because
it is characterized as a report of clinical cases, the number of re-
search subjects for whom records exist with a window of 10 years
is low. Also, the assessments found are descriptive, reporting the
current condition of the patient in both evaluations. Since there are
numerous studies that compare surgical techniques and conserva-
tive treatment for the patient with spondylotic cervical myelopathy,
it is necessary to conduct further studies that describe and compare
which techniques and methods of physiotherapy treatment are most
indicated for patients with this disease, even if it is only in a descrip-
tive way, to guide future professionals and researchers.

CONCLUSION

According to the findings of this study, and supported by the lite-
rature, it is consistent to say that CSM does not follow a clear pattern
evolution, and there may be several clinical differentiations in each
case. Thus, the treatment should be individualized and properly
grounded, to obtain the best results. But there are a common means
of assistance available for this disease, such as strengthening the
muscles to gain strength, stimulating the range of active or passive
movement, increasing or maintaining functional independence, and
preventing future functional losses as the disease progresses. These
therapeutic tools should be registered, to make them available to
other researchers, and even to clinical practice, to ensure the best
therapeutic conduct in CSM.

All authors declare no potential conflict of interest related to
this article.
REFERENCES


