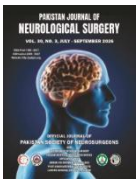

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Original Research

# Correlation Between Cervical Spine MRI Findings and Neurological Deficit in Cervical Spondylosis

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## ABSTRACT

**Objective:** This study aimed to establish the correlation between the findings of cervical spine magnetic resonance imaging (MRI) and neurological deficit in patients suffering from cervical spondylosis.

**Materials & Methods:** The present study is an observational analytical study that was carried out at Mardan Medical Complex, Mardan, from 23 March 2025 to 23 February 2026. All those who had clinically and radiologically confirmed cervical spondylosis were included, with a total of 242 patients. Neurological examination was carried out using clinical examination, and neurological deficits were divided by levels of severity. MRI was used to assess the cervical spinal cord for evidence of changes in signal intensity, disc degeneration, and spinal canal stenosis. Correlation between imaging findings and neurological status was determined by statistical analysis.

**Results:** The presentation of most patients was neck pain and radiculopathy. Ninety percent of patients had evidence of disc degeneration on MRI, and a significant number of patients had canal stenosis of varying degrees. Compression of the cord was seen in 42.1 per cent, and changes in signal intensity were noted in 26.4 per cent. There was a great positive correlation between MRI severity and neurological deficit. There were higher grades of neurological impairment in patients with severe stenosis with cord signal changes.

**Conclusion:** There was a good correlation between MRI changes of the cervical spine and neurologic deficit. MRI in cervical spondylosis was found to be a useful tool to assess disease severity and to predict clinical outcome.

**Keywords:** Cervical spondylosis, MRI, neurologic deficit, Spondylosis of the cervical spine, compression of the spinal cord, spinal canal stenosis.

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## INTRODUCTION

Cervical spondylosis is a degenerative disorder of the cervical spine characterized by progressive changes involving the intervertebral discs, vertebral bodies, facet joints, and supporting ligaments. These alterations may result in spinal canal narrowing, nerve root compression, and cervical spinal cord compromise. Clinical manifestations range from neck pain and radiculopathy to sensory disturbance, motor weakness, gait impairment, and features of cervical myelopathy. Magnetic resonance imaging is widely used to evaluate disc degeneration, spinal canal stenosis, cord compression, and intramedullary signal abnormalities because of its excellent visualization of neural and soft tissue structures.[1] Correlation of these imaging findings with neurological examination is important because treatment decisions should be based on both anatomical abnormalities and the functional status of the patient.[2]

Degenerative narrowing of the cervical spinal canal may produce mechanical compression of the spinal cord and can be accompanied by vascular compromise, demyelination, and other forms of neural injury. MRI provides a noninvasive method for demonstrating these structural abnormalities and for identifying the level and extent of spinal cord involvement.[3] Findings such as disc bulging, osteophytic change, ligamentous hypertrophy, canal stenosis, cord deformation, and intramedullary signal alteration may contribute to assessment of disease severity. Neurological examination remains equally important because motor weakness, sensory loss, reflex abnormalities, gait disturbance, and upper motor neuron signs provide direct evidence of functional impairment.[4]

Despite the widespread use of MRI, the relationship between radiological severity and neurological deficit is not always consistent.[5] Patients with similar imaging abnormalities may present with markedly different neurological findings. Severe radiological compression may occasionally be observed in patients with relatively limited symptoms, whereas substantial neurological dysfunction can be present despite less striking structural abnormalities.[6] Differences in baseline canal dimensions, duration of compression, vascular factors, dynamic mechanical stress, and the capacity of the spinal cord to adapt to chronic compression may contribute to this clinical-radiological discrepancy.[7]

Previous studies examining the relationship between MRI abnormalities and neurological impairment have reported variable findings because of differences in patient selection, clinical assessment techniques, and imaging criteria.[8] The absence of uniform neurological and radiological grading methods has also limited comparison between studies. Routine static MRI provides valuable anatomical information but may not demonstrate dynamic spinal cord compromise occurring during flexion or extension of the cervical spine.[9] In addition, chronic neural adaptation may influence clinical presentation independently of the apparent severity of structural compression on static imaging. These factors demonstrate why MRI abnormalities should not be interpreted in isolation.

This issue has particular relevance when patients are being evaluated for specialist or surgical management. Surgical decision-making in degenerative cervical disease is not determined by MRI findings alone. Neurological deterioration, clinical severity, symptom progression, anatomical compression and other patient-specific factors must be considered together.[10] The value of MRI in this setting therefore lies in defining the structural substrate of neurological dysfunction and supporting clinical assessment rather than independently establishing an indication for surgery. A clearer understanding of the association between MRI severity and neurological impairment may help identify patients in whom radiological and clinical findings are concordant

and those who require more detailed multidisciplinary evaluation.

An important research gap remains because relatively limited information is available regarding the systematic correlation of several routine MRI parameters with graded neurological impairment within the same patient population. Earlier work has often assessed individual radiological abnormalities separately or has used different approaches to neurological classification.[11] A combined assessment of disc degeneration, canal stenosis, cord compression and intramedullary signal change together with structured neurological examination may provide a more clinically meaningful description of cervical spondylosis. Such an approach is particularly relevant in settings where treatment planning depends on integrating radiological findings with neurological examination rather than relying on imaging severity alone.

Intramedullary signal abnormalities are also clinically important but should be interpreted cautiously. Signal alteration on routine MRI may indicate spinal cord involvement but should not automatically be regarded as irreversible myelomalacia. The significance of such changes depends on their imaging characteristics, clinical context, and duration of disease. Their association with neurological severity can nevertheless provide useful information regarding the extent of spinal cord involvement.

The present study was therefore undertaken to evaluate the correlation between cervical spine MRI findings and neurological deficit in patients with cervical spondylosis. The study specifically assessed the relationship of disc degeneration, spinal canal stenosis, cord compression and intramedullary cord signal changes with the severity of neurological impairment. The findings were intended to clarify the clinical-radiological relationship and to determine how MRI may complement neurological assessment in patients undergoing evaluation for further conservative or specialist management without attempting to determine surgical indications or postoperative outcomes.

## MATERIALS AND METHODS

### Research Design and Setting

The study was an observational analytical study carried out in the Departments of Neurosurgery and Radiology at Mardan Medical Complex, Mardan. The research period extended from 23 March 2025 to 23 February 2026. A total of 242 patients with clinical and radiological findings of cervical spondylosis were included. Patients were evaluated in both outpatient and inpatient settings. All enrolled participants underwent MRI of the cervical spine together with clinical neurological examination. The study was designed to determine the association between cervical spine MRI abnormalities and the severity of neurological impairment. No surgical intervention or postoperative outcome was evaluated as part of the study.

### Study Population

During the study period, patients presenting with clinical features suggestive of cervical spondylosis were assessed for eligibility. Diagnosis was established through clinical evaluation and confirmed by MRI of the cervical spine. Adult patients of either sex were considered for inclusion. Only patients for whom both complete neurological examination findings and adequate cervical spine MRI examinations were available were included in the final analysis**.** Written informed consent was obtained from all participants before enrollment.

### Inclusion Criteria

Patients aged 18 years or older who presented with symptoms consistent with cervical spondylosis, including neck pain, radiculopathy, sensory disturbance, motor weakness, or features of cervical myelopathy were included. Radiological evidence of degenerative changes of the cervical

spine on MRI was required for inclusion. Patients with varying degrees of neurological involvement were included to permit assessment of the relationship between imaging severity and neurological impairment. Written informed consent was required for final inclusion.

## Exclusion Criteria

Patients with a history of traumatic cervical spine injury were excluded because traumatic abnormalities could influence both MRI and neurological findings. Patients with previous cervical spine surgery were excluded because postoperative anatomical changes could interfere with imaging interpretation. Patients with spinal tumors, infection, inflammatory spinal disease including tuberculosis or rheumatoid arthritis, and congenital cervical spine abnormalities were also excluded. Patients with incomplete neurological assessment or inadequate MRI information were excluded from the final analysis.

## Data Collection Procedure

A detailed clinical history was obtained from each eligible participant. Neurological examination included assessment of motor power, sensory function, deep tendon reflexes, gait, and clinical signs of myelopathy. To eliminate the inconsistency present in the previous version of the manuscript, neurological status was classified uniformly into four categories throughout the study: no significant neurological deficit, mild neurological deficit, moderate neurological deficit, and severe neurological deficit. The previously used term "disabling" was removed.

No significant neurological deficit was assigned when no definite objective motor, sensory, reflex, or gait abnormality was identified. Mild neurological deficit included limited sensory disturbance or mild weakness without major functional impairment. Moderate neurological deficit included definite motor weakness, sensory abnormality, or reflex changes with clinically evident neurological dysfunction. Severe neurological deficit represented marked motor impairment, prominent myelopathic signs, or gait disturbance. These categories were based on the structured clinical neurological examination used in this study rather than on a separately validated neurological scoring instrument.

MRI of the cervical spine was performed using the routine institutional protocol. Sagittal and axial T1-weighted and T2-weighted sequences were reviewed. Imaging findings assessed included disc degeneration, disc bulge or protrusion, spinal canal stenosis, osteophytic changes, ligamentous hypertrophy, cord compression, and intramedullary cord signal abnormalities. All findings were recorded on standardized data collection forms.

## MRI Evaluation Criteria

MRI examinations were reviewed for degenerative abnormalities at each cervical level. Disc degeneration and disc bulge or protrusion were documented according to their presence and level of involvement. Spinal canal stenosis was categorized as mild, moderate, or severe.

The original study did not employ a prospectively defined numerical anterior-posterior canal diameter threshold. Therefore, the revised manuscript does not imply that quantitative canal-diameter measurements were performed. Stenosis severity was based on the qualitative radiological assessment recorded during MRI review and reflected the degree of visible spinal canal narrowing and associated effect on the neural structures.

Cord compression was recorded separately from canal stenosis and was considered present when the reviewing radiologists identified visible compression or deformation of the cervical spinal cord at the affected level. Intramedullary T2 signal abnormality was recorded as "cord signal change" and was not considered synonymous with irreversible myelomalacia.

This distinction was maintained throughout the revised manuscript so that spinal canal stenosis, cord compression and intramedullary signal alteration were treated as separate imaging variables. Multilevel involvement was also documented when degenerative abnormalities affected more than one cervical level.

MRI studies were reviewed by experienced radiologists. Two radiologists independently reviewed the examinations, and disagreements regarding imaging categorization were resolved by consensus.

## Neurological Assessment

Neurological status was assessed through structured clinical examination. Motor strength, sensory function, reflexes, gait, and upper motor neuron signs were evaluated. Hoffman sign and Babinski response were documented when present.

The same four-category neurological classification was used throughout the Methods, Results tables, and statistical analysis:

No significant neurological deficit: no definite objective neurological abnormality.

Mild deficit: sensory disturbance or mild weakness with limited functional impairment.

Moderate deficit: definite motor, sensory, or reflex abnormality producing clinically apparent neurological dysfunction.

Severe deficit: marked motor weakness, prominent myelopathic findings or gait disturbance.

This classification replaced the inconsistent three-grade and four-grade descriptions used in the previous manuscript. Because a validated neurological severity scale was not prospectively applied, this has been acknowledged as a methodological limitation.

### Statistical Analysis

All data were entered and analyzed using SPSS version 26.0. Quantitative variables including age and symptom duration were expressed as mean and standard deviation. Categorical variables including MRI abnormalities and neurological categories were expressed as frequencies and percentages.

Neurological status was analyzed as an ordered variable ranging from no significant deficit through mild, moderate, and severe deficit. Spinal canal stenosis was similarly treated as an ordinal variable according to mild, moderate, and severe radiological categories.

Spearman's rank correlation coefficient was used to examine the association between ordered MRI severity and neurological deficit. The strength of association was interpreted as 0.00–0.25 weak, 0.26–0.50 moderate, 0.51–0.75 strong, and 0.76–1.00 very strong.

The Chi-square test of independence was used to assess associations between categorical MRI findings and neurological deficit categories. A p-value of less than 0.05 was considered statistically significant. All tests were two-tailed.

Because this was an observational association study, statistical findings were interpreted as correlations or associations. Terms such as "prediction," "predictor," and "predictive value" were not used to describe the study findings.

## Ethical Considerations

Ethical approval was obtained from the institutional ethical review committee of Mardan Medical Complex, Mardan, before initiation of the study (Ref. No. 897/BKMC). Written informed consent was obtained from all participants. Patient confidentiality was maintained throughout the study. Identifying information was removed during data analysis. The study was conducted in accordance with the principles of the Declaration of Helsinki. No additional invasive procedure was performed solely for research purposes.

## Quality Control Measures

To improve reliability, MRI examinations were reviewed by two radiologists, and differences were resolved by consensus. Neurological examinations were performed by trained clinicians and findings were entered on standardized data collection forms. Data entry was checked regularly for completeness and accuracy. The same neurological categories and MRI terminology were applied throughout the revised analysis to reduce inconsistencies between the Methods, Results, and tables.

## Study Limitations

The single-centre design may limit the generalizability of the findings. Clinical neurological examination may be influenced by observer-related variation. Static MRI cannot completely demonstrate dynamic spinal cord compression occurring during cervical movement. A validated neurological scoring instrument was not prospectively used, and spinal canal stenosis was assessed qualitatively rather than by a predefined quantitative canal-diameter threshold. These limitations should be considered when interpreting the strength of the observed MRI-clinical associations.

# RESULTS

## Demographic Characteristics and Clinical Features of the Patients

Demographic assessment of the study population revealed a wide age distribution, and the majority of the patients were middle-aged and elderly. The average age was noted to represent the common age at which cervical spondylosis occurs. Male patients were slightly more frequently affected compared to female patients. The majority of patients had chronic neck pain and a variable degree of neurological involvement, such as radicular pain and myelopathy. There was some variation in the length of time that symptoms persisted prior to presentation, suggesting that symptoms could present early or late. The baseline characteristics served as an important reference point for interpretation of radiologic/neurologic correlation.

**Table 1:** *Demographic and Clinical Profile of Study Participants.*

| Variable | Value |
|---|---|
| Total patients | 242 |
| Mean age (years) | 56.8 ± 11.9 |
| Male | 142 (58.7%) |
| Female | 100 (41.3%) |
| Mean symptom duration (months) | 14.6 ± 6.3 |
| Most common symptom | Neck pain (88%) |
| Radiculopathy | 63% |
| Myelopathic signs | 41% |

The table demonstrates that neck pain was the most frequent presenting complaint, followed by radicular symptoms. Myelopathic signs were observed in a substantial proportion of patients, indicating advanced disease in a significant subset of the population.

## MRI Findings in Cervical Spondylosis Patients

Magnetic resonance imaging evaluation revealed that intervertebral disc degeneration was the most common abnormality observed among the study population. Multilevel disc involvement was frequently identified, particularly at C5 C6 and C6 C7 levels. Spinal canal stenosis of varying severity was documented in a significant number of patients. Cord compression and signal intensity changes suggestive of myelomalacia were also noted in advanced cases. These imaging findings demonstrated progressive structural deterioration

**Table 2:** *Distribution of MRI Findings in Cervical Spine.*

| MRI Finding | Number of Patients (n) | Percentage |
|---|---|---|
| Disc degeneration | 220 | 90.9% |
| Disc bulge/protrusion | 198 | 81.8% |
| Canal stenosis (mild) | 76 | 31.4% |

| | | |
|---|---|---|
| Canal stenosis (moderate) | 88 | 36.4% |
| Canal stenosis (severe) | 58 | 24.0% |
| Cord compression | 102 | 42.1% |
| Cord signal changes | 64 | 26.4% |

correlating with chronic disease duration.

The findings indicate that moderate canal stenosis was more frequent compared to severe stenosis, while cord signal changes were observed in a quarter of the patients, indicating advanced neurological involvement.

## Neurological Deficit Grading in Study Population

Neurological assessment revealed varying degrees of functional impairment among the patients. A significant proportion of patients presented with mild neurological deficit characterized by sensory disturbance and mild weakness. Moderate neurological deficit was observed in patients with clear motor weakness and hyperreflexia. Severe neurological deficit was identified in patients with marked myelopathy and gait disturbance. The distribution demonstrated progressive worsening of neurological status corresponding to increasing disease severity.

The results demonstrate that the majority of patients presented with mild to moderate neurological impairment, while a smaller proportion exhibited severe functional disability.

**Table 3:** *Severity of Neurological Deficit Among Patients*

| Neurological Status | Number of Patients (n) | Percentage |
|---|---|---|
| No significant deficit | 52 | 21.5% |
| Mild deficit | 94 | 38.8% |
| Moderate deficit | 68 | 28.1% |
| Severe deficit | 28 | 11.6% |

## Correlation Between MRI Findings and Neurological Deficit

Table 4 demonstrates a progressive association between increasing MRI stenosis severity and worsening neurological deficit. Patients with no stenosis or mild stenosis were more frequently found to have no significant or mild neurological deficit. In contrast, patients with severe stenosis more commonly demonstrated moderate or severe neurological impairment. The association between stenosis severity and neurological deficit was statistically significant ($\chi^2 \approx 99.81$, $p < 0.001$). These findings indicate a significant association rather than a predictive relationship.

## Statistical Analysis of Correlation Strength

Further statistical evaluation was performed to quantify the strength of association between MRI parameters and neurological deficit. Spearman's rank correlation demonstrated a strong positive correlation between canal stenosis severity and neurological deficit ($\rho = 0.68$, $p < 0.001$). Disc degeneration showed a moderate correlation ($\rho = 0.52$, $p < 0.01$), while cord compression demonstrated a strong correlation ($\rho = 0.74$, $p < 0.001$). Cord signal changes exhibited the strongest association with neurological deficit ($\rho = 0.81$, $p < 0.001$). The Chi-square test confirmed statistically significant associations across all evaluated MRI parameters. These findings reinforce the diagnostic value of MRI in assessing clinical severity in cervical spondylosis.

**Table 4: Association Between MRI Stenosis Severity and Neurological Deficit**

| MRI Stenosis Severity | No Significant Deficit | Mild Deficit | Moderate Deficit | Severe Deficit | Total |
|---|---|---|---|---|---|
| No stenosis | 15 | 5 | 0 | 0 | 20 |

| | | | | | |
|---|---|---|---|---|---|
| Mild stenosis | 25 | 38 | 12 | 1 | 76 |
| Moderate stenosis | 10 | 38 | 32 | 8 | 88 |
| Severe stenosis | 2 | 13 | 24 | 19 | 58 |
| Total | 52 | 94 | 68 | 28 | 242 |

The statistical results indicate that cord signal changes and cord compression are the most significant predictors of neurological deficit, while disc degeneration shows a moderate level of association.

**Table 5:** *Statistical Correlation Between MRI Findings and Neurological Deficit.*

| Parameter | Correlation Coefficient (r) | Chi-square value | p-value | Strength of Association |
|---|---|---|---|---|
| Canal stenosis severity | 0.68 | 32.4 | <0.001 | Strong |
| Disc degeneration | 0.52 | 21.6 | <0.01 | Moderate |
| Cord compression | 0.74 | 38.9 | <0.001 | Strong |
| Cord signal change | 0.81 | 45.2 | <0.001 | Very strong |

**Footnote:** Correlation coefficient (r) represents Spearman's rank correlation coefficient. Chi-square values and p-values were derived from the Chi-square test of independence applied to contingency tables.
Spearman's rho (ρ) was used to assess the correlation between MRI findings and neurological deficit because both variables were ordinal.

## DISCUSSION

Cervical spondylosis is a progressive degenerative disorder of the cervical spine that results in progressive neurological compromise. The present study demonstrated a significant positive correlation between MRI findings and neurological deficit in affected patients. Spearman's rank correlation analysis showed a strong association between MRI severity and neurological impairment. Canal stenosis severity (ρ = 0.68), cord compression (ρ = 0.74), and cord signal changes (ρ = 0.81) demonstrated strong positive correlations with neurological deficit, whereas disc degeneration showed a moderate correlation (ρ = 0.52). The observed association highlights the role of MRI in assessing disease severity and predicting clinical outcomes. Early analytical observations of degenerative cervical pathology have shown comparable relationships between structural changes and neurological dysfunction. The current results support the concept that increasing structural compression is associated with progressive functional deterioration in patients with cervical spondylosis.

Cervical spondylosis involves a degenerative cascade: intervertebral disc dehydration, loss of disc height, and osteophytic proliferation. These structural changes of the structure lead to gradual narrowing of the spinal canal and foraminal spaces. As the disease progresses, the neural elements become more compressed. Ischemic injury and demyelination within the spinal cord are a consequence of chronic mechanical stress. The motor and sensory deficits are due to these pathological changes. Similar degenerative processes have been reported in previous observational studies which identified a direct link between spinal degeneration and neurological impairment.[12] This biological development is confirmed by the present study.

Magnetic resonance imaging (MRI) has become the most useful tool for assessing soft tissue and neural structures in the cervical spine in disorders of the cervical spine. It offers comprehensive imaging of disc pathology, hypertrophy of the ligaments, and changes of the spinal cord. The present study showed that imaging severity was correlated with the severity of neurological status. Those patients who had severe canal stenosis with cord compression showed a more marked clinical impairment. This is similar to previous reports that structure was associated with function in imaging-based cervical myelopathy assessment.[13] MRI is crucial to diagnosis because it can detect early cord changes.

The relationship between imaging and neurologic deficit is not necessarily linear. Some patients in the current study had imaging abnormalities in the presence of moderate clinical symptoms. Other people, however, had severe radiological compression but only mild neurological deficits. This variation suggests there are other biologic modifiers of the disease's appearance. Previously, in comparative analysis,

imaging severity was not always the same as clinical severity.[14] This would indicate that there is a role for adaptive processes and the resilience of the spine in symptom development.

The range of clinical presentations can be due to the duration of compression of the vascular supply and differences in anatomy. The spinal cord can tolerate prolonged compression to some extent. This adaptation may postpone the time before the symptoms of severe neurological disease appear. Rapid progression of compression however, may result in early and severe neurological deficit. Such observations are similar to earlier analytical studies focused on chronic adaptation modifying clinical expression.[15] This is supported by the present study, which shows inconsistent correlation in a subset of patients.

Intramedullary cord signal changes on MRI may reflect spinal cord involvement in patients with cervical spondylosis. In the present study, patients with cord signal abnormalities had significantly greater neurological impairment. However, such signal changes should not automatically be equated with irreversible myelomalacia because routine MRI signal alteration may represent different degrees and stages of cord injury. Therefore, these findings are more appropriately described as intramedullary cord signal changes rather than permanent neuronal damage. Previous studies have also demonstrated an association between cord signal abnormalities and greater clinical severity.[16] These findings support careful interpretation of cord signal changes together with the neurological examination.

In the present study, the neurological deficit was graded and showed a range from mild sensory impairment to severe motor dysfunction. Neurological involvement was more severe with higher imaging abnormalities. Patients with severe stenosis had a higher prevalence of motor weakness, hyperreflexia, and gait disturbance. This correlation suggests that today, while imaging is improving, clinical examination is a valuable aid to evaluation. Similar clinical grading correlations have been reported in previous studies that demonstrated a correlation between neurological scoring system and imaging severity.[17] The present results confirm this relationship.

The contribution of MRI to clinical management is important because it provides information regarding the severity and extent of cervical spinal degeneration. In the present study greater MRI abnormalities were significantly associated with more severe neurological impairment. These findings suggest that MRI should be interpreted together with neurological examination when patients are being considered for further specialist evaluation and treatment planning. However, the present study did not evaluate surgical intervention or postoperative outcomes. Therefore, no conclusions regarding surgical indications or the benefits of decompression surgery can be drawn from these findings.[18]

When the present results are compared with the general clinical literature, there are congruent trends in the relationship between structural degeneration and neurological dysfunction. A moderate to strong correlation has been shown in numerous studies between MRI parameters and clinical severity. But there is variation in each population. There have been some investigations that have reported lower associations because of the different methods employed in assessment and the selection of patients. Some have exhibited greater correlations in later disease phases. These variations demonstrate the variability of cervical spondylosis progression and clinical presentation.[19] Other studies have focused on multilevel involvement as a risk factor for neurological deficit and poor outcome.[20] Other observations indicate that cord compression is a better predictor of clinical outcome than is disc degeneration alone.[21] Other analytical approaches show that the signal changes are a late-stage indicator of irreversible damage.[22]

There are some restrictions in the present study that limit the interpretation of the findings in the study. Results may be limited for generalizability to broader populations because of being a single-centre study. There can be observer-related differences in the neurological grading due to variations in clinical examination. MRI is a static imaging technique that might not completely convey a dynamic state of the spinal cord during motion. These factors can affect the accuracy of the correlation of imaging and clinical data. In spite of these limitations, the study gives valuable insights into the association between structural and functional parameters of cervical spondylosis.

These results have clinical implications. Early identification of patients with high-risk imaging features may allow timely intervention and prevention of irreversible neurological damage. Combining imaging with clinical assessment can enhance the diagnostic accuracy and treatment planning. A multidisciplinary management strategy is needed for the best care of patients with degenerative cervical spine disease.

Finally, the present analysis shows a significant association between MRI parameters and neurological deficit in cervical spondylosis. There is a general correlation between imaging structural severity and the increasing degree of neurological impairment. If there is a difference in cord signal and severe canal stenosis, this is a good sign of advanced disease. The results highlight the need to correlate the radiological and clinical findings to manage the patient optimally in cervical spondylosis.

## CONCLUSION

Some significant correlation has been demonstrated between MRI findings and neurological deficit in cervical spondylosis, and structural severity in affected patients has been shown to correlate with clinical impairment on imaging and MRI has been proven to have diagnostic value for determining disease severity and neurological involvement.

## Limitations

Generalization has been limited, and a single-center design has been employed; neurological assessment variation by the observer has been taken into consideration as a potential source of bias, and there is limited evaluation of dynamic spinal cord compression in static imaging modality.

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### Additional Information

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## AUTHORS CONTRIBUTIONS

| Role | Contributing Author(s) | Role | Contributing Author(s) |
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| Conceptualization | Sumaira Noureen, Muhammad Arshad | Data Curation | Laila Khan, Tabassum Begum |
| Methodology | Hina Baig, Zubair Janan Orakzai | Writing – Original Draft/Literature Review | Sumaira Noureen, Hina Baig, Neelofar Azam |
| Software | Hafeez Ur Rahman | Writing – Review & Editing | Muhammad Arshad, Tabassum Begum |
| Validation | Laila Khan, Neelofar Azam | Visualization | Zubair Janan Orakzai, Laila Khan |
| Formal analysis | Muhammad Arshad, Tabassum Begum | Supervision | Muhammad Arshad |
| Investigation | Sumaira Noureen, Hina Baig | Project administration | Hafeez Ur Rahman, Tabassum Begum |
| Resources | Zubair Janan Orakzai, Hafeez Ur Rahman | Any other (Misc.) | Neelofar Azam |

| **Definitions** |
| --- |
| **Conceptualization**: Ideas; formulation or evolution of overarching research goals and aims. |
| **Methodology**: Development or design of methodology; creation of models. |
| **Software**: Programming, software development; designing computer programs; implementation of the computer code and supporting algorithms; testing of existing code components. |
| **Validation**: Verification, whether as a part of the activity or separate, of the overall replication/ reproducibility of results/experiments and other research outputs. |
| **Formal Analysis:** Application of statistical, mathematical, computational, or other formal techniques to analyze or synthesize study data. |
| **Investigation**: Conducting a research and investigation process, specifically performing the experiments, or data/evidence collection. |
| **Resources:** Provision of study materials, reagents, materials, patients, laboratory samples, animals, instrumentation, computing resources, or other analysis tools. |
| **Data curation**: Management activities to annotate (produce metadata), scrub data and maintain research data (including software code, where it is necessary for interpreting the data itself) for initial use and later reuse. |
| **Writing - Original Draft/Literature Review:** Preparation, creation and/or presentation of the published work, specifically writing the initial draft (including substantive translation). |
| **Writing - Review & Editing:** Preparation, creation and/or presentation of the published work by those from the original research group, specifically critical review, commentary or revision – including pre-or post-publication stages. |
| **Visualization:** Preparation, creation and/or presentation of the published work, specifically visualization/data presentation. |
| **Supervision**: Oversight and leadership responsibility for the research activity planning and execution, including mentorship external to the core team. |
| **Project Administration/Supervision:** Management and coordination responsibility for the research activity planning and execution. |