

## **Summary of AO Spine North America and CSRS Guidelines on CSM Endorsed by WFNS Spine Committee**

Below guidelines about cervical spondylotic myelopathy of AO Spine North America and Cervical Spine Research Society (CSRS) are endorsed by WFNS Spine Committee with minor modifications. More detailed papers of the guidelines can be obtained from the papers cited in this text.

### **The Natural History of Degenerative Cervical Myelopathy (DCM)**

#### **Questions**

- 1-What is the natural history of DCM?
- 2-Which are the risk factors for progression of DCM?

#### **Conclusions**

The incidence of spinal cord injury (SCI) of persons having DCM (including OPLL) is substantially higher than the general population (estimated to be between 20-40/million) around the world, the incidence rate of hospitalization for SCI is 13.9 per 1000 person-years in patients with cervical spondylotic myelopathy and 4.8 per 1000 person-years in patients with myelopathy secondary to ossification of the posterior longitudinal ligament (OPLL).

The strength of evidence for these estimates are low.

### **Effectiveness of Operative and Nonoperative Treatment for DCM**

#### **Questions**

- 1-What is the evidence of the efficacy, effectiveness and safety of nonoperative treatment in patients with DCM compared with surgical intervention?
- 2-Do the outcomes of nonoperative treatment vary according to myelopathy severity?
- 3-Are minor injuries associated with neurological deterioration among patients with cervical myelopathy or asymptomatic cervical cord compression treated nonoperatively?

#### **Conclusion**

Nonoperative management results in similar outcomes as surgical treatment in patients with a modified JOA  $\geq 15$ , single-level myelopathy and intramedullary signal change on T2-weighted magnetic resonance imaging. Of note however, patients managed nonoperatively for DCM have higher rates of hospitalization for spinal cord injury than those treated surgically. The overall level of evidence for these findings was rated as low.

We believe that these patients, if managed nonoperatively, should be followed closely and monitored for neurological deterioration. It is important that clinicians inform their patients of the possibility of disease progression and educate them on future relevant symptoms.

Furthermore, patients managed nonoperatively for DCM have higher rates of subsequent hospitalization for spinal cord injury than those treated surgically.

## **Nonoperative Treatment for DCM**

### **Questions**

- 1-What is the change in function, pain, and quality of life following structured nonoperative treatment?
- 2-Is there variability in the change in function, pain, and quality of life following different types of nonoperative treatment?
- 3-Are there differences in outcomes following nonoperative treatment between certain subgroups (eg, baseline severity score, duration of symptoms)?
- 4-What are the negative outcomes and harms associated with structured nonoperative treatment?

### **Conclusions**

There is a lack of evidence to determine the role of nonoperative treatment in patients with DCM. However, in the majority of studies, patients did not achieve clinically significant gains in function following structured nonoperative treatment.

Furthermore, 23% to 54% of patients managed nonoperatively subsequently underwent surgical treatment.

## **Surgical Treatment for DCM**

### **Questions**

- 1-What are the expected functional, disability, and pain outcomes following surgical intervention for DCM?
- 2-Do these expected outcomes of surgical intervention depend on preoperative disease severity or duration of symptoms?
- 3-What are the complications associated with surgical intervention?

### **Conclusions**

In patients with DCM, surgery prevents further disease progression and also results in significant gains in functional impairment, disability, and pain. A shorter duration of symptoms and less severe myelopathy preoperatively are both important predictors of achieving a postoperative mJOA  $\geq 16$ . Finally, surgery for DCM is a relatively safe treatment option, with a cumulative incidence of complications estimated at 14.1%.

## **The Management of Non-myelopathic Patients with Cervical Spinal Cord Compression, Canal Stenosis and/or OPLL**

### **Questions**

- 1-What are the frequency and timing of symptom development?
- 2-What are the clinical, radiographic, and electrophysiological predictors of symptom development?

### **Conclusions**

1-We recommend surgical intervention for patients with moderate (mJOA 12-14) and severe (mJOA < 12) DCM.

2-We suggest offering surgical intervention or conservative therapy for patients with mild (mJOA 15-17) DCM. If initial nonoperative management is pursued, we recommend operative intervention if there is neurological deterioration and suggest operative intervention if the patient fails to improve.

3-We suggest not offering prophylactic surgery for non-myelopathic patients with evidence of cervical cord compression without signs or symptoms of radiculopathy. We suggest that these patients be counseled as to potential risks of progression, educated about relevant signs and symptoms of myelopathy, and be followed clinically.

4-Non-myelopathic patients with cord compression and clinical evidence of radiculopathy with or without electrophysiological confirmation are at a higher risk of developing myelopathy and should be counselled about this risk.

We suggest offering either surgical intervention or nonoperative treatment consisting of close serial follow-up. In the event of myelopathic development, the patient should be managed according to the recommendations above.

## Reference

- 1-Fehlings MG, Kwon BK, Tetreault LA. Guidelines for the Management of Degenerative Cervical Myelopathy and Spinal Cord Injury: An Introduction to a Focus Issue. *Global Spine J* Vol 7, 3 Suppl, 2017; pp. 6S–7S
- 2-Fehlings MG, Tetreault LA, Kurpad S, Brodke DS, Wilson JR, et al. Change in Functional Impairment, Disability, and Quality of Life Following Operative Treatment for Degenerative Cervical Myelopathy: A Systematic Review and Meta-Analysis. *Global Spine J* Vol 7, 3 Suppl, 2017; pp. 53S–69S
- 3-Fehlings MG, Tetreault LA, Riew D, Middleton JW, Wang JC. A Clinical Practice Guideline for the Management of Degenerative Cervical Myelopathy: Introduction, Rationale, and Scope. *Global Spine J* Vol 7, 3 Suppl, 2017; pp. 21S–27S
- 4-Fehlings MG, Tetreault LA, Riew KD, Middleton JW, Aarabi B, et al. A Clinical Practice Guideline for the Management of Patients With Degenerative Cervical Myelopathy: Recommendations for Patients With Mild, Moderate, and Severe Disease and Nonmyelopathic Patients With Evidence of Cord Compression. *Global Spine J* Vol 7, 3 Suppl, 2017; pp. 70S–83S
- 5-Matsunaga S, Sakou T, Taketomi E, Komiya S. Clinical course of patients with ossification of the posterior longitudinal ligament: a minimum 10-year cohort study. *J Neurosurg.* 2004;100:245–248.
- 6-Rhee J, Tetreault LA, Chapman JR, Wilson JR, Smith JS, Martin AR, Dettori JR, Fehlings MG. Nonoperative Versus Operative Management for the Treatment Degenerative Cervical Myelopathy: An Updated Systematic Review. *Global Spine J* Vol 7, 3 Suppl, 2017; pp. 35S–41S
- 7-Tetreault LA, Karadimas S, Wilson JR, Arnold PM, Kurpad S, Dettori JR, Fehlings MG. The Natural History of Degenerative Cervical Myelopathy and the Rate of Hospitalization Following Spinal Cord Injury: An Updated Systematic Review. *Global Spine J* Vol 7, 3 Suppl, 2017; pp. 28S–34S

8-Tetreault LA, Rhee J, Prather H, Kwon BK, Wilson JR, Martin AR, Andersson IB, Dembek AH, Pagarigan KT, JR, Fehlings MG. Change in Function, Pain, and Quality of Life Following Structured Nonoperative Treatment in Patients With Degenerative Cervical Myelopathy: A Systematic Review. *Global Spine J* Vol 7, 3 Suppl, 2017; pp. 42S–52S

9-Tetreault LA, Skelly AC, Dettori JR, Wilson JR, Martin AR, Fehlings MG. Guidelines for the Management of Degenerative Cervical Myelopathy and Acute Spinal Cord Injury: Development Process and Methodology. *Global Spine J* Vol 7, 3 Suppl, 2017; pp. 8S–20S

10-Wu JC, Chen YC, Liu L, et al. Conservatively treated ossification of the posterior longitudinal ligament increases the risk of spinal cord injury: a nationwide cohort study. *J Neurotrauma*. 2012;29: 462-468. doi:10.1089/neu.2011.2095.

11-Wu JC, Ko CC, Yen YS, et al. Epidemiology of cervical spondyotic myelopathy and its risk of causing spinal cord injury: a national cohort study. *Neurosurg Focus*. 2013;35:E10. doi:10.3171/2013.4.FOCUS13122.