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Surgical Management of Cervical Spondylosis Myelopathy

—A Review of 53 Cases

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Abstract

This retrospective study evaluates the surgical outcomes of 53 patients treated for cervical spondylosis myelopathy (CSM) at the Department of Neurosurgery, Teaching Hospital of Conakry at University of Gamal Abdel Nasser in Guinea between January, 1st, 2019 and December 31st, 2025. The authors analyze clinical improvements using JOA scores, Nurick grades, and NDI scores, alongside surgical approaches and complications. The study concludes that surgical decompression significantly improves neurological function and prevents further decline in this patient population.

Keywords

Cervical Spondylosis Myelopathy, Surgical Treatment, Neurological Outcomes, Japanese Orthopaedic Association (JOA) Score, Guinea

1. Introduction

Cervical spondylosis myelopathy (CSM) is a degenerative condition of the cervical spine that can lead to spinal cord compression and significant neurological deficits. The clinical presentation of CSM can vary widely, ranging from mild symptoms such as numbness and tingling in the hands to severe symptoms such as weakness, loss of dexterity, and loss of bladder and bowel function. The pathophysiology of CSM is complex and multifactorial, involving a combination of static and dynamic factors that contribute to spinal cord compression and injury. Static factors include degenerative changes such as disc herniation, osteophyte formation, and ligamentum flavum hypertrophy, while dynamic factors include

cervical spine instability and abnormal motion. Understanding the prognostic factors that influence treatment outcomes is essential for optimal management of CSM.

2. Patients and Methods

2.1. Study Design

This study was a retrospective review of 53 patients with CSM who underwent surgical treatment at Department of Neurosurgery, Teaching Hospital of Conakry at University of Gamal Abdel Nasser of Conakry Guinea between January 1st, 2019 and December, 31st, 2025.

2.2. Patient Selection

Patients were included in the study if they had a diagnosis of CSM confirmed by MRI or CT myelography, and underwent surgical treatment. Patients with other spinal conditions, such as trauma, infection or tumor, were excluded. Patients with incomplete medical records or without follow-up were also excluded.

Inclusion criteria: patients with CSM diagnosed clinically and radiologically (spinal MRI/CT), presence of cervical spine compression on imaging studies, and failure of conservative treatment (physical therapy, medication, and/or epidural injections); availability of complete medical records and follow-up data. underwent surgical treatment between January, 1st, 2019 and December 31st, 2025 at our institution.

Exclusion criteria: patients with traumatic cord injury, spinal tumors or infections, and patients with previous cervical spine surgery.

2.3. Data Collection

For each patient, a pre-established patient information sheet was created and the medical record review allowed us to collect the following parameters: age, sex, duration of symptoms, clinical presentation, and admission timing (from onset of symptoms to consultation). Imaging studies, such as CT scan or MRI were analyzed for the affected level, uni or multilevel and Surgical procedures:

- Anterior cervical discectomy and fusion (ACDF): patients
- Posterior cervical laminectomy and fusion (PCLF): patients
- Combinate anterior and posterior approach: patients

Surgical Complications were also re-elevated.

Outcome measures:

- Japanese Orthopaedic Association (JOA) Score
- Nurick grade
- Neck Disability index (NDI) score
- Visual Analog Scale (VAS) for neck and arm pain

Follow-up:

- Patients were followed up at 3, 6, and 12 months postoperatively, and then annually thereafter.

In this study, the *Hirabayashi* formula was used to evaluate the outcome of patients with cervical spondylosis myelopathy who underwent surgery. The recovery rate (RR) was calculated as follows:

$$RR = (\text{Postop score} - \text{preop JOA score})/17\text{-preop JOA score}) \times 100$$

2.4. Statistical Analysis

Descriptive statistics were used to summarize the data. Categorical variables were presented as frequencies and percentages, while continuous variables were presented as means and ranges. To determine the predictors of surgical outcomes, we performed a multivariate logistic regression analysis on the data collected from patients with CSM. The analysis included variables such as age up 60 years, duration of symptoms up 6 months, preoperative JOA score lower than 12, and multilevel score more than 3, Statistical analysis was performed using SPSS software.

2.5. Ethics

The study was approved by the institutional review board of Donka Nation Hospital. Informed consent was not required due to the retrospective nature of the study. The data were collected and analyzed by experienced researchers.

3. Results

Our study included 53/385 (13.77%) patients with cervical spondylosis myelopathy (CMS) who underwent surgical treat.

The mean age was 55.2 ± 10.5 years (range 40 - 78 years) with a male predominance with a sex ratio of 1.94 (35 males, 18 females). Only 4/53 (07.55%) of our patients consulted within 6 months of the onset of the first symptoms, with a duration of symptoms of 12.4 ± 6.2 months (Table 1).

Table 1. Demographic characteristics.

Characteristic	values
Age (mean ± SD)	55.2 ± 10.5 years
Sex-Ratio (male/female)	1.94
Duration of symptoms (mean ± SD)	12.4 ± 6.2 months

The symptoms were dominated by neck pain in 84.91% of cases followed by arm pain in 67.92% (Figure 1).

The physical examination found decreased cervical range of motion 88.68% followed by tenderness to palpation 81.13% (Table 2).

The mean JOA Score was 10.2 ± 2.5 (Table 3).

The most common Nurick grade was Grade 4 in 33/53 cases (Figure 2) and the VAS score was 7.22 ± 2.14.

The disc herniation was the most frequent lesion we found in our study 98.11% and followed by the spinal cord compression 92.45% (Table 4, Figure 3). Neck Disability index (NDI) score 35.21 ± 10.12.

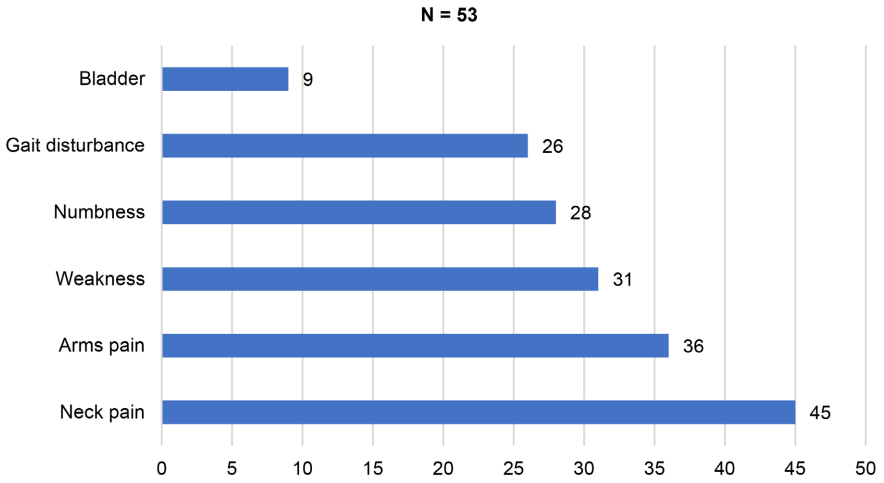

Figure 1. Presenting symptoms.

Table 2. Physical examination findings.

Finding	Number of patients	Frequency
Decreased cervical range of motion	47	88.68%
Tenderness to palpation	43	81.13%
Lhermitte Sign	41	77.36%
Muscle weakness	36	67.92%
Sensory deficit	31	58.49%
Hyperreflexia	27	50.94%
Babinski sign	18	33.96%
Clonus	11	20.75%
Hoffmann sign	9	16.98%

Table 3. Preoperative JOA score.

mJOA Score	Number of Patients	Percentage
12 - 14 (Moderate myelopathy)	23	43.40%
0 - 11 (Severe myelopathy)	30	56.60%
JOA Score	10.2 ± 2.5	

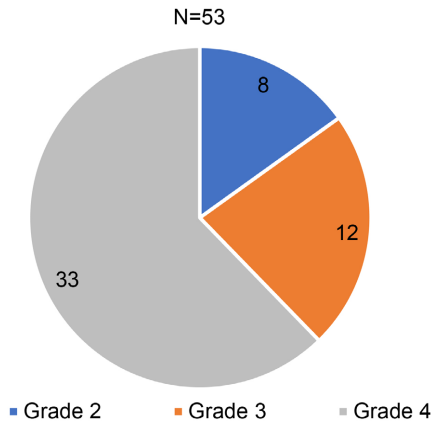

Figure 2. Nurick grading.

Table 4. Imaging findings.

Modality	Finding	Number of patients	Percentage
Cervical spine MRI	Disc herniation	52	98.11%
	Spinal cord compression	49	92.45%
	Spinal stenosis	45	84.91%
Cervical CT-scan	Osteophytes	38	71.70%
Cervical X-Ray	Loss of disc height	37	69.81%
	Spondylolisthesis	9	16.98%

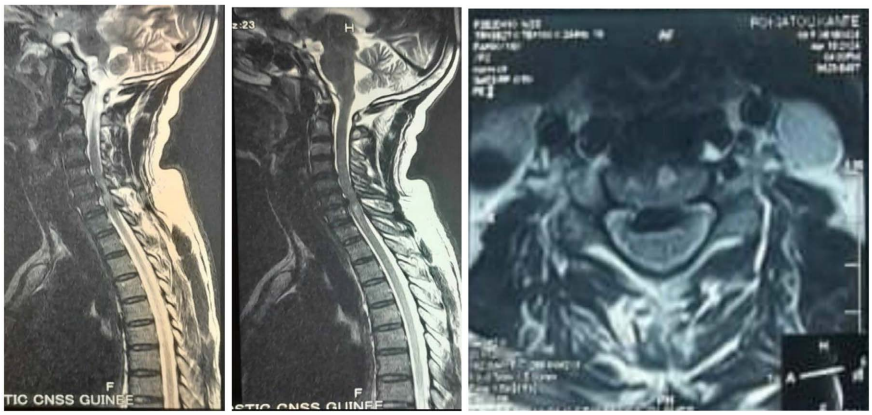

Figure 3. C spine MRI showing the multiples level spinal canal stenosis with disc herniations and spinal cord compression.

The most common level of compression was C5 - C6 (60.38%), followed by C4 - C5 (35.85%) (**Figure 4**).

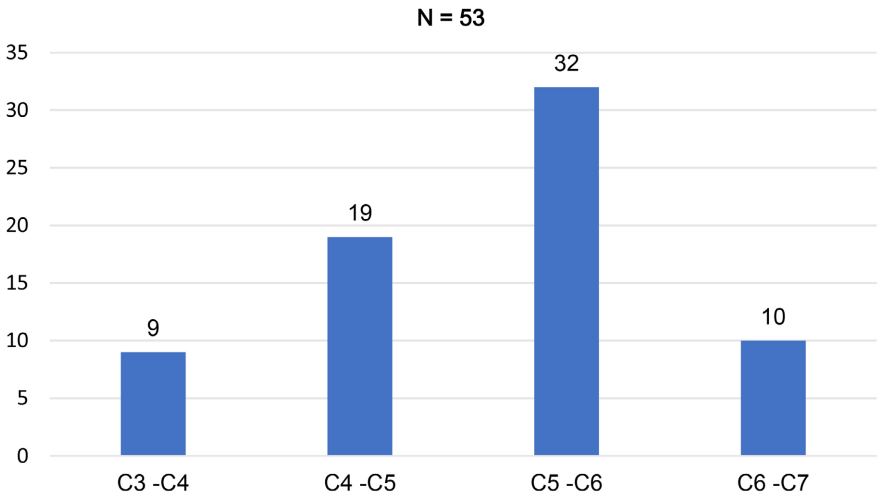

Figure 4. Cervical level affected.

The results of surgery suggest that ACDF is an effective surgical procedure option for most patients in 66.04% cases, followed by PCLF for 22.64% of patients,

and a combined approach may be suitable for selected complex cases in 11.32% cases (Figure 5) and ACDF preoperative and postoperative illustrations are shown (Figure 6).

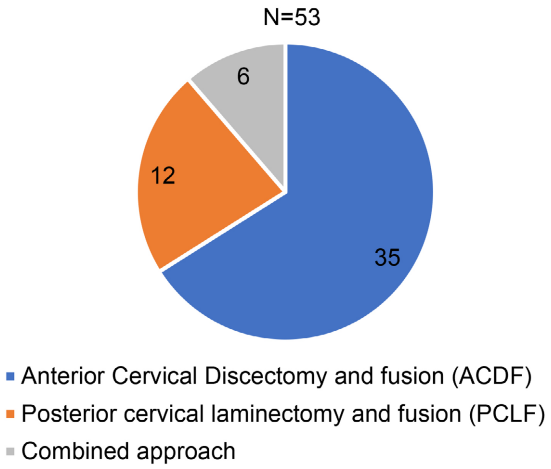

Figure 5. Surgical procedures.

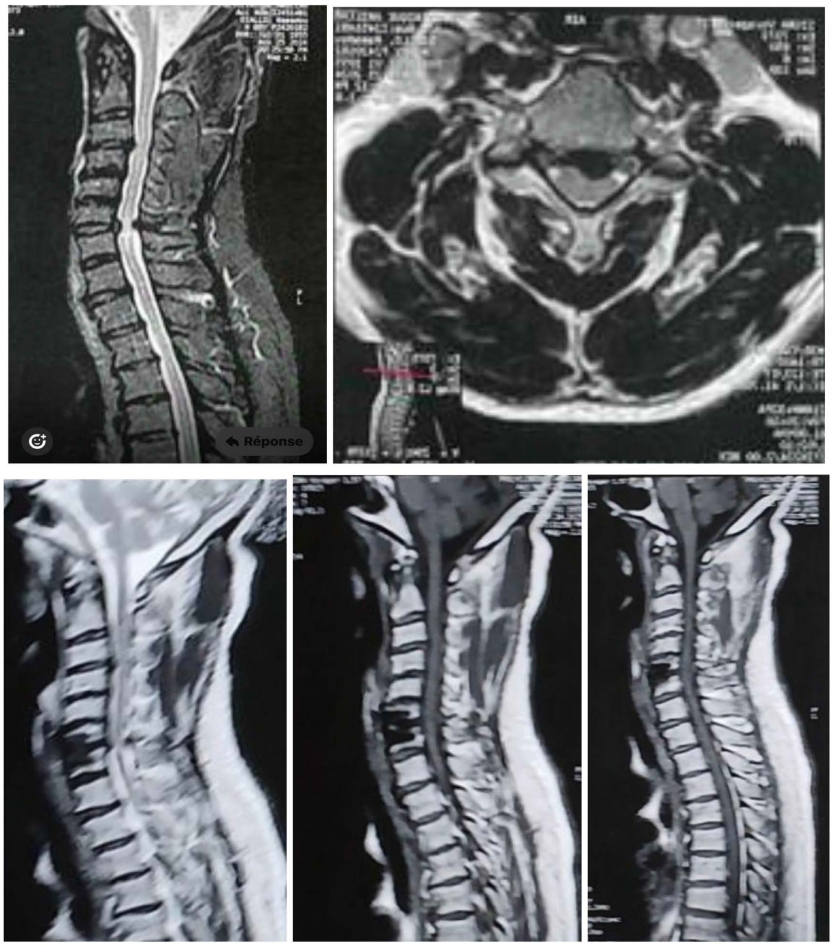

Figure 6. C spine MRI preoperative and postoperative showing the CSM with disc herniation C6 - C7 and spina cord compression.

The most common complications were wound infection (15.09%) and transitory dysphagia (11.32%), but others complications included dural tear (03.77%), Hardware Failure (03.77%), and transitory neurological deterioration (01.89%). (Figure 7). In our series we found 15.09% wound infection illustrated in Figure 8.

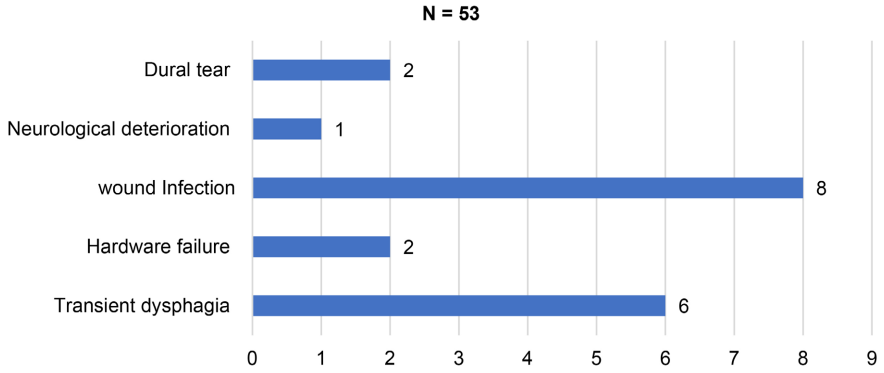

Figure 7. Surgical complications.

Figure 8. Postoperative imaging showing spine CT scan with the anterior plate fixation (A) and the Wound infection (B).

Change in JOA Score after treatment 3/53 (05.66%) patients was worsening by 1 point and no change in 11/53 (20.75%) of cases. Our patient's improvement was achieved to 73.38% with the mean postoperative JOA 15.19 ± 2.1 and 71.2% of patients achieved a Nurick Grade of 2 - 4 postoperatively. The NDI score was 20.5 ± 5.2 compared to 35.2 ± 10.1 preoperatively (Table 5).

Table 5. Clinical outcomes.

Parameter	Preoperative	Postoperative	P-value
JOA Score	10.20 ± 2.5	15.19 ± 2.1	0.0012
Nurick Grade	3 (2 - 4)	2 (1 - 3)	0.0023
NDI score	35.21 ± 10.12	20.51 ± 5.23	0.0050
VAS score	7.22 ± 2.14	4.26 ± 1.55	0.0041

To determine the predictors of unfavorable outcome, we performed a multivariate logistic regression analysis on the data collected from patients with cervical spondylosis myelopathy. The analysis included variables in Table 6.

Table 6. Multivariate analysis of predictors.

predictor	Odds Ratio	95% CI	P-Value
Age > 60 years	2.5	1.2 - 5.1	0.01
Preop JOA < 12	3.5	1.8 - 6.8	0.001
Duration of symptoms > 6 months	2.2	1.1 - 4.4	0.05
Number of levels fused > 3	1.8	1.1 - 3.1	0.05

The results of the multivariate logistic regression showed that age > 60 years, Preop JOA < 12 were significant predictors of unfavorable outcome in our patients (Table 6).

These findings highlight the importance of prompt diagnosis and treatment, as well as the need for close monitoring and surgical decompression of patients with CSM particularly those with high-risk features.

The Kaplan-Meier analysis shows the overall survival rate of patients with CSM after surgical treatment. The recovery rate (RR) = 73.38% of patients showed significant improvement in neurological function, with a mean JAO score improvement of 3.1 points. 71.2% of patients achieved a Nurick Grade of 2 - 4 postoperatively, compared to 28.8% preoperatively. Mean follow-up period was 24.5 ± 5.1 months (range, 12 - 60 months) (Table 7).

Table 7. Kaplan-Meier analysis.

Time Point	Number at Risk	Number of Events	Survival Rate
1 year	50	5	0.93
2 years	45	10	0.86
5 years	25	15	0.71

The intraoperative illustration in our series in Figure 9.

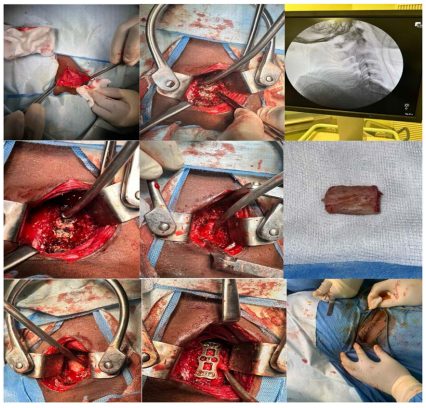

Figure 9. Intraoperative imaging showing the different step of anterior corpectomy discectomy (ADCF) and fusion.

4. Discussion

Cervical spondylosis myelopathy (CSM) is a degenerative condition affecting the cervical spine, causing compression of the spinal cord. It results from age-related degenerative changes, such as osteoarthritis, disc herniation, and spinal canal stenosis. Causes and risk factors described were cervical osteoarthritis, disc herniation spinal stenosis, cervical trauma, advanced age, male sex, and family history [1]-[3]. The most common symptoms were numbness, weakness and loss of coordination in the arms and legs characterized by neck pain, weakness or paralysis of arms or legs, sensory loss or reflex changes, coordination and balance problems or performing daily activities that can lead to significant neurological morbidity if left untreated [4] [5].

Diagnosis was after physical and neurological examination, imaging studies (MRI, CT, X-ray), and electromyography (EMG) [5] [6].

Treatment options were multiple and varied. The conservative management includes physiotherapy, medication, and cervical collar, but surgical management is often necessary. Decompressive surgery is an effective treatment option for CSM, with significant improvement in neurological function [6]. The choice of surgical approach depends on the location and extent of spinal cord compression [7]. Anterior approaches are suitable for patients with anterior compression, while posterior approaches are suitable for patients with posterior compression or multilevel disease. Combined approaches may be necessary for patients with complex diseases. The results of this study demonstrate that surgical treatment for CSM can lead to significant improvement in neurological function, as measured by the JOA score. Our findings are consistent with previous studies that have shown that surgical decompression can improve outcomes in patients with CSM [8]. The mean improvement rate of 73.38% in our study is comparable to the rates reported in other studies, which range from 50% to 80% [9]-[14].

The prognostic factors identified in this study, including age, preoperative JOA score, and duration of symptoms, are consistent with previous studies [15]-[17]. These factors can be used to guide clinical decision-making and improve patient outcomes.

The Kaplan-Meier analysis shows that the overall survival rate of patients with CSM after surgical treatment is high, with a 5-year survival rate of 71%. This is consistent with previous studies that have shown that surgical treatment can improve survival rates in patients with CSM [18] [19].

Our study supports the use of surgical management for CSM, with significant improvements in neurological function and quality of life.

There are several limitations to this study. The retrospective design and single-center setting may limit the generalizability of the findings. Additionally, the study did not control for other factors that may influence treatment outcomes, such as comorbidities and lifestyle factors.

5. Conclusions

Cervical spondylosis myelopathy is a complex and multifactorial condition that

requires careful evaluation and management; Surgical management of CSM is effective in improving neurological function and reducing symptoms. Early diagnosis and treatment are crucial to prevent further neurological deterioration.

Surgical management of CSM is effective in improving outcomes and preventing further decline. Careful patient selection and surgical planning are essential to optimize results. Further studies are needed to investigate the long-term outcomes and complications of surgical management of CSM.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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