

Management of degenerative cervical myelopathy – An update

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SUMMARY

Introduction: Degenerative cervical myelopathy (DCM) is the most common cause of spinal cord dysfunction in adult patients. Patients generally present with a slow, progressive neurological decline or a stepwise deterioration pattern. In this paper, we discuss the most important factors involved in the management of DCM, including a discussion about the surgical approaches.

Method: The authors performed an extensive review of the peer-reviewed literature addressing the aforementioned objectives.

Results: Although the diagnosis is clinical, magnetic resonance imaging (MRI) is the study of choice to confirm stenosis and also to exclude the differential diagnosis. The severity the clinical symptoms of DCM are evaluated by different scales, but the modified Japanese Orthopedic Association (mJOA) and the Nürick scale are probably the most commonly used. Spontaneous clinical improvement is rare and surgery is the main treatment form in an attempt to prevent further neurological deterioration and, potentially, to provide some improvement in symptoms and function. Anterior, posterior or combined cervical approaches are used to decompress the spinal cord, with adjunctive fusion being commonly performed. The choice of one approach over the other depends on patient characteristics (such as number of involved levels, site of compression, cervical alignment, previous surgeries, bone quality, presence of instability, among others) as well as surgeon preference and experience.

Conclusion: Spine surgeons must understand the advantages and disadvantages of all surgical techniques to choose the best procedure for their patients. Further comparative studies are necessary to establish the superiority of one approach over the other when multiple options are available.

Keywords: cervical myelopathy, spondylotic myelopathy, surgical approach, anterior approach, posterior approach.

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INTRODUCTION

Chronic cervical degeneration or spondylosis (CS) is a natural consequence of aging, resulting in arthritic changes in the intervertebral discs, facet joints, ligaments and vertebral bodies.^{1,2} These include abnormal bony spurs on the vertebrae, disc and joints degeneration, ligament hypertrophy and ossification. However, although the vast majority of the general population will have cervical spondylosis, only the minority of patients will have clinical symptoms.²

Degenerative cervical myelopathy (DCM) is the most common cause of spinal cord dysfunction in adult patients and a clinical presentation of spondylosis resulting in spinal cord compression.²⁻⁴ The degenerative changes, at times in concert with a developmentally narrow canal, lead to chronic cord compression, which may then become symptomatic. These changes are generally unique for each patient, resulting in a wide range of radiological presentations and clinical scenarios. For this reason, the surgical

approach is generally individualized according to many factors involved in each case and surgeon's experience.⁵

In this paper, we discuss the most important factors involved in the surgical management of DCM, including the approaches.

NATURAL HISTORY

The clinical history of patients is quite variable, similarly to its radiological presentation.² Some patients may present with a slow and progressive neurological decline, whereas others may have a stepwise pattern with periods of quiescent disease prior to deterioration.^{2,5,6} An acute presentation is not common, with exception for cervical trauma or acute disc herniation.²

It is well known that patients with symptoms will be unlikely to improve without surgical treatment. Non operative management techniques, while utilized to address concurrent neck pain, do not improve the underlying disease state of compression, demyelination, macro and micro-vascular architecture changes, neuronal and oligodendrocyte apoptosis and destruction of the blood-spinal cord barrier. Under chronic pressure, necrosis of white and gray matter ensues in the cervical spinal cord.^{2,6} Finally, almost all patients untreated surgically will worsen and, in some reports, over 50% will progress to severe clinical disability.⁷⁻¹⁰

CLINICAL PRESENTATION

Physical examination of a DCM patient may include at least one long-tract sign localized to the cervical spinal cord (Babinski, Oppenheim and Hoffman signs, clonus, hyperreflexia, crossed abductor sign, coordination impairment and gait dysfunction). Symptomatically, patients can complain of tingling and numbness in the arms and hands, muscle weakness, gait difficulty, neck and arm pain, loss of coordination, heavy feelings in the legs, and deterioration in fine motor skills (such as buttoning a

shirt).¹¹ Neck pain and stiffness are also common, with restriction to movements. Finally, some patients may uncommonly present with bladder dysfunction.

The two most common systems used to evaluate the severity of DCM are the Nürick grade system (Table 1) and the Japanese Orthopedic Association (JOA).^{12,13} Of note, a modified version of the JOA has been proposed and validated for western cultures (Table 2).¹⁴

The JOA scale is an objecting assessment scale of the severity of DCM.¹² It is based on six domain scores: 1) Motor dysfunction of the upper extremities; 2) Motor dysfunction of the lower extremities; 3) Sensory dysfunction in the upper extremities; 4) Sensory function in the trunk; 5) Sensory function in the lower extremities and 6) Bladder function.

The JOA score can range from 0 to a maximum of 17 points. Yonenobu et al. defined the myelopathy as mild if the JOA is larger than 12, moderate from 9 to 13 and severe when the JOA is less than 9 points.¹⁵

A modified JOA score, which improves applicability towards Western cultures, replaces the use of chopsticks with a spoon to evaluate motor function in the upper extremities, assessing only motor dysfunction in the upper and lower extremities, sensory function in the upper extremities and bladder function, excluding sensory function in the trunk and lower extremities (four domain scores).¹⁴ Each one of the four scales varies, respectively, from 0 to 5, 7, 3 and 3, ranging from 0 to 18 points. Fehlings et al. proposed classifying the severity of the myelopathy using the mJOA as mild (15 or more), moderate (12 to 14) and severe (less than 12).¹⁶ Of note, a score of 17 in the JOA scale or 18 in the mJOA scale reflects a normal neurological function.

Finally, Kato et al. performed a prospective multicenter study and reported that the both JOA and the mJOA have a good correlation, but it was not ideal to use them interchangeably.¹⁷

TABLE 1 The Nürick grade system – Six grades of severity based on “difficulty in walking”.

Grade	Characteristics
0	signs or symptoms of root involvement but without evidence of spinal cord disease
1	signs of spinal cord disease but no difficulty in walking
2	slight difficulty in walking which does not prevent full-time employment
3	difficulty in walking which prevented full time employment or the ability to do all housework, but which was not so severe as to require someone else's help to walk
4	to walk only with someone else's help or with the aid of a frame
5	chair-bound or bedridden

TABLE 2 The modified JOA scoring system for evaluating the severity of DCM.

Score	Description
Motor dysfunction of upper extremity	
0	Unable to move hands
1	Unable to eat with a spoon but able to move hands
2	Unable to button shirt but able to eat with a spoon
3	Able to button shirt with great difficulty
4	Able to button shirt with slight difficulty
5	No dysfunction
Motor dysfunction of lower extremity	
0	Complete loss of motor and sensory function
1	Sensory preservation without ability to move legs
2	Able to move legs but unable to walk
3	Able to walk on flat floor with a walking aid (cane or crutch)
4	Able to walk up- and/or downstairs w/aid of a handrail
5	Moderate-to-significant lack of stability but able to walk up- and/or downstairs without handrail
6	Mild lack of stability but able to walk unaided with smooth reciprocation
7	No dysfunction
Sensory dysfunction	
0	Complete loss of hand sensation
1	Severe sensory loss or pain
2	Mild sensory loss
3	No sensory loss
Sphincter dysfunction	
0	Unable to micturate voluntarily
1	Marked difficulty in micturition
2	Mild-to-moderate difficulty in micturition
3	Normal micturition

ADDITIONAL WORK-UP

Plain radiographies

Initial investigation of DCM is based on simple plain cervical radiographs, including flexion-extension exams to detect occult instability.¹⁸ CS is characterized by osteophyte formation, loss of cervical disc space, loss of normal cervical alignment, uncovertebral and facet joints hypertrophy.

The Pavlov ratio is measured based on simple plain cervical radiographies to estimate congenital narrowing of the spinal canal, a major risk of DCM.^{19,20} Using the lateral incidence, the spinal canal / vertebral body ratio is determined (a/b), where “a” is the distance from the posterior surface of the vertebral body to the nearest point of the spinal lamina line and “b” is defined as the midpoint between the anterior surface and the posterior sur-

face of the vertebral body. A normal Pavlov ratio is about 1.0, whereas < 0.8 suggests congenital cervical stenosis, and spondylotic compression occurs when < 0.4. Although the ratio is useful for screening, further radiological investigation is needed when the ratio is < 0.8, as large vertebral bodies may skew the final ratio and yield false positive results.²¹

Also useful information obtained with plain cervical radiography is the mean value of the spinal canal in the antero-posterior (AP) diameter. In normal adult males, the mean value of the AP diameter of the spinal canal measured on lateral cervical radiograph is 17 to 18 mm at C3-5 and 12 to 14 mm at C6-7. Severe cervical stenosis is presumed when the diameter is less than 10 mm in the lower cervical spine and 10 to 13 in the upper cervical spine.²²

Additionally, in cases where cervical deformity is present, measuring the C2-7 sagittal vertical axis (SVA) is important for outcome purposes. The horizontal distance from two plumb lines, one from the mid-vertebral body of C2 and the second from the posterior superior corner of the C7 vertebral body, greater than 4 cm postoperatively is associated with poor neck disability scores.¹⁸

Finally, 36 inch long cassette X-rays may be useful for assessment of global sagittal balance in patients with severe cervical deformity and concordant thoracolumbar deformity and dynamic flexion-extension x-rays are also used for detecting segmental instability and also assessment of cervical flexibility.¹⁸

Magnetic resonance imaging

Magnetic resonance imaging (MRI) is the modality of choice to evaluate the neural elements, with multiplanar images and a high accuracy in detecting spinal cord compression secondary to degenerative changes. It is the gold standard modality for confirming the diagnosis of DCM. In addition to diagnosis, MRI can provide prognostic information: patients with high T2 signal intensity and concomitant a low T1 signal intensity in the spinal cord generally have unfavorable outcomes. Some new studies using new MRI techniques, such as diffusion tensor imaging (DTI) and fiber tractography can demonstrate spinal cord changes and DCM earlier than conventional sequences.²³

CT scan

Conventional CT scan can demonstrate a small diameter of the spinal canal, osteophytes and degenerative changes but has a poor visualization of the spinal cord. It provides detailed information of the bone anatomy, with superiority when compared to X-rays and even MRI.²⁴ CT scan is important for surgical planning when spinal instrumentation will be required for preoperative anatomical study including that of the upper cervical spine.

In patients with contra-indications for an MRI study or those with previous surgeries and spinal instrumentation that may affect image quality, CT myelography can demonstrate indirect cord and nerve root compression.^{24,25} CT myelography can also be used for calculating the compression ratio, a relationship between the smallest sagittal diameter of the spinal canal / transverse diameter x 100 (%). A compression rate of less than 0.4 correlates with clinical evidence of DCM and with a less favorable clinical outcome. By this reasons, some authors proposed that surgery should be indicated before this degree of deformation occurs into the spinal cord.²⁶

Electromyography

Although limited in the assessment myelopathy, electromyography (EMG) may demonstrate radiculopathy.²⁷ It is, however, most useful in assessing differential diagnoses, such as motor neuron diseases (such as amyotrophic lateral sclerosis) and peripheral neuropathy. Additionally, EMG may offer some prognostic information: patients without myelopathy (mJOA scale of 18 or normal) but with severe stenosis and abnormal findings on the EMG have been shown in one study to eventually develop symptomatic DCM.²⁶

Somatosensory and motor evoked potential (SSEP and MEP)

In patients with cervical cord compression, the somatosensory evoked potential (SSEP) are delayed or have low amplitude.²⁶ Cortical motor evoked potential (MEP) are more sensitive than SSEP in assessing early spinal cord dysfunction.²⁸ Bednarik et al. demonstrated that patients with cervical stenosis without clinical myelopathy who had abnormal SSEP had statistically more chances of developed DCM than those with normal SSEP, suggesting a predictable importance of this exam.²⁶

NORMAL CERVICAL ALIGNMENT

Assessment of cervical alignment is important for planning surgical treatment in DCM. The normal cervical lordosis between C2 to C7 range from 20 to 35 degrees, but these measures depends on patient's population, age, radiological modality, etc.²⁹ Benzel et al. proposed that cervical kyphosis can be diagnosed if any vertebra from C3 to C6 crosses a line drawn from the posteroinferior aspect of the body of C2 in the midsagittal plane to the posteroinferior aspect of the body of C7.³⁰ Maintenance of cervical alignment is important, once it is associated with patient's outcome.

Lastly, in the cervical spine, about two thirds of the weight-bearing axis lies posterior to the vertebral bodies in the posterior column.³⁰ This emphasizes the importance of the integrity of the posterior ligamentous and bony structures in the maintenance of cervical alignment.

DIFFERENTIAL DIAGNOSIS

Differential diagnosis of DCM may include:³¹ primary spinal cord tumors; syringomyelia; extramedullary lesions (primary tumors, metastases); congenital myelopathies; normal pressure hydrocephalus; spinal cord infarction or infection; bilateral carpal tunnel syndrome; neurological diseases (amyotrophic lateral sclerosis, myasthenia gravis, multiple sclerosis, etc)

A thorough clinical examination, an adequate assessment of patient medical history, and the MRI is critical for differential diagnosis of DCM and other pathologies.

SURGICAL TREATMENT

In cases with moderate or severe DCM, surgical treatment is clearly indicated as non-operative management will lead to continued, and possibly irreversible, neurological decline. Additionally, although recovery of lost function after surgery is generally uncertain, the best surgical results are generally associated with patients with mild DCM and early symptoms.²⁶ Considering these points, some authors have proposed surgery for all patients with diagnosis of DCM. However, Kadanka et al. have demonstrated that patients with mild DCM were successfully treated (no significant deterioration in the mJOA score, recovery ratio, or timed 10 m walk within either group during the 2 years of follow-up) with close clinical observation in one randomized controlled study comparing conservative *versus* surgery in spondylotic cervical myelopathy.³² Of note, a limitation of this study is that, although patients did not deteriorate, they did not have any clinical improvement with clinical treatment.

The main goals of surgical treatment in DCM are to decompress the spinal cord, maintain or restore cervical alignment and stabilize the involved segments when needed. To achieve these goals, many different surgical techniques were proposed, using anterior, posterior or combined approaches. The choice of each one is based on patient characteristics (age, clinical symptoms, number of involved levels, site of compression, cervical alignment, previous surgeries, patients functional status, bone quality, presence of instability, among others), surgeon's

preference and analysis of risk and benefits of each approach over the other considering the case.

SURGICAL APPROACHES

Considering all the surgical goals, we discussed the key components of the most common surgical approaches used to treat DCM, summarized in Table 3.

ANTERIOR CERVICAL APPROACHES

Anterior cervical surgery is one of the most frequent spinal surgeries performed in the US, mostly commonly used to treat DCM in one, two, or three level disease. The anterior cervical approach was described by Smith and Robinson in 1955.³³ It allows an excellent exposure of the ventral aspect of the spinal cord without touching the neural elements. With the anterior cervical approach, it is also possible to perform disc space distraction that can enlarge the neural foramen and the spinal canal, with direct decompression and restoring cervical lordosis.^{34,35} The use of autografts or allografts into the disc space is important to achieve fusion.^{34,35} Fusion is important to maintain the disc space height without collapse, maintaining cervical lordosis, and also for stabilization of the involved segments, avoiding further new compression.^{34,35}

In cases where ventral cord compression involves a significant component of the vertebral body, beyond the disc boundaries, a cervical corpectomy is necessary to adequately decompress the spinal cord, followed by reconstruction and stabilization. An interbody device such as a titanium, PEEK, allograft or autograft (harvest from the iliac crest or fibula) is used for reconstruction and fusion.^{34,35} A combination of discectomies and corpectomies can be used according to patient need and sites of compression.³⁵⁻³⁷

TABLE 3 Main surgical approaches and their variations for treating DCM.

Anterior cervical approaches

Discectomy(ies)

Corpectomy(ies)

Combined discectomy(ies) and corpectomy(ies)

Cervical arthroplasty

Posterior cervical approaches

Laminectomy

Laminectomy and fusion (instrumented or not)

Laminoplasty

Open-door or unilateral technique

Double door laminoplasty (also known as French door laminoplasty, spinous process-splitting, midline opening or T-saw laminoplasty)

DCM: degenerative cervical myelopathy.

Comparison of anterior discectomies versus corpectomy

Clinical outcomes [JOA, visual analog scale (VAS) for arm and neck pain] for two levels discectomies were comparable with one level corpectomy when both options are feasible.³⁸ However, anterior cervical corpectomy and fusion (ACCF) had a higher operative time and bleeding amount compared with discectomies.³⁸ Additionally, discectomies obtained better improvements in segmental height and postoperative cervical lordosis when compared with corpectomy.^{38,39} Of note, although corpectomies may have a lower rate of pseudoarthrosis than multilevel discectomies, because of the fewer bone graft interfaces, there was a higher stress on bone screws compared with discectomy. The choice of one approach over the other depends on surgeons' preference and patient's radiological findings.

Cervical arthroplasty

Cervical arthroplasty is also an alternative for treating one or even two levels DCM secondary to degenerative disc disease, especially those secondary to disc herniation. The best surgical candidates are younger patients, without facet joints arthritis and preserved cervical motion.⁴⁰ The rationale for performing a cervical arthroplasty instead of fusion is to preserve segmental motion and avoid adjacent level disease, even though this has been questioned since heterotopic ossification may occur in up to 50% of the cases and ASD has not been shown to be decreased by cervical arthroplasty in long term outcomes. Both anterior cervical anterior discectomy and fusion (ACDF) and cervical arthroplasty are effective to treat disc herniation in DCM.⁴⁰ When performing a cervical arthroplasty, surgeons may be aware that an inadequate decompression may lead to recurrence of myelopathic symptoms.

POSTERIOR CERVICAL APPROACHES

The posterior cervical approach is a straightforward alternative to decompress the spinal cord and nerve roots with direct visualization.⁴¹ However, unlike the anterior cervical approach, posterior approaches require a preoperative lordotic or straight cervical alignment.⁴¹ Rigid local or global kyphosis is a contraindication for posterior decompression, as the spinal cord remains compressed and stretched by the anterior elements.⁴¹ Posterior approaches avoid certain complications that are more common with anterior approaches, such as dysphagia, dysphonia and injury to the esophagus and carotid sheath contents.⁴¹

Cervical laminectomy

The oldest and most traditional posterior cervical surgery is a decompressive laminectomy.⁴¹ It is based on direct

decompression of the spinal canal, enlarging its anteroposterior diameter. Posterior approaches can directly decompress the posterior elements such as the ligamentum flavum, posterior bone, facet hypertrophy and also indirectly decompress the ventral elements, shifting the spinal cord posteriorly.^{41,42}

However, as stated previously, the main disadvantages of cervical laminectomy are the inability to access ventral pathologies, such as disc herniation and anterior osteophytes, and the high risk of cervical deformity (postoperative kyphosis), which can result in cervical pain and late neurological deterioration.⁴¹ Another complication of an isolated cervical laminectomy is post-laminectomy membrane that may cause recurrent stenosis.

Cervical laminectomy and instrumented fusion

The incidence of post-operative kyphosis after cervical laminectomy may be as high as 50%, and dependent on many factors, such as preoperative deformity, the presence of segmental instability, removal C2 and/or C7 lamina, extensive laminectomies, wide facetectomies and younger age.^{41,43} Due to the risk of post-operative instability, concomitant instrumented fusion is advocated as a prophylactic maneuver for avoiding deformity and its consequences, especially when treating multilevel spinal cord compression.^{41,42}

Similarly to a standard laminectomy, posterior instrumentation requires a lordotic or at least straight cervical spine alignment. A wide range of modern surgical techniques of instrumentation were described for the cervical spine, such as lateral mass and pedicle screws, laminar screws, pars screws for C2, among many others.^{41,44} Cervical instrumentation may also avoid a new compression due to instability in the decompressed site. Disadvantages may include increasing surgical time and cost, implant related complications and loss of cervical range of motion, potentially increasing the chances of adjacent level disease below and above the fixed levels.⁴¹

Cervical laminoplasty

Laminoplasty is a surgical technique proposed in the early 1970's by Japanese surgeons for the treatment of ossification of the posterior longitudinal ligaments (OPLL) and congenital cervical stenosis.^{45,46} The goal is to enlarge the cervical spine canal and avoid post-operative kyphosis but also to preserve motion at the treated levels. This motion preservation is the potential advantage of laminoplasty compared with laminectomy and instrumented fusion, which can potentially avoid the complications associated with arthrodesis.

A multitude of surgical procedures for expandable laminoplasty were described, but we can group them in two main techniques:^{45,46}

1. open-door or unilateral technique; and
2. double door laminoplasty (also known as French door, spinous process-splitting, midline opening or T-saw laminoplasty).

The open door technique is based on open the lamina in one side (generally the most symptomatic one or with radicular symptoms) and hinge the contra-lateral side, where in a greenstick fracture is performed. The lamina can be maintained in the open position with sutures or miniplates (that offers immediate stability). In contrast, the double door expands the spinal cord symmetrically by opening the midline with a split of the spinous processes and hinging both the left and right hemilaminae. The midline laminar splits can be opened with laminar spreaders or bone graft.^{41,45,46}

While laminoplasty offers advantages over cervical fusion, it is not indicated for all patients. It does not address neck pain and may even cause worsening symptoms compared with anterior approaches, with extensive posterior muscle denervation. It is contra-indicated in patients with loss of cervical lordosis and with segmental instability. Complications of laminoplasty may include C5 palsy (5 to 12%), cervical axial pain, decreasing in cervical range of motion (ROM), and progression of OPLL.^{28,41,46}

Interestingly, although C5 palsy is associated classically with posterior decompression, Gandhoke reported that the incidence of C5 palsy was similar comparing anterior cervical corpectomy (31 cases) *versus* posterior laminoplasty (31 cases as well).⁴⁷ There were two cases of C5 nerve root pareses in each group ($p=1$). There was no differences between the complication or reoperation rates between the two groups ($p=0.184$ and $p=0.238$, respectively). This study, however, was underpowered to assess different complication rates.

Finally, laminoplasty requires some stabilization to maintain the lamina in a new expanded position. The hardware for laminar fixation may increase the cost of the procedure (such as titanium implants) and also add potential complications (such as lamina migration, non union, hardware subsidence, etc). Lastly, there is a risk of laminar door closure with recurrence of neurological symptoms.

COMPARISON OF ANTERIOR VERSUS POSTERIOR APPROACHES FOR MULTILEVEL DCM

Both anterior and posterior approaches are associated with improvement in patients' final neurological outcomes in DCM. Some systematic reviews reported that there was a

trend towards better postoperative neural function with anterior approaches, possibly explained by the fact that anterior surgery is generally proposed for several forms of the disease. However, the recovery rate was similar between both according to systematic reviews with meta-analysis.⁴⁸ Of note, multilevel anterior cervical decompression and fusion had a higher rate of complications compared with posterior surgery.⁴⁸

Fehlings et al. performed a prospective observational multicenter study of 264 patients comparing the anterior and posterior surgical approaches to treat DCM.⁴⁹ The choice of each approach was at the discretion of the surgeon and a follow-up rate of 87% was obtained. Outcome measures included the mJOA scale, Nürick scale, the Neck Disability Index and SF-36 Health Survey *version 2* Physical and Mental Component Scores. A total of 169 patients were treated anteriorly and 95 received a posterior cervical surgery. DCM patients who underwent anteriorly cervical surgery were younger and had less severe myelopathy (as defined by the mJOA and Nürick scores). Both groups had similar baseline Neck Disability Index and SF-36, but the mJOA was lower in the posterior approach group. The extent of improvement in the Nürick scale, Neck Disability Index, SF-36 *version 2* Physical Component Score, and SF-36 *version 2* Mental Component Score were similar between the groups, although the mJOA improvement was lower in the anterior group (2.47 *vs.* 3.62, respectively, $p<0.01$). They concluded that, although patients who underwent anterior cervical approach were younger and had less severe DCM, both treatments had similar efficacy in the treatment of DCM.

COMBINED ANTERIOR-POSTERIOR APPROACHES

In selected cases, a combined anterior-posterior or posterior-anterior approach can be used. The indications for combined approaches include patients requiring osteotomies for releasing the spine, patients with high risk for hardware failure, such as those with severe osteoporosis, and patients with a failure of a previous surgical approach (generally an anterior approach).^{41,50-52} Combined approaches may add morbidity of both anterior and posterior surgeries, but must be considered in some challenging cases to successfully achieve the goals of surgery (decompression, stability and good cervical alignment). Of note, patients with 2-stage surgery are at an increased risk of experiencing major complications as they typically have more extensive degenerative pathology.

CONCLUSION

Cervical spondylotic myelopathy is the most common cause of spinal cord dysfunction in adult patients. The

diagnosis is made clinically and confirmed with a cervical MRI. The severity of the DCM can be objectively assessed using the mJOA and the Nürick scale, the most commonly used scoring for cervical myelopathy.

Surgical treatment is the main treatment modality. The main goals of surgery are to decompress the spinal cord, maintain stability and achieve a good cervical alignment with an anticipated outcome of neurological preservation or improvement. The choice of one approach over the other depends on patient's characteristics (such as number of involved levels, site of compression, cervical alignment, previous surgeries, bone quality, presence of instability, among others) and surgeon's preference.

Spine surgeons must understand the advantages and disadvantages of all surgical techniques to choose the best surgery for each patient to optimize the final outcome. Further comparative studies are necessary to attest the superiority and differential risks of one approach over the other when multiple options are available.

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RESUMO

Manejo da mielopatia cervical degenerativa – Uma atualização

Introdução: a mielopatia cervical degenerativa (MCD) é uma das causas mais comuns de disfunção medular em adultos. Os pacientes em geral apresentam declínio neurológico lento e progressivo, ou deterioração escalonada. No presente artigo, discutimos os mais importantes fatores envolvidos no manejo da MCD, incluindo considerações sobre os aspectos relacionados à escolha da abordagem cirúrgica.

Método: realizou-se extensa revisão da literatura de artigos *peer-reviewed* relacionados ao tema.

Resultados: embora o diagnóstico seja realizado clinicamente, a ressonância magnética (RM) é o estudo de imagem de escolha para confirmá-lo e excluir eventuais diagnósticos diferenciais. A gravidade do quadro clínico pode ser avaliado utilizando-se diferentes escalas, como a modified Japanese Orthopedic Association (mJOA) ou a de Nürick, provavelmente as mais comuns. Uma vez que

a melhora clínica espontânea é rara, a cirurgia é a principal forma de tratamento, em uma tentativa de evitar dano neurológico adicional ou deterioração e, potencialmente, aliviar alguns sintomas e melhorar a função dos pacientes. Abordagens cirúrgicas por via anterior, posterior ou combinada podem ser usadas para descomprimir o canal, concomitantemente a técnicas de fusão. A escolha da abordagem depende das características dos pacientes (número de segmentos envolvidos, local de compressão, alinhamento cervical, cirurgias prévias, qualidade óssea, presença de instabilidade, entre outras), além da preferência e experiência do cirurgião.

Conclusão: os cirurgiões de coluna devem compreender as vantagens e desvantagens de todas as técnicas cirúrgicas para escolher o melhor procedimento para seus pacientes. Estudos futuros comparando as abordagens são necessários para orientar o cirurgião quando múltiplas opções forem possíveis.

Palavras-chave: mielopatia cervical, mielopatia espondilótica, abordagem cirúrgica, abordagem anterior, abordagem posterior.

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