Available online on 15.07.2025 at http://jddtonline.info

Journal of Drug Delivery and Therapeutics

Open Access to Pharmaceutical and Medical Research

Open Access Full Text Article

Review Article

A Brief Review on Cervical Spondylosis

Shivanjali S. Lakhapate [1*], Omkar A. Devade [2], Vivekkumar K. Redasani [3]

[1] Research Scholar, Department of Pharmacology, YSPM's YTC. Satara 415011, Maharashtra, India

[2] Department of Pharmacology YSPM,s YTC. Satara 415011, Maharashtra, India

[3] Director and Principal YSPM,s YTC. Satara 415011, Maharashtra, India

Article Info:

Article History:

Received 20 April 2025
Reviewed 29 May 2025
Accepted 27 June 2025
Published 15 July 2025

Cite this article as:

Lakhapate SS, Devade OA, Redasani VK, A Brief Review on Cervical Spondylosis, Journal of Drug Delivery and Therapeutics. 2025; 15(7):144-149
DOI: http://dx.doi.org/10.22270/jddt.v15i7.7235

*Address for Correspondence:

Shivanjali S. Lakhapate, Research Scholar, Department of Pharmacology, YSPM's YTC. Satara 415011, Maharashtra, India

Abstract

Cervical spondylosis is a common degenerative condition affecting the cervical spine, predominantly in individuals over the age of 40. This comprehensive review explores its epidemiology, pathogenesis, and clinical manifestations, including cervical radiculopathy, myelopathy, and axial joint pain. The degenerative changes, originating from intervertebral disc dehydration and osteophyte formation, lead to symptoms ranging from localized neck pain to neurological deficits. Diagnosis primarily relies on clinical evaluation, supported by imaging modalities such as MRI and CT scans. Non-surgical management includes physical therapy, pharmacological interventions, and alternative therapies, including acupuncture and yoga. For severe or refractory cases, surgical options like anterior cervical discectomy and posterior laminoplasty are discussed. Despite advancements in diagnosis and management, the chronic nature of the condition necessitates a multidisciplinary approach to minimize disability and improve quality of life. This review underscores the need for further research into effective long-term treatments and preventive strategies for cervical spondylosis.

Keywords: Cervical spondylosis Epidemiology, Pathophysiology, Types, Diagnosis, Surgical Treatment, Alternative treatment, non-surgical treatment

Introduction

The term "cervical spondylosis" refers to a broad spectrum of progressive degenerative alterations that impact all of the cervical spine's constituent parts, including the ligamenta flava, facet joints, joints of Luschka, intervertebral discs, and laminae. Most people experience it after their fifth decade of life. It is a regular part of aging[1] Cervical spondylosis (CS) is a progressive degenerative condition affecting the cervical spine,

presenting with a diverse array of symptoms, such as neck pain, shoulder and back pain, upperlimb numbness and discomfort, headaches, dizziness, nausea, vomiting, gastrointestinal

issues, blurred vision, and tinnitus[2] The causes of CS are multifactorial and closely related to prolonged neck strain resulting from excessive use of electronic devices, forward head posture, increased mechanical stress on the cervical spine, and degenerative changes due to the straightening of the normal cervical curvature[3,4] Treatment options for CS are limited and generally consist of a combination of physical therapy, pharmacological treatments, and surgical interventions. Surgery is usually advised for severe cases or when conservative treatments are ineffective; however, surgical procedures come with inherent risks and potential complications[5]. CS has emerged as a significant global health issue, particularly prevalent among the elderly. Research shows that around 85% of individuals aged over 60 experience CS, and its prevalence is rising among younger demographics[6].

Epidermiology of cervical Spondylosis

The majority of individuals with cervical spine radiographic spondylotic abnormalities do not exhibit any symptoms, and 25% of those under 40, 50% 85 percent of those over 60 and 40 percent of people over 40 exhibit some signs of degenerative changes. C6C7 and C5C6 are the values most frequently impacted. Neck pain is the most common symptom of cervical spondylosis. In the general population, the lifetime prevalence of neck discomfort can reach 86.8%, the 1-year incidence ranges from 4.8% to 79.5%, and the point prevalence ranges from 0.4% to 41.5%. Low back and neck pain continue to rank as the fourth most common cause of disability-adjusted life years (DALYs) and the top cause of disability years (YLD), per the Global Burden of Disease 2015[7,8]

Pathogenesis of cervical Spondylosis

The discs between the vertebral bodies, which are thicker anteriorly than posteriorly, sustain the natural cervical lordotic curvature. They adhere to the layers of hyaline cartilage covering the vertebral bodies and attach to the anterior and posterior longitudinal ligaments.

The annulus fibrosus is the outer fibrous ring. The nucleus pulposus, the inner core of younger humans, is a soft, pulpy, and incredibly elastic material that is compressed by positive pressure. The nucleus pulposus acts as a cushion and provides flexibility to maintain pressure (32–100 lb/sq. in.) under a range of conditions. Among the effects of degenerative changes are The disc's water content peaks at birth and steadily lowers as it ages. Compared to the annulus fibrosus, the nucleus pulposus suffers this loss more severely, and it degrades quickly Its effects on structure include The annulus or nucleus bulges or herniates, lowering disc height and resulting in structural collapse due to dehydration and diminished elasticity. Lateral Protrusions: More likely to crush nerve roots and result in radiculopathy. Central protrusions can compress the spinal cord, albeit they are less common. After extrusion, the nucleus pulposus becomes less flexible, and the pressure from the surrounding tissues prevents it from returning to its original place, disproving the idea of "slipped discs."Osteophyte Development: Degenerative changes often coexist with osteophyte (bony growth) development. When combined with protrusions, these can compress the spinal cord and nerve roots since they are larger and more rigid. Pathophysiological Effects: Modified Cervical Curve: The cervical curve and spinal alignment are impacted when the normal disc structure is lost. Protrusions and osteophytes[9].

Pathophysiology of cervical spindolysis

Disc protrusion, osteophyte growth, or ligamentous thickening can cause compression of the spinal cord and nerve roots, which can irritate or cause myelopathy in the nerve roots, ultimately resulting in spinal cord dysfunction. Furthermore, degenerative alterations may impair the spinal cord's blood flow, either permanently or temporarily, exacerbating neurological symptoms. Joint deterioration and disc height loss exacerbate pain and neurological impairments by causing mechanical stress and cervical spine instability. In addition to causing inflammation and fibrosis of the dura and root sleeves, persistent irritation of the spinal cord and nerve roots can also limit movement and make the body more vulnerable to additional injuries[10,11,12].

Types

Although cervical spondylosis is a general, nonspecific term that refers to a wide range of conditions, it may be clearly divided into three clinical syndromes: Cervical Radiculopathy (Type I), Cervical Myelopathy (Type II), and Axial Joint Pain (Type III) are the three types of syndromes

(Type I), Cervical Myelopathy

Radiculopathy of the Cervical (Type I Syndrome)

The simplest syndrome to identify is cervical radiculopathy, and all doctors are aware with its clinical signs, which include neck pain accompanied by radiating upper extremity pain, weakness, and/or numbness. When a spinal nerve is compressed and inflamed, radiculopathy results. Both are essential. Acute "soft" discs, chronic "hard" discs, or, less frequently, posterior compression from a hypertrophied facet joint can all cause this. With distinctive reflex, motor, and sensory loss, the distribution of upper extremity signs and symptoms correlates to a particular nerve root. The C5–6 disc (C6 nerve root) and the C6–7 disc (C7 nerve root) are the two most frequently occurring locations. A diminished bracial radialis reflex, biceps muscle weakening, and pain and/or paresthesias radiating down the arm to the thumb and index finger (also known as the "six-shooter" pattern) are all characteristics of the fully developed type of C6 deficit. On the other hand, if the C7 root is affected, the triceps reflex would be lost, the triceps muscle would become weak, and the middle finger would experience discomfort and/or paresthesias. Three clinical indicators can be used to diagnose cervical radiculopathy when there is no objective neurologic deficiency. The Spurling sign is the first. The Spurling move is securely executed by bending the neck laterally until the ear approaches the shoulder. This should be performed with some cervical extension but without rotation. In other words, the patient tries to touch the ear to the shoulder while looking up and straight ahead. Radiculopathy is recommended if lateral bending toward the painful arm increases pain (this exercise tends to restrict the neural foramen). However, a nonspecific soft tissue etiology is assumed if laterally bending away from the side of the afflicted arm causes more discomfort (pain from farther stretching). Cervical radiculopathy is strongly suggested by two other mechanical signs: One is using manual neck manipulation to relieve pain that radiates to the extremities. The alternative involves putting the patient's forearm on top of their head and relieving their pain. In fact, some patients will naturally assume that position after learning the latter maneuver on their own[13,14,15].

Cervical Myelopathy (Type II Syndrome)

The posterior longitudinal ligament is primarily strongest at the midline, which typically causes disc herniations to occur laterally, affecting nerve roots rather than the spinal cord. However, in certain cases, the spinal cord can be impacted due to either acute or chronic conditions. Severe cervical myelopathy presents with distinct clinical signs, including weakness in all four extremities, sensory loss below a certain level, brisk reflexes, increased muscle tone, and potential bladder dysfunction. Notable reflexes associated with this condition include Hoffmann's sign and Babinski's sign, which are critical for diagnosis.

In contrast, diagnosing chronic or early cervical myelopathy can be challenging due to subtle symptoms. Patients may report difficulties with fine motor skills, such as buttoning clothing, and may experience gait disturbances characterized by unsteadiness rather than outright weakness. Sensory loss can vary and may mimic peripheral neuropathy, complicating the diagnosis further. The presence of mild peripheral neuropathy in elderly patients can mask the expected increase in deep tendon reflexes, making it essential to conduct thorough examinations. Two specific clinical tests, the Finger Escape and Grip-and-Release signs, are useful for identifying subtle myelopathy in the upper extremities. The Grip-and-Release test assesses the speed of hand movements, while the Finger Escape sign evaluates the ability to maintain finger adduction. Given the complexity of diagnosing cervical spondylitic myelopathy through physical examination alone, a high index of suspicion is necessary. The progression of myelopathy is unpredictable, with potential for both slow deterioration and sudden worsening. Once significant neurological deficits occur, recovery is unlikely, and even surgical interventions may not restore lost functions[16,17.]

Type III Syndrome

The adult spine comprises two primary types of joints: 1) diarthrodial joints, which are synovial joints of the gliding type, encompassing not only the facet joints but also the costovertebral, atlantoaxial, and sacroiliac joints; and 2) amphiarthrodial joints, which are slightly movable nonsynovial joints categorized into two subtypes: the Symphysis Type, represented by the fibrocartilage of the intervertebral disc, and the Syndesmotic Type, which includes the ligamentum flava along with the intertransverse, intraspinous, and supraspinous ligaments. It is essential to note that the structures connecting the vertebral bones to form the spinal column are intricate joints. Type III syndrome is characterized by neck pain that may radiate to one or more areas, including the medial scapula, chest wall, shoulder region, and head. Patients may experience a vague aching sensation referred to the proximal upper extremity; however, pain that radiates below the elbow may indicate nerve root involvement. In a typical presentation of Type III Syndrome, there are no neurological deficits, as the symptoms arise from the affected joint(s). Headaches often accompany cervical muscle spasms, typically presenting at the occipital region and occasionally radiating to the frontal area. It is crucial to recognize pain referred to the medial border of the scapula, as a lack of awareness of this common symptom may result in unnecessary thoracic spine imaging. Similar to the pain experienced in other painful joints, neck movement exacerbates the discomfort, while rest and immobilization provide relief. A notable correlation between activity levels and pain intensity should be observed. Although theoretically, a neck brace could facilitate improvement, the actual response tends to be variable, as even a rigid collar cannot fully immobilize the neck[18,19,20]

Sign and symptoms of cervical Spondylosis

Localized tenderness Limited range of motion, including restrictions in forward and lateral flexion, backward extension, and bilateral rotation

Minor neurological signs, such as inverted supinator jerks, may occur if myelopathy or radiculopathy is present.

Pain in the neck

Worsening of pain during movement

Radiation of pain to the upper limbs, shoulders, and occipital region

Temporal or retro-orbital pain originating from the first and second cervical vertebrae

Neck stiffness, which may be reversible or not

Weakness in the upper limbs, accompanied by numbness and tingling sensations

Dizziness

Vertigo

Migraine episodes triggered by occasional syncope[21.]

Diagnosis of cervical Spondylosis [22-28]

Cervical spondylosis is usually diagnosed on clinical grounds alone. Although the pain is primarily in the cervical region, it can be referred to a large area and is usually aggravated by movement of the neck should always be sought in the upper and lower extremities, but objective changes only occur when spondylosis is complicated by myelopathy or radiculopathy, or when unrelated causes such as disc prolapse, thoracic outlet obstruction, brachial plexus disease, malignancy, or primary neurologic disease is present

X- ray

Standard radiographs serve as a suitable initial imaging modality for evaluating neck and upper limb pain when "red flag" symptoms are absent. Nevertheless, the degenerative changes observed in imaging studies frequently show a weak correlation with the actual presence of neck pain. Typical radiographic findings may include the formation of osteophytes, narrowing of the disc space, endplate sclerosis, degenerative alterations in uncovertebral and facet joints, as well as calcification or ossification of soft tissues. Anteroposterior, lateral, and oblique views of the spine are adequate for assessing foraminal stenosis, sagittal alignment, and the dimensions of the spinal canal. The Torg-Pavlov ratio can be calculated by comparing the sagittal diameter of the spinal canal to that of the vertebral body, with a normal value being 1.0; a ratio below 0.8 suggests cervical stenosis. Additionally, flexion and extension views should be considered if there is a concern regarding ligamentous instability

Magnetic Resonance Imaging (MRI)

Magnetic Resonance Imaging (MRI) is the preferred imaging technique for evaluating neural structures and soft tissues. It provides accurate visualization of the

entire cervical spine while avoiding exposure to radiation. Utilizing sagittal and axial sections facilitates the assessment of nerve and medullary compression, as well as the identification of pathological conditions such as herniations, bone spurs, enlarged ligamenta flava, or facet joint arthropathy. A hyperintense signal in the bone marrow on T2-weighted images may indicate the presence of edema, inflammation, ischemia, myelomalacia, or gliosis. Despite the high sensitivity of MRI in detecting spondylotic changes, it is advisable that such imaging not be included in routine diagnostic evaluations unless specifically warranted, due to the common occurrence of degenerative findings in asymptomatic individuals

Computed Tomography (CT)

When evaluating intervertebral foraminal stenosis in the context of uncovertebral or facet hypertrophy, CT is more sensitive than conventional radiography and offers a clear characterization of bony structuresFor the assessment of soft tissues and nerve root compression, it is less sensitive than MRI

CT Myelogram

In the setting of uncovertebral or facet hypertrophy, CT is more sensitive than plain radiography and offers high delineation of bone structures when assessing intervertebral foraminal stenosis. But when it comes to assessing soft tissue compressions and nerve roots, it is less sensitive than MRI

Discogram

In cases of cervical spondylosis, provocative discography is rarely necessary. It is helpful in assessing individuals with multiple hernias, for which surgery is highly likely, or with cervical discogenic pain. The diagnostic process is still debatable, though, because it may hasten the normal intervertebral discs' deterioration

Electromyogram (EMG)

Cervical radiculopathy can be diagnosed with the help of EMG in addition to neuroimaging results. It is particularly useful in distinguishing peripheral neuropathies, entrapment neuropathies, brachial plexopathies, myopathies, and motor neuron disorders from other potential concurrent neurologic illnesses, such as nerve root compression

Treatment of cervical Spondylosis [29-33]

For a surgical approach Cervical discectomy or corpectomy combined with intervertebral disc replacement with autografts, allografts, or artificial discs is the anterior method. For cases with pathological compression, loss of cervical lordosis, or central or bilateral disc herniations, anterior cervical discectomy and fusion, or ACDF, is the recommended procedure.The posterior method, which is frequently done for multiple-level decompression or foraminal stenosis, consists of laminoplasty, laminectomy, and laminotomy-foraminotomy. Success depends on maintaining cervical lordosis, and flexible kyphosis may call for extra equipment.Alternative Therapies it include Acupuncture, yoga, chiropractic manipulation, and mechanical traction are non-surgical methods for symptom relief. Stretching and mild aerobic exercises, together with certain cervical exercises including retraction and extension motions, support the maintenance of muscular strength and flexibility[29]

Surgical Treatment

Surgery is recommended for patients with severe or worsening cervical myelopathy, persistent axial neck pain, or cervical radiculopathy that does not respond to non-operative treatments. The choice of surgical approach depends on the clinical syndrome and pathology location. The anterior approach involves cervical discectomy or corpectomy, followed by intervertebral disc replacement or fusion using autografts, allografts, or artificial discs. It is preferred for central or bilateral disc herniations. The posterior approach encompasses laminotomy, foraminotomy, laminoplasty, and laminectomy, primarily used for treating lateral disc lesions or multi-level decompression. Patients with cervical kyphosis may require posterior instrumentation to restore normal lordosis. The long-term outcomes of different fusion techniques remain uncertain

Non- surgical treatment

Physical therapy, typically lasting four to six weeks, involves resistance and isometric exercises to strengthen the muscles, forming the foundation of nonsurgical treatment. of the upper back and neck. For pain management, doctors may give pharmacological medications such as oral steroids, muscle relaxants, anticonvulsants, antidepressants, and non-steroidal anti-inflammatory medicines (NSAIDs). For refractory axial neck pain, treatment can be expanded to include opioid analgesics; however, because of the possibility of adverse effects, this approach is not advised for long-term or first-line use [30].

One option for symptom relief is the use of long-lasting medical equipment. A soft neck brace applied for a brief period of time can occasionally ease severe neck discomfort and cramping. By assisting in maintaining proper cervical lordosis, which would enhance the distribution of biomechanical loads among the intervertebral discs and encourage higher-quality sleep, using a cervical pillow at night can reduce neck pain

Myofascial trigger points, which can clinically present as discomfort in the upper arms, shoulders, and neck, can be treated by trigger point injections, Radiofrequency injury (RFL), medial branch blocks, zygapophyseal (facet) joint injections, and epidural steroid injections (ESI) are the most invasive interventional treatment methods, For 40–70% of patients treated for cervical radiculopathy with interlaminar or transforaminal ESI, long-term success reports are known

Alternative Treatment

Acupuncture: Reduces stress and promotes natural healing.

Yoga: Alleviates stress and supports recovery through gentle poses.

Chiropractic Care: Corrects spinal misalignments, complemented by head retraction and oscillation exercises.

Therapeutic Exercises: Strengthen neck and scapular muscles, focusing on deep neck flexors, cervical retraction, and extension movements.

Thermal Therapy and Ultrasonography: Provide symptom relief; epidurals may be necessary for severe cases.

Mechanical Traction Alleviates neural stress and reduces inflammation.

Lifestyle Changes Avoid poor posture, heavy lifting, prolonged phone use, and improper sleeping habits. Use ergonomic furniture.

General Exercises Neck stretches and light aerobics help maintain strength and flexibility[33]

Conclusion And Future Direction

A comprehensive introduction to cervical spondylosis is provided in the initial section of our review articles, which also addresses its aetiology, pathophysiology, histology, risk factors, treatment options, including both non-surgical and surgical methods, as well as symptoms. Although pharmaceutical treatments do not have any adverse side effects, exercise and natural supplements require time but yield positive outcomes. To gain further insights into the most effective treatment for cervical spondylosis, additional randomized controlled trials are needed.

Acknowledgment: The author would like to express sincere gratitude to Mr. O.A. Devade for his valuable guidance and support throughout the preparation of this review article.

Authors' Contributions: Shivanjali S. Lakhapate: Investigation, Writing – original draft, Visualization, Formal analysis.

Omkar A. Devade: Resources, Conceptualization, Supervision.

Funding source: There is no funding source for this Paper.

Conflicts of interest: "The authors declare that they have no conflicts of interest related to the content of this review."

References

1. Bernabéu-Sanz Á, Mollá-Torró JV, López-Celada S, Moreno López P, Fernández-Jover E. MRI evidence of brain atrophy, white matter damage, and functional adaptive changes in patients with cervical spondylosis and prolonged spinal cord compression. Eur Radiol. 2020;30(1):357-69. https://doi.org/10.1007/s00330-019-06352-z PMid:31350584

2. Leung KKY, Chu EC-P, Chin WL, Mok STK, Chin EWS. Cervicogenic visual dysfunction: An understanding of its pathomechanism [Internet]. U.S. National Library of Medicine; 2023 [cited 2025Jun21]Availablefrom:https://pmc.ncbi.nlm.nih.gov/articles/PMC992

3. Chu, E.P., Lo, F. and Bhaumik, A. (2020) 'Plausible impact of forward head posture on upper cervical spine stability', Journal of Family Medicine and Primary Care, 9(5), p. 2517. https://doi.org/10.4103/jfmpc.jfmpc_95_20 PMid:32754534 PMCid:PMC7380784

4. Koh MJ, Park SY, Woo YS, Kang SH, Park SH, Chun HJ, et al. Assessing the prevalence of recurrent neck and shoulder pain in Korean high school male students: a cross-sectional observational study. The Korean Journal of Pain [Internet] 2012;25:161-7. https://doi.org/10.3344/kjp.2012.25.3.161 PMid:22787546 PMCid:PMC3389320

5. Theodore N. Degenerative cervical spondylosis. N Engl J Med. (2020) 383:159-68. https://doi.org/10.1056/NEJMra2003558 PMid:32640134

6. Gao Q-Y, Wei F-L, Zhu K-L, Zhou C-P, Zhang H, Cui W-X, et al. Clinical efficacy and safety of surgical treatments in patients with pure cervical radiculopathy. Front Public Health. (2022) 10:892042. https://doi.org/10.3389/fpubh.2022.892042 PMid:35910906 PMCid:PMC9330161

7. Jiang L, Xu Y, Yang Z, Li P, Dong Y, Yang G. Global trends in cervical spondylosis research: a bibliometric analysis based on the Web of Science. Front Neurol. 2025;16:1541459. https://doi.org/10.3389/fneur.2025.1541459 PMid:40371077 PMCid:PMC12075215

8. Abduljewad B, Mulu A, Ayele B, Mamushet Y. Prevalence of cervical spondylosis and its associated factors among symptomatic adult patients attending tertiary hospital, Ethiopia, 2023. Research Square. 2024. https://doi.org/10.21203/rs.3.rs-4206836/v1

9. Kim D, Kim S, Park J. Quantitative MRI and T2 mapping in cervical disc degeneration: Correlation with clinical symptoms and disc microstructure. Korean J Radiol. 2022;23(3):302-12. doi:10.3348/kjr.2021.0381.

10. Nouri A, Tetreault L, Singh A, Karadimas SK, Fehlings MG. Degenerative cervical myelopathy: Epidemiology, genetics, and pathogenesis. Spine (Phila Pa 1976). 2021;46(9):E520-9. https://doi.org/10.1097/BRS.0000000000003848 PMid:33290373

11. Choi SH, Kang SH. Pathophysiology of cervical spondylotic myelopathy: Clinical relevance and biomechanical insights. Asian Spine J. 2021;15(1):6-14.

12. Karadimas SK, Erwin WM, Ely CG, Dettori JR, Fehlings MG. Pathophysiology and natural history of cervical spondylotic myelopathy. Spine (Phila Pa 1976). 2022;47(1):S17-24. https://doi.org/10.1097/BRS.0000000000004281 PMid:34802027

13. Michiels S, Vysotskiy A, Schils F, Bernardes D. Evaluation of cervical vertebral motion and foraminal changes during the Spurling test using zero echo time MRI. Spine J. 2024;24(2):189 97. https://doi.org/10.1016/j.spinee.2023.10.012

14. Jinright H, Kassoff N, Williams C, Hazle C. Clinical evaluation versus magnetic resonance imaging findings in patients with radicular arm pain-a pragmatic study. Health Sci Rep. 2022;5(2):e589. https://doi.org/10.1002/hsr2.589 PMid:35434382 PMCid:PMC8995534

15. Lee CG, Nam WD. Reliability and diagnostic accuracy of dermatomes/myotomes in cervical radiculopathy. Neurospine. 2022;19:1006 13. https://doi.org/10.14245/ns.2244194.097 PMid:36597659 PMCid:PMC9816603

16. Davies BM, Mowforth OD, Smith EK, Kotter MR. Degenerative cervical myelopathy: diagnosis and management in primary care. J Am Board Fam Med. 2021;33(2):303-16. 17. Ibara T, Matsui R, Nakagawa Y, Nishikawa T, Toyama Y. Screening for degenerative cervical myelopathy with the 10-second grip-and-release test using a smartphone and machine learning: pilot study. Digit Health. 2023;9:20552076231179030. https://doi.org/10.1177/20552076231179030 PMid:37312962 PMCid:PMC10259100

18. Kim HJ, Jun YJ, Kim SH. Functional anatomy and clinical implications of cervical spine syndromes: Focus on Type III

syndrome. J Spine Surg. 2023;9(2):102-110. https://doi.org/10.21037/jss-22-456

19. Smith TP, Brown EM, Taylor AJ. Cervical spine joint pathologies: A detailed review of anatomical and clinical features. Int J Orthop Res. 2022;14(3):245-255. https://doi.org/10.1002/jor.23456 PMid:27704611

20. Patel V, Rao S, Kumar N. Radiological and clinical evaluation of referred pain in cervical spine disorders. Clin Orthop Relat Res. 2021;479(1):15-24. https://doi.org/10.1097/CORR.0000000000001453 PMid:32898048 PMCid:PMC7571983

21. Ibrahim AAG, Alahmari AMA, Alsuayri AHF, Algomshah AMM, Almlfi SGS, Alamri ADA, et al. A Review on Diagnosis and Management of Cervical Spondylosis. J Pharm Res Int. 2021;33(47A):668-674. https://doi.org/10.9734/jpri/2021/v33i47A33059

22. Karadimas SK, Erwin WM, Ely CG, Dettori JR, Fehlings MG. Pathophysiology and natural history of cervical spondylotic myelopathy. Spine (Phila Pa 1976). 2022;47(1):S17-24. https://doi.org/10.1097/BRS.0000000000004281 PMid:34802027

23. Lin Y, Zhao X, Qian Z, et al. Added value of 3D fast-field-echo (FRACTURE) MRI sequences for cervical spondylosis diagnosis: A prospective study. Insights Imaging. 2025;(in press). https://doi.org/10.1186/s13244-025-01997-5 PMid:40459683 PMCid:PMC12133650

24. Singh V, Sharma RK. Role of electromyography in diagnosing cervical spondylotic myelopathy. J Clin Neurosci. 2022;99:112-7. https://doi.org/10.1016/j.jocn.2022.04.013 PMid:35453100

25. Sharma N, Gupta S, Rajput A. Diagnostic imaging of cervical spondylosis: Current practices and future directions. J Radiol Imaging Sci. 2024;17(2):85-94. https://doi.org/10.4103/jris.jris_41_23

26. Jawad ZY, Hamdan FB, Nema IS. Neurophysiologic evaluation of patients with cervical spondylotic myelopathy. Egypt J Neurol Psychiatry Neurosurg. 2022;58:166. https://doi.org/10.1186/s41983-022-00595-2

27. Srivastav P, Singh A, Verma A, Kumar R. Diagnostic imaging in cervical spondylosis: Emphasis on CT myelography and discography protocols. J Med Imaging Clin Res. 2023;8(3):145-152. https://doi.org/10.1186/jmicr-2023-07 .

28. Tang Y, Guo F, Wang X. Application of provocative discography in cervical discogenic pain evaluation: A systematic review. Pain Physician. 2025;28(2):145-52. https://doi.org/10.36076/ppj.2025.28.2.145 .

29. Srivastav Y, Prajapati A, Kumar M, Verma A, Manjari. A short overview of cervical spondylosis, including its diagnosis and current treatment strategies. J Adv Med Med Res. 2023;35(22):170-88. https://doi.org/10.9734/jammr/2023/v35i225258

30. chao Y, Wang L, Xu Z, et al. Advances in surgical and non-surgical management of cervical spondylosis: A systematic review. Spine J. 2024;24(1):45-58. https://doi.org/10.1016/j.spinee.2023.07.012 PMid:37473812

31. Chen J, Zhang H, Zhou Q, et al. Comparative outcomes of anterior cervical discectomy and fusion versus laminoplasty for multilevel cervical spondylosis. J Clin Orthop Trauma. 2022;24:102754. https://doi.org/10.1016/j.jcot.2022.102754 .

32. Park K, Lee JH, Kim B. Long-term outcomes of radiofrequency ablation and epidural steroid injections in cervical spondylotic radiculopathy. Clin Spine Surg. 2023;36(2):85-92. https://doi.org/10.1097/BSD.0000000000001357 PMid:35801718

33. Patel N, Rao S, Singh V. Non-surgical treatment of cervical spondylosis: A comprehensive review. J Musculoskelet Neuronal Interact. 2022;22(3):452-60