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Presentation and management of a patient with rapid progression of degenerative cervical myelopathy during pregnancy: a case report

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Objective: To describe the clinical presentation and management of a patient with degenerative cervical myelopathy (DCM) during pregnancy.

Case presentation: A 34-year-old female, who was 21-weeks pregnant, presented for chiropractic evaluation with acute left upper-back pain.

Intervention and outcome: For the initial symptoms, the patient completed multidisciplinary treatment with progressive improvement in pain. At the nine-week follow-up visit, the patient described a rapid onset of extremity paresthesia and balance change. The physical examination revealed hyperreflexia. DCM was established as the working diagnosis based on clinical examination. Spinal cord compression was confirmed by MRI (magnetic resonance imaging). The patient had a cesarean delivery and anterior cervical discectomy and fusion (ACDF) surgery was performed at four-weeks

Présentation et gestion d'une patiente présentant une progression rapide de la myélopathie cervicale dégénérative pendant la grossesse: un rapport de cas
Objectifs: Décrire la présentation clinique et la gestion d'une patiente atteinte de myélopathie cervicale dégénérative (MCD) pendant la grossesse.

Présentation de cas: Une femme de 34 ans, qui était enceinte de 21 semaines, s'est présentée pour une évaluation chiropratique en raison d'une douleur aiguë dans le coin supérieur gauche du dos.

Intervention et résultats: Pour les symptômes initiaux, la patiente a suivi un traitement multidisciplinaire qui a offert une amélioration progressive de la douleur. Au cours de la visite de suivi à la neuvième semaine, la patiente a décrit un début rapide de paresthésie des extrémités et un changement au niveau de l'équilibre. L'examen physique a révélé une hyperréflexie. On a établi un diagnostic de travail de MCD fondé sur l'examen clinique. On a confirmé la compression de la moelle épinière au moyen de l'IRM (imagerie par résonance magnétique). La patiente a accouché par césarienne et on a réalisé une disectomie cervicale antérieure suivie d'une fusion (DCAF) quatre semaines

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postpartum.

Summary: Symptoms associated with DCM may be wide-ranging. DCM diagnosis is commonly delayed and timely recognition and management is essential. This case highlights the importance of awareness of DCM and appropriate management for this condition.

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KEY WORDS: *case report, cervical, myelopathy, pregnancy, surgery, chiropractic*

après l'accouchement.

Résumé: Les symptômes associés à la MCD peuvent être variés. Le diagnostic de MCD est souvent retardé, et la reconnaissance et la gestion en temps opportun sont essentielles. Ce cas souligne l'importance de la sensibilisation à la MCD et de la gestion appropriée de cette maladie.

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MOTS CLÉS : *rapport de cas, cervical, myélopathie, grossesse, chirurgie, chiropratique*

Introduction

Degenerative cervical myelopathy (DCM) is the most common cause of spinal cord dysfunction in the adult population worldwide.[1] The prevalence of DCM is estimated to be at least 605 individuals per million in North America.[2] DCM is a chronic and progressive disorder that is characterized by compression of the cervical spinal cord due to spondylosis, degenerative disc disease, ligamentous ossification, and other degenerative conditions.[3] Patients with DCM may experience slow or rapid development of symptoms, such as decreases in manual dexterity, pain, weakness or numbness of the upper and lower extremities, gait disturbances, and bladder or bowel dysfunction.[4] Due to the degenerative nature of DCM, the older population is most often affected, with an average diagnosis at greater than 50 years of age.[3] However, DCM is not exclusively found in the older population and can affect younger adults as well.

The clinical presentation of DCM can be classified as mild, moderate, or severe,[5] based on the Modified Japanese Orthopaedic Assessment Score (mJOA) which assesses bladder control and sensory and motor function of the extremities.[5] Surgical intervention to remove spinal cord compression is the only intervention shown to prevent further disability caused by DCM.[6] Surgical cases for DCM are increasing, with an estimated prevalence of DCM related surgeries of 1.6 per 100,000 annually.[7] Although surgical decompression of the spinal cord is an effective treatment option for DCM, many patients with DCM endure an incomplete neurological recovery.[8]

Delayed diagnosis of DCM remains common and early diagnosis of DCM is imperative to preserve function and minimize disability that may result from spinal cord compression associated with DCM.[4,9,10] Studies have shown an association between delayed diagnosis, disease progression, and incomplete recovery following surgical intervention.[11,12] This highlights the importance for an increase in public and professional awareness of DCM. Despite calls for an increase in awareness of DCM, delayed diagnoses of DCM remain common with studies showing that average delays in symptom onset to diagnosis ranges between 2.2-6.3 years.[9,10,13,14]

The purpose of this paper is to discuss the diagnosis and management of a case of rapidly progressive DCM in a pregnant patient. This paper highlights diagnostic challenges and treatment approach of DCM in the setting of pregnancy.

Case presentation

A 34-year-old female presented for chiropractic evaluation at an academic tertiary medical center with a chief complaint of acute left upper trapezius musculature pain and generalized left upper back pain (Figure 1). At the time of initial chiropractic evaluation, the patient was 21-weeks pregnant and was referred for chiropractic evaluation by her obstetrician. The patient was employed as a mental health counselor and primarily worked from a home-based computer workstation. The patient described an insidious mechanism of onset of approximately six-week duration with progressive worsening of pain intensity. Pain was rated as variable in nature, between 2 to 10 out of 10 on a numerical pain rating scale. She denied antecedent fall, trauma, injury, or specific inciting incident. She described her pain as a tight and aching qual-

ity with intermittent sharp sensations. Furthermore, the patient described transient tingling along the anterolateral portion of the left arm. Swinging her left arm while walking and sitting at a computer for greater than 10-minutes were provocative in nature, exacerbating the symptoms of left upper trapezius and left upper thoracic pain. Self-stretching of the cervical spine into lateral bending was palliative in nature. Before the initial evaluation, the patient described using Tylenol and cyclobenzaprine (15 mg daily) prescribed by the referring obstetrician for pain management, with limited relief. However, heat and ice application provided temporary pain relief. She denied gait abnormalities, lower extremity symptoms, fine motor deficits in the hands or fingers, saddle anesthesia, bladder or bowel dysfunction, or issues with balance or falls.

A chart review of the patient's past medical history revealed plain film imaging of the cervical spine secondary to a motor vehicle collision approximately 10 years prior to the initial chiropractic evaluation. Imaging of the cervical spine revealed no abnormal findings. Physical examination performed during the initial chiropractic evaluation revealed blood pressure, pulse, and temperature to be within normal limits. Additionally, motor strength testing was 5+ equal and bilateral throughout the upper and lower extremities. Sensation to light touch was intact equal and bilateral throughout the upper and lower extremities.

Figure 1.

Timeline graphic representation of management. This timeline demonstrates an overview of the patient's clinical journey, from initial presentation through multidisciplinary management, collaborative care decisions, and subsequent interventions.

Biceps, brachioradialis, patellar, and achilles deep tendon reflexes were 2+ equal and bilateral. Pathological reflexes were evaluated through testing of the Hoffman reflex and assessment for sustained ankle clonus, both of which were grossly unremarkable on examination. Lhermitte's sign was unremarkable. Cervical ranges of motion were moderately limited in extension, flexion, lateral bending, and rotation bilaterally with provocation of the patient's

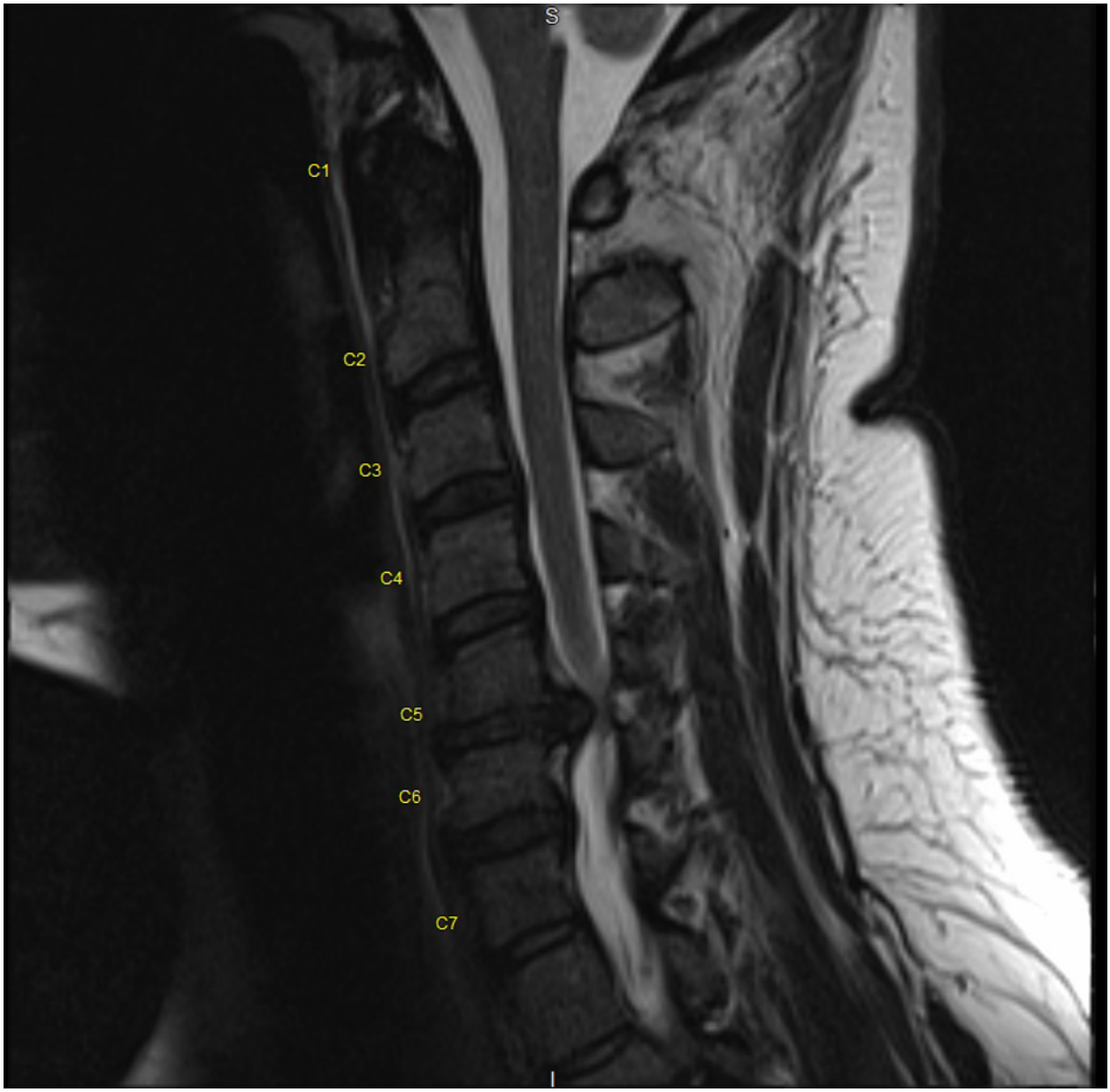

Figure 2.
Magnetic resonance imaging (MRI) confirming clinical diagnosis of cervical myelopathy. MRI sagittal view shows severe central canal stenosis at C5-C6 with 10 millimeters of disc extrusion causing cord compression with complete effacement of surrounding cerebrospinal fluid.

chief complaint. Maximum foraminal compression testing re-produced the patients' pain complaints on the left. Gentle manual cervical traction was relieving. Upper limb tension test (A) on the left and Spurling's test on the left provoked diffuse pain at the cervicothoracic junction.

A primary working diagnosis of cervical radicular pain

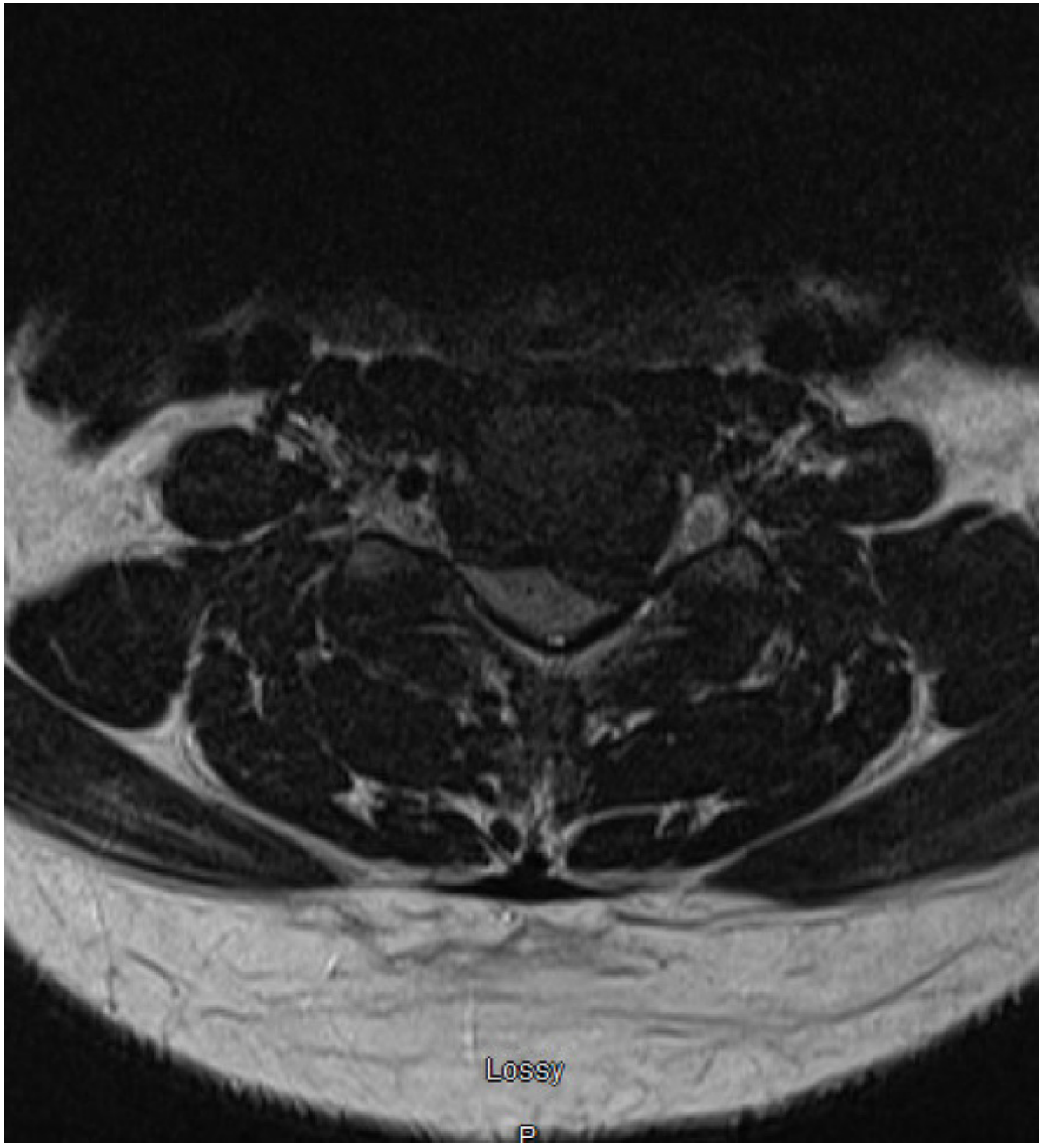

Figure 3.

Magnetic resonance imaging (MRI) confirming clinical diagnosis of cervical myelopathy. MRI axial view shows severe central canal stenosis at C5-C6 with 10 millimeters of disc extrusion causing cord compression with complete effacement of surrounding cerebrospinal fluid.

with acute nonspecific musculoskeletal related pain in the cervicothoracic spine was established. Through a shared decision-making process with the patient, a plan of care was established to proceed with a multidisciplinary care approach, including physical therapy, occupational therapy, and chiropractic care. Over a six-week period, the patient completed two physical therapy sessions, one occupational therapy session, and four chiropractic treatment sessions. Physical therapy sessions included supervised exercise with home exercise prescription focused on repeated cervical spine retraction exercise and scapular stabilization exercises. Occupational therapy evaluation included an assessment of workstation and home ergonomics with recommendations to optimize body mechanics and lifting techniques. Chiropractic treatments consisted of soft tissue manipulation of the upper trapezius and cervical paraspinal musculature, as well as upper thoracic joint manipulation. The patient responded favorably to this multidisciplinary management plan over the 6-week period. She described progressive reductions of pain level variability with a report of pain variability rated 1 to 5 out of 10 on a numeric pain rating scale at the sixth week of care. Due to progressive reduction of pain by the sixth week of care, the patient was invited to return for chiropractic care on an as needed basis.

The patient returned to the chiropractor nine weeks after the initial evaluation with reports of continued improvement in her pain complaints. However, she described an insidious mechanism of onset of numbness and tingling in the bilateral hands and thighs that was most prominent with cervical extension. The patient also described a new onset of balance dysfunction, though denied falling. She denied deficit in fine motor control of the hands/fingers, saddle anesthesia, and bladder and bowel incontinence/retention. Physical examination revealed 3+ patellar deep tendon reflexes bilaterally and 2+

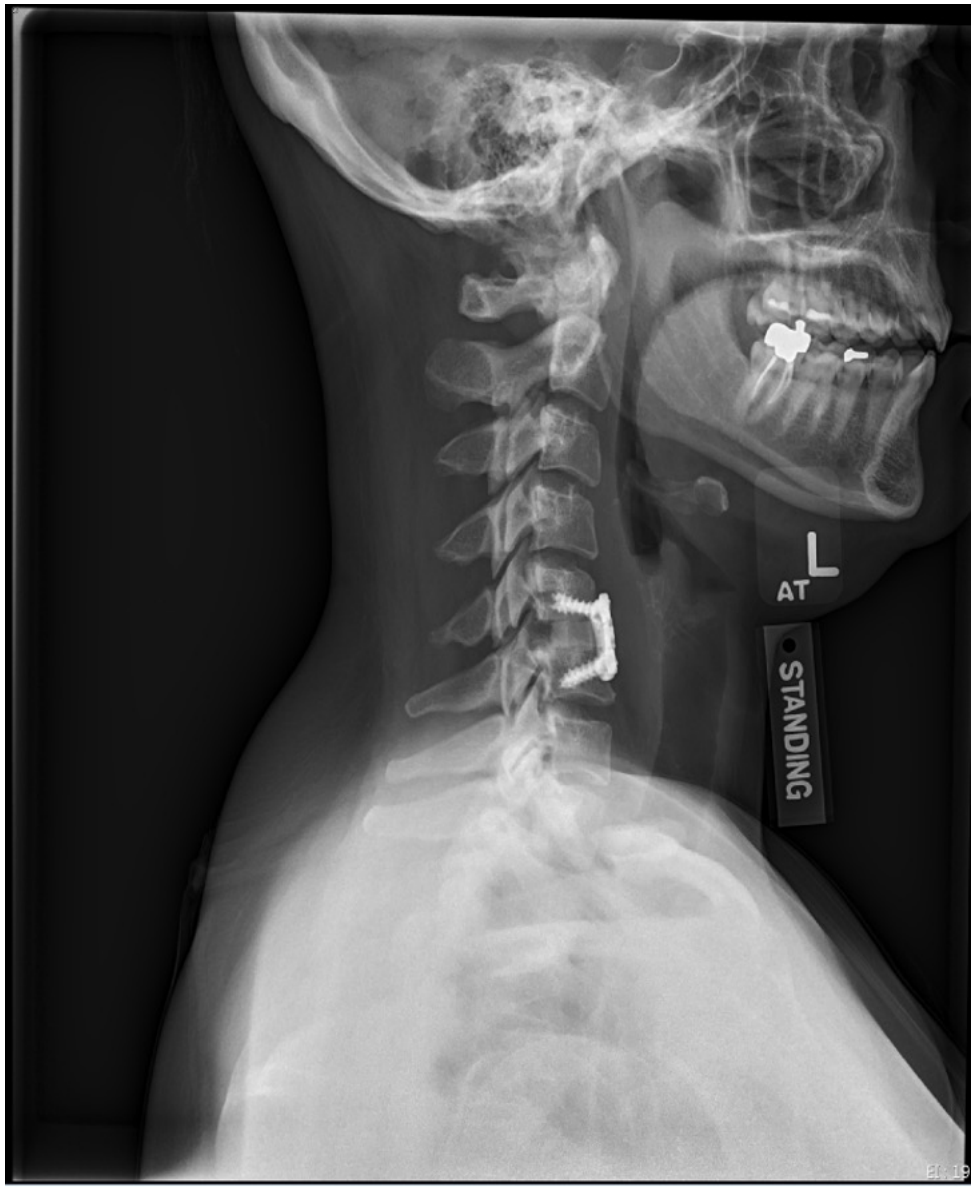

Figure 4.
Lateral view of cervical spine x-ray at 6-weeks following anterior cervical discectomy and fusion (ACDF) surgery for degenerative cervical myelopathy (DCM). X-ray shows normal postoperative healing without hardware complication.

achilles, biceps, and brachioradialis deep tendon reflexes bilaterally. Sensation to light touch was decreased equally and bilaterally in the medial thighs, within the L2 and L3 dermatomes. Hoffman sign was absent and there was no ankle clonus appreciated on physical examination. A primary working diagnosis of cervical myelopathy was established. A cervical magnetic resonance imaging (MRI) study was completed and confirmed cervical spinal cord compression. MRI revealed severe central canal stenosis at C5-C6 with 10 millimeters of disc extrusion causing complete effacement of surrounding cerebrospinal fluid (Figure 2, Figure 3).

The patient was referred for neurosurgical evaluation. At the time of neurosurgical evaluation, the patient was 35-weeks pregnant. The plan of management for this complaint was cervical spine surgery following labor. The neurosurgical and obstetric team recommended a caesarean section at 37 weeks followed by cervical spinal cord decompression early postpartum. There are no definite guidelines for timing of cervical spine surgery in the postpartum period. Therefore, the neurosurgery team and the obstetric team came to a consensus on timing for surgery that would be safe and feasible for the patient. At four-weeks postpartum, a C5-C6 anterior cervical discectomy and fusion (ACDF) surgery was performed. At six-weeks postoperative neurosurgery follow-up, the patient described resolution of paresthesia with no abnormal neurologic findings upon examination. Postoperative x-rays were completed which revealed normal postoperative healing without hardware complication (Figure 4).

Discussion

We present a case illustrating the evaluation and management of DCM in a pregnant patient. This case is unique as it describes the rapid progression of symptoms and the management of a patient diagnosed with DCM during pregnancy. In this case, the recognition of a new onset of distinct features associated with DCM, despite the patient's progressive improvement in pain complaints, was critical for timely diagnosis of DCM. Symptoms associated with DCM have been reported to mimic other, less severe, neurological disorders such as peripheral neuropathies.[15] However, the clinical signs and symptoms associated with DCM may mimic other severe pathologies such as multiple sclerosis, amyotrophic lateral sclerosis, and acute transverse myelitis.[16] It is critical that spinal pathologies caused by other disease processes are not overlooked in patients presenting with neurological symptoms suggestive of myelopathy and a timely and accurate diagnosis is established. A summary of differentiating features associated with neuromusculoskeletal pathologies that can mimic DCM is described in Table 1. Further detailed discussion regarding the differentiation of various pathologies mimicking DCM has been discussed elsewhere.[16]

Additionally, the term "degenerative cervical myelopathy (DCM)" has recently been identified as the preferred terminology to broadly define a disease state characterized by compression on the cervical spinal cord resulting in progressive neurological dysfunction. The term DCM was decided upon by a multi-disciplinary stakeholder group, which included persons living the disease. In the past, this condition has been labeled with multiple different names which created confusion and limited scientific progress. The term DCM was decided upon to unify the field and we have chosen to reflect that in the manuscript.[17]

As in the current case, the diagnosis of DCM was largely dependent upon an appropriate history and physical examination. Significant history findings may include a wide range of symptoms manifesting as a result of cord compression. For example, patients may describe difficulty opening a jar, buttoning a shirt, writing, balance impairments, and neck pain. The physical examination for DCM should include testing with moderate to high sensitivity and specificity to ensure appropriate diagnosis and management.[18] A recent systematic review and meta-analysis found that Tromner test and hyperreflexia are the most sensitive clinical tests for diagnosing DCM; Babinski sign, Tromner test, clonus, and inverted supinator sign are the most specific clinical tests for diagnosing DCM.[18] Guideline recommendations suggest that if there is a suspicion of DCM, additional imaging is needed to confirm or refute the diagnosis.[18] MRI is currently the gold standard for confirmation of spinal cord compression in DCM.[19]

Current clinical practice guidelines recommend that patients with mild DCM should be offered surgical intervention or the option to participate in structured rehabilitation.[6] However, surgical intervention is recommended for patients with moderate and severe DCM.[6] In this case, the patient initially presented with radicular pain and non-specific acute musculoskeletal pain. Guidelines rec-

ommend a multimodal approach to managing musculoskeletal pain,[20] which in this case consisted of supervised exercise, patient education, soft tissue therapy, and spinal manipulative therapy. After 6-weeks of conservative therapy the patient reported improvement of musculoskeletal pain associated with DCM, though described and demonstrated new neurologic symptoms which required surgical intervention. In the current case, the patient had severe spinal cord compression due to a disc herniation with rapidly progressive cervical myelopathy. As straining

Table 1.
Differentiation of clinical features of neuromusculoskeletal pathologies from degenerative cervical myelopathy (DCM).[16, 22, 23, 24]

Pathology	Signs and Symptoms	Differentiating Features from DCM	Diagnostic Confirmation
Multiple sclerosis	Vision changes, bladder disturbances, gait abnormalities, fatigue, unilateral extremity paresthesia	Vision changes including diplopia and loss of vision, unilateral extremity paresthesia, fatigue, Uhthoff phenomenon (worsening in warm environment)	White matter lesions on MRI, oligoclonal bands present in cerebrospinal fluid, 2 episodes of disturbances, raised IgG
Amyotrophic lateral sclerosis	Hoffmans sign, Babinski sign, gait abnormalities, muscular atrophy, loss of fine motor skills, fasciculations and weakness in the face or extremities	Fasciculations, speech changes, dysphagia, unintentional weight loss	EMG reveals lower motor neuron disease, bilateral changes within the corticospinal tracts on MRI
Parkinson disease	Tremors, rigidity, bradykinesia, initial onset is unilateral then progresses to a bilateral distribution, decreased dexterity, shuffling gait	Shuffling gait, tremors, speech changes, dysphagia, small handwriting, involuntary movements	Nigral signal changes on MRI, changes on EMG
Carpal tunnel syndrome (CTS)	Unilateral or bilateral hand pain, numbness and tingling in the median nerve distribution, nocturnal symptoms, dysesthesia, thenar atrophy in late stages	Symptoms isolated to unilateral or bilateral hand or forearm, absence of Hoffmans sign and Babinski sign, positive CTS provocative tests on examination	Diagnosis is largely based on history and physical exam, however electrodiagnostic studies may help guide clinical decision making
Cubital tunnel syndrome	Numbness and tingling in the ulnar nerve distribution, Wartenberg sign, hand weakness specifically in the fourth and fifth digits	Symptoms isolated to hand or forearm, absence of Hoffmans sign and Babinski sign, positive cubital tunnel syndrome provocative tests on examination	Diagnosis is largely based on history and physical exam, however electrodiagnostic studies may help guide clinical decision making
Acute transverse myelitis	Weakness or paralysis of the extremities, well-defined sensory level distribution, autonomic dysfunction	Flaccid paraparesis of the extremities, difficulty flexing legs and extending arms, autonomic dysfunction	T2 signal changes on MRI
Syringomyelia	Cape-like sensory distribution, weakness, loss of pain and temperature sensation, vision changes, gait disturbances, dizziness	Cape-like sensory distribution, loss of pain and temperature sensation, vision changes, dizziness	Diagnosis is confirmed by the presence of a syrinx on MRI

during labor can induce further disc herniation and may lead to neurological deterioration[21], a cesarean section was recommended to protect both the mother and baby. This recommendation facilitated early surgical intervention to address the DCM.

The early recognition of signs and symptoms of DCM ensured timely imaging and an appropriate clinical plan. This case further emphasizes the need for timely recognition of DCM and early referral for appropriate intervention.

Summary

This unique case which describes the diagnosis and management of DCM in a pregnant patient features the importance of timely recognition and diagnosis of DCM. Diagnostic delays are common and are likely associated with low awareness of DCM and the wide range of symptoms associated with DCM which may be subtle in nature. Given the potential rapid progression of the disease with functional deterioration, it is important that portal-of-entry health care professionals be aware of the clinical features and management of DCM.

Limitations

The case report is subject to limitations due to being based on a single individual's clinical presentation and outcomes. Moreover, the findings in the case report cannot be generalized to a larger population. Additionally, the retrospective nature of the case report limits the ability to account for potential documentation and recall bias. Although efforts have been made to provide a comprehensive description of the clinical presentation and management, additional variables such as psychosocial factors, and other concurrent unknown treatment may have influenced the described outcomes. Potential additional variables were not investigated or reported in the case report. Finally, the patient's perspective was not explored as a component of the case report.

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