MAK HILL Publications Research Journal of Medical Science

Research Article
doi: 10.59218/makrjms.2023.170.174

Cervical Spondylosis: Clinicoradiological Correlation, Management and Outcome

Jeswani Mayank, Shukla Avdhesh, Gupta Sunny, Sharma Avinash and Kankane Vivek Kumar

Gajra Raja Medical College, Department of Neurosurgery, Gwalior, India

ABSTRACT

Cervical spondylosis is a pathological condition characterised by degenerative changes that primarily affect the cervical spine. This condition encompasses cervical radiculopathy and myelopathy, which are distinguished by the compression or irritation of nerve roots or the spinal cord, respectively. Cervical spondylosis often presents with degenerative alterations affecting the facet joints, hypertrophy of the ligamentum flavum and ossification of the posterior longitudinal ligament. Furthermore, it is possible for the occurrence of anterior and posterior osteophytes to manifest. The degenerative changes in the cervical spine possess the capacity to apply pressure on pain-sensitive structures, resulting in the manifestation of diverse clinical syndromes accompanied by associated symptoms. Non-surgical interventions, such as physical therapy, pain management and the administration of anti-inflammatory medications, are commonly employed as initial treatment modalities for cervical spondylosis. In instances of heightened severity or when conservative approaches prove inadequate in delivering satisfactory relief, surgical interventions may be contemplated as a means to alleviate pressure on nerve structures. The purpose of this study was to assess the demographic pattern, symptomatology, radiographic features, various modalities of treatment and the functional outcome of the patients with cervical spondylosis. This retrospective study included 82 patients admitted with neck pain or weakness in upper and lower limbs or radiologically diagnosed case of cervical spondylosis under department of neurosurgery, GRMC and associated J.A. group of Hospitals from May 2021 to April 2023 who seek medical or surgical management. No randomisation done. A statistical analysis of patients with cervical radiculopathy and myelopathy revealed that males in the age group of 40-50 years were commonly affected, particularly those engaged in manual labor. Radiculopathy symptoms lasted less than 3 months, while myelopathy symptoms persisted between 3 months and 1 year. Myelopathy patients had a smaller anteroposterior diameter <10 mm on MRI compared to radiculopathy patients 10-12 mm and regardless of treatment approach (surgical or conservative), pain reduction was significant in operated patients. Cervical spondylosis is a natural ageing process and occurs in most people after the age of five. Most people with spondylotic changes in the cervical spine on radiographs remain asymptomatic. Cervical spondylosis is usually diagnosed for clinical reasons only but imaging is also required. Treatment for cervical spondylosis can be medical or surgical, depending on whether the patient has symptoms of myelopathy, radicular pain, or neck pain.

OPEN ACCESS

Key Words

Cervical spondylosis, Radiculopathy, Myelopathy, Degenerative cervical spine

Corresponding Author

Kankane Vivek Kumar,
Gajra Raja Medical College, Department of Neurosurgery, Gwalior, India Tel: 9039965510

Received: 2 June 2023
Accepted: 16 June 2023
Published: 28 June 2023

Citation: Jeswani Mayank, Shukla Avdhesh, Gupta Sunny and Sharma Avinash, 2023. Cervical Spondylosis: Clinicoradiological Correlation, Management and Outcome. Res. J. Med. Sci., 17: 170-174, doi: 10.59218/makrjms.2023.170.174

INTRODUCTION

Cervical disc disease is a prevalent condition that can lead to significant neurological compromise due to unique anatomical characteristics compared to lumbar disc disease. It is the most common cause of acquired disability in individuals over the age of fifty. The first description of the intervertebral disc was provided by Andreas Vesalius in 1543. Patients typically present with pain but the disease progression can manifest as a clinical syndrome of cervical pain, cervical radiculopathy and cervical myelopathy[1].

Patients with cervical spondylosis may have multiple levels of disc herniations and spinal stenosis. The pathophysiology of cervical disc disease is multifactorial, with factors like advancing age, occupational heavy loading, trauma and whole-body vibration being potential risk factors[2]. The most common degenerative changes are observed in the C5-C6 level, followed by C6-C7 and C4-C5[3].

The cervical spine's unique anatomy includes the presence of the intervertebral disc from the C2-C3 level downward, contributing to cervical spine mobility and stability. Additionally, the cervical vertebrae feature the uncinate process, which forms the joint of Luschka or uncovertebral joint, reinforcing the intervertebral disc and providing additional stability and motion[4].

The intervertebral disc itself consists of two main parts: the annulus fibrosus, located peripherally and the nucleus pulposus, located centrally, which are responsible for its load distribution function. Various types of nucleus pulposus herniations can occur, including disc protrusion, disc extrusion and disc sequestration, depending on the interaction between the nucleus pulposus and the annular fibres[5].

Treatment options for cervical disc disease range from nonoperative measures to surgical interventions, such as decompression, instrumented fusion, or a combination of laminoplasty and instrumentation. To detect the source and extent of neurological compression, radiological investigations like plain X-ray spine, CT scan, myelography and magnetic resonance imaging (MRI) are commonly employed.

The current study aims to investigate the clinical and radiological correlation in cervical spondylosis by analysing and correlating the clinical findings and radiological imaging results of affected patients. This research holds promise in improving our understanding of the disease and potentially enhancing treatment strategies for better patient outcomes.

MATERIALS AND METHODS

This was a retrospective study on 82 patients who were admitted under department of neurosurgery, GRMC and associated J.A. group of Hospitals, Gwalior from May 2021 to April 2023 who underwent conservative or surgical management and after analysing the patient's signs and symptoms, radiological features management and outcome, the results were obtained.

In this retrospective analysis, patients who presented with neck pain, weakness in the upper and lower limbs, or a radiological diagnosis of cervical spondylosis were included. Demographic information such as age and sex, as well as clinical manifestations including symptoms and signs, were recorded. In Fig. 1a and b, such as X-rays or MRI scans, were also collected to aid in the diagnosis and assessment of cervical spondylosis.

Furthermore, surgical findings, if applicable, were documented for patients who underwent surgical intervention. The patients' outcomes and progress were evaluated at the time of discharge and followed up after a period of 4 months post-discharge.

This study aimed to provide valuable insights into the clinical presentation, imaging characteristics and surgical outcomes of patients with cervical spondylosis.

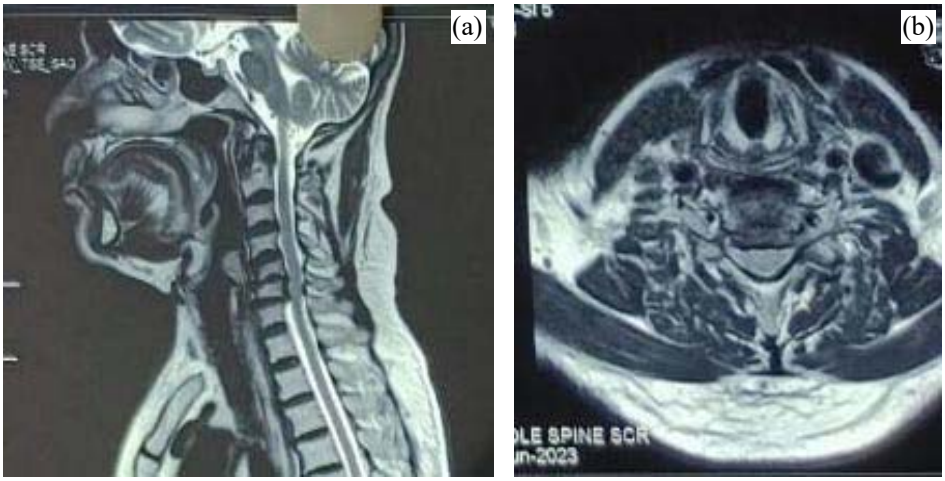

Fig. 1(a-b): Midsagital and axial cut of degenerative cervical spine

By analysing the collected data, researchers can gain a better understanding of the disease and potentially improve patient management and treatment strategies. Clinical outcomes were classified based on the visual analog scale as either symptomatically improved or deteriorated.

Inclusion criteria:

- All patients presented with neck pain or limb weakness between age group of 20-80 years
- Patients with neck pain with no MR findings of root or cord compression were included in the group managed conservatively after ruling out other pathological causes of neck pain
- Patients with radiculopathy with MR evidence of root compression and with root compression signs such as motor or sensory or deep tendon reflexes changes
- Patients presenting with compressive form of myelopathy with MR evidence of cord compression

Exclusion criteria:

- Post traumatic radiculopathy or myelopathy
- Patients with congenital disorders or spinal tumours or any infective aetiology

RESULTS

A retrospective study was conducted at GR Medical College and JA group of hospitals (GRMC), Gwalior, over a two-year period from May 2021 to April 2023. The study focused on 82 patients diagnosed with cervical spondylosis and was carried out in the department of Neurosurgery. The study design was non-randomized and single-institute based. The examination of sociodemographic data and clinical characteristics of patients who exhibited radiculopathy and myelopathy in relation to cervical spondylosis revealed a number of statistically significant observations.

The research findings indicate that individuals of the male gender, particularly those between the ages of 40 and 50, exhibit a greater prevalence of cervical spondylosis. Furthermore, this group demonstrates an increased vulnerability to the development of radiculopathy and myelopathy. The condition may be influenced by occupational factors, such as repetitive movements or physical strain, which are commonly observed among individuals engaged in manual labour. There was a disparity in the duration of symptoms observed in the two groups, as radiculopathy symptoms exhibited a relatively rapid resolution (within a span of less than three months), whereas myelopathy symptoms persisted for a more extended period (ranging from three months to one year). The examination of magnetic resonance imaging (MRI) data has indicated that individuals with a narrower anteroposterior (AP) diameter, specifically measuring less than 10 mm, exhibit an increased propensity for developing myelopathy as opposed to radiculopathy, which is more commonly observed in individuals with an AP diameter ranging from 10-12 mm. Both surgical and conservative treatment modalities demonstrated efficacy in significantly reducing pain in patients, as assessed by the visual analogue scale, both prior to and following surgery. Out of a total of 82 patients, it was found that 28% of the patients were managed conservatively and experienced symptomatic improvement. The remaining 72% of the patients underwent surgical intervention, with specific procedures distributed as follows: 26.8% underwent anterior cervical discectomy and fusion, 20.7% underwent posterior cervical decompressive laminectomy, 12.1% with radiculopathy underwent anterior cervical discectomy without instrumentation, 6% underwent corpectomy with cage stabilisation, 4.8% with both radiculomyelopathy underwent multi-level anterior cervical discectomy and bony fusion with stabilisation and finally, 1.2% of the patients underwent corpectomy and bone graft fusion. A total of 86.5% of individuals demonstrated improvement following either surgical or conservative management, while 13.5% exhibited no change or experienced a degree of deterioration.

The statistical findings presented in this study offer significant contributions to our understanding of the demographic and clinical features of patients diagnosed with cervical spondylosis-related radiculopathy and myelopathy. These insights are instrumental in informing the development of focused treatment approaches for these medical conditions.

DISCUSSIONS

Cervical spondylosis commonly occurs in patients between the ages of 40 and 50, with a slightly higher prevalence in males. Kelly *et al*.[6] found that the condition mainly affected individuals over 30 years of age, with the highest prevalence observed between 40 and 49 years of age. The occurrence of cervical spondylosis in individuals under 30 years of age was relatively rare, with only five cases reported. However, a male preponderance was observed starting from the age of 20.

Manual labourers engaged in heavy work are more prone to early degenerative changes in the cervical spine. This is due to the transfer of weight from the load being carried on the arms to the cervical spine through the muscles of the arm. In a study by Hayashi and Yabuki[7], it was found that 32% of the study population consisted of manual labourers.

Furthermore, a significant history of trauma affecting the head and neck region was reported in 61% of the patients. These factors contribute to the higher incidence of degenerative changes in the cervical spine among manual labourers, especially those with a history of trauma.

Laminectomies, often combined with instrumented fusion, are commonly performed procedures to address spinal instability and maintain or restore lordosis. Studies by Lees *et al*.[8] have shown satisfactory outcomes in 70-80% of patients undergoing laminectomy. Another technique, expansive open-door laminoplasty, described by Hirabayashi *et al*.[9], has demonstrated good results in 66% of patients. However, it is important to note that these procedures are not without potential complications, such as haematoma, dural injury, paralysis, postoperative C5 palsy, post laminectomy kyphosis and neck pain. In cases of radiculopathy, foraminotomy can be considered as an alternative for direct decompression of the affected nerve roots.

Highsmith *et al*.[10] conducted a study comparing the neurological outcomes of laminectomy with fusion and laminoplasty and found similar results. However, they observed that patients who underwent laminectomy with fusion experienced less neck pain compared to those who underwent laminoplasty. This suggests that if neck pain is a significant symptom, fusion may be a more suitable option as it can address pain associated with degenerative disc disease, in addition to providing neurological recovery. Decompression alone may improve neurological function but may not alleviate pain caused by degenerative changes in the discs.

Active modalities are an important component of rehabilitation for neck pain. These modalities include aerobic conditioning, dynamic muscle training, isometric exercises and range of motion exercises. Postural training can also be beneficial. Isometric exercises specifically target the strengthening of the paravertebral muscles while avoiding movements that may exacerbate pain. However, Gross *et al*.[11] suggest that there is not strong evidence supporting the use of neck strengthening and stretching exercises for patients with chronic neck pain.

In a study by Mann *et al*.[12], low-back pain physicians used pain drawings to categorize patients into five different disorders: Benign back pain, herniation of the nucleus pulposus, spinal stenosis, serious underlying disorders and psychogenic regional pain disturbance. However, the specificity of this approach was only 51%. In our study, we focused specifically on patients diagnosed with cervical radiculopathy. We found that more than 90% of these patients made markings on the upper and lower arm in their pain drawings.

Oda *et al*.[13] discovered that the cervical disc with the highest stress during motion is located at the C5-6 level. This may explain why degenerative changes are more frequently observed at this specific level. Teressi *et al*.[14] and Matsumoto *et al*.[15] also reported similar findings, where disc degeneration was the most common degenerative change, followed by posterior and anterior disc protrusions. The least common degenerative change observed was foraminal stenosis, followed by narrowing of the disc space.

CONCLUSION

Cervical spondylosis is a common age-related condition characterised by arthritic changes in the cervical spine, typically occurring after the age of fifty. These changes can lead to compression of spinal nerve roots or the spinal cord, resulting in symptoms such as neck pain, radiculopathy (nerve root compression), or myelopathy (spinal cord compression). However, many individuals with cervical spondylosis on radiographic imaging remain asymptomatic. Diagnosis is usually made based on clinical presentation but imaging may be necessary for confirmation. Treatment options for cervical spondylosis vary depending on the presence of symptoms such as myelopathy, radicular pain, or neck pain and can include medical management or surgical intervention.

ACKNOWLEDGMENT

The authors are acknowledged to present part of this paper in the form of poster presentation at MPCG chapter NSICON 2023.

REFERENCES

1. Brooker, A.E.W. and R.W. Barter, 1965. Cervical spondylosis: A clinical study with comparative radiology. Brain, 88: 925-936.
2. Anderson, G.B.J., 1991. The Epidemiology of Spinal Disorders. In: The Adult Spine: Principles and Practice., Frymoyer, J.W. (Ed.)., Raven Press, New York, pp: 7-46.
3. Matsumoto, M., Y. Fujimura, N. Suzuki, Y. Nishi, M. Nakamura, Y. Yabe and H. Shiga, 1998. MRI of cervical intervertebral discs in asymptomatic subjects. J. Bone Joint. Surg. Br., 80: 19-24.
4. Shedid, D. and E.C. Benzel, 2007. Cervical spondylosis anatomy: Pathophysiology and biomechanics. Neurosurgery, 60: S1-S13.
5. Fardon, D.F., A.L. Williams, E.J. Dohring, F.R. Murtagh, S.L.G. Rothman and G.K. Sze, 2014. Lumbar disc nomenclature: version 2.0: Recommendations of the combined task forces of the North American spine society, the American society of spine radiology and the American society of neuroradiology. Spine J., 14: 2525-2545.

6. Kelly, J.C., P.J. Groarke, J.S. Butler, A.R. Poynton and J.M. O'Byrne, 2012. The natural history and clinical syndromes of degenerative cervical spondylosis. Adv. Orthopedics, Vol. 2012. 10.1155/2012/393642.
7. Hayashi, K. and T. Yabuki, 1985. Origin of the uncus and of Luschka's joint in the cervical spine. J. Bone Joint. Surg. Am., 67: 788-791.
8. Lees, F. and J.W.A. Turner, 1963. Natural history and prognosis of cervical spondylosis. Br. Med. J., 2: 1607-1610.
9. Hirabayashi, K., K. Watanabe, K. Wakano, N. Suzuki, K. Satomi and Y. Ishii, 1983. Expansive open-door laminoplasty for cervical spinal stenotic myelopathy. Spine, 8: 693-699.
10. Highsmith, J.M., S.S. Dhall, R.W. Haid, G.E. Rodts and P.V. Mummaneni, 2011. Treatment of cervical stenotic myelopathy: A cost and outcome comparison of laminoplasty versus laminectomy and lateral mass fusion. J. Neurosurg.: Spine, 14: 619-625.
11. Gross, A., T.M. Kay, J.P. Paquin, S. Blanchette and P. Lalonde *et al*, 2015. Exercises for mechanical neck disorders. Cochrane Database Syst. Rev., Vol. 1. 10.1002/14651858.CD004250.pub5.
12. Mann, N.H., M.D. Brown, D.B. Hertz, I. Enger and J. Tompkins, 1993. Initial-impression diagnosis using low-back pain patient pain drawings. Spine, 18: 41-53.
13. Oda, T., M.M. Panjabi and J.J. Crisco, 1991. Three-dimensional translational movements of the upper cervical spine. J. Spinal. Disord., 4: 411-419.
14. Teresi, L.M., R.B. Lufkin, M.A. Reicher, B.J. Moffit and F.V. Vinuela *et al*., 1987. Asymptomatic degenerative disk disease and spondylosis of the cervical spine: MR imaging. Radiology, 164: 83-88.
15. Matsumoto, M., Y. Fujimura, N. Suzuki, Y. Nishi, M. Nakamura, Y. Yabe and H. Shiga, 1998. Mri of cervical intervertebral discs in asymptomatic subjects. J. Bone Joint Surg. Br., 80: 19-24.