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Contribution of Magnetic Resonance Imaging to the Diagnosis of Slow Spinal Cord Compression at the University Hospital of Kati

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Abstract

Introduction: Slowly progressive spinal cord compression results from the development of an expansile lesion within the spinal canal and constitutes a neurosurgical emergency. Magnetic resonance imaging (MRI) is the reference imaging modality for its diagnosis. This study aimed to assess the contribution of MRI to the etiological diagnosis of slowly progressive spinal cord compression at Kati Hospital. **Materials and Methods:** We conducted a retrospective descriptive study over a one-year period, from September 2024 to August 2025. All patients referred for spinal MRI in whom a diagnosis of slowly progressive spinal cord compression was established were included. MRI examinations were performed using a 1.5-T Fujifilm MRI scanner installed in 2024. **Results:** During the study period, 64 cases of slowly progressive spinal cord compression were identified among 364 MRI examinations, yielding a frequency of 17.6%. The mean age of the patients was 49.4 years (range: 11 - 84 years). The most affected age groups were 50 - 59 and 60 - 69 years. There was a marked male predominance (75%), with a male-to-female ratio of 3:1. Radicular pain was the most common indication for MRI. The cervical spine was the most frequently involved region (45.3%). Extradural lesions accounted for 93.6% of cases. Degenerative disorders were the leading etiology (53.1%), followed by neoplastic and infectious lesions (23.4% each). Among neoplastic lesions, metastases were the predominant cause (60%), whereas infectious lesions were mainly represented by spondylodiscitis. Spinal cord compression was associated with MRI evidence of spinal cord injury in 56.2% of patients.

Conclusion: Degenerative disorders, particularly intervertebral disc herniation, were the leading causes of slowly progressive spinal cord compression, followed by tumors and infectious, which predominantly involved the extradural compartment.

Keywords

Slowly Progressive Spinal Cord Compression, Magnetic Resonance Imaging, Etiological Diagnosis

1. Introduction

Slow spinal cord compression is a pathological process resulting from mechanical and/or vascular mechanisms that lead to a progressive deterioration of spinal cord function, ultimately resulting in flaccid paraplegia or tetraplegia and potentially progressing to myelomalacia [1]. It represents a neurosurgical emergency requiring early diagnosis and prompt decompression to prevent irreversible neurological deficits [2].

Magnetic resonance imaging (MRI) is the gold standard imaging modality. It allows accurate diagnosis, precise topographic localization, and etiological characterization of compressive lesions, thereby guiding therapeutic management [3].

In addition to degenerative conditions, which are the most common etiologies [4], tumoral causes predominate in developed countries [5] [6]. In sub-Saharan Africa, several studies have reported a predominance of infectious etiologies [7] [8], whereas others have described a higher frequency of tumoral lesions [9].

In this study, we report our experience from a series of 64 patients.

The aim of this study was to evaluate the role of MRI in the diagnosis of slow spinal cord compression at University Hospital "Pr BSS" of Kati by determining its frequency, etiological spectrum, and associated complications.

2. Materials and Methods

This was a retrospective and descriptive study conducted over a one-year period from September 2024 to August 2025 in the MRI unit of the Department of Medical Imaging at University Hospital "Pr BSS" of Kati.

The study included patients of all ages and both sexes who underwent spinal MRI examinations at our department.

Slowly progressive spinal cord compression was defined as a non-traumatic neurological condition with an insidious or progressive onset, associated with clinical manifestations suggestive of spinal cord involvement and MRI evidence of a compressive lesion affecting the spinal cord or other intraspinal neural structures.

Clinical features considered suggestive of spinal cord compression included one or more of the following: persistent or progressive spinal pain, radicular pain, progressive motor deficit, sensory disturbances, gait impairment, pyramidal signs,

and sphincter dysfunction.

MRI criteria included the identification of a spinal lesion or structural abnormality causing narrowing of the spinal canal, compression, deformation, or displacement of the spinal cord, with or without obliteration of the perimedullary cerebrospinal fluid spaces and associated spinal cord signal abnormalities.

Patients were included if they:

- underwent spinal MRI during the study period;
- presented with clinical and/or radiological findings consistent with slowly progressive spinal cord compression;
- had complete and interpretable clinical and MRI records.

Patients with acute traumatic spinal cord compression, sudden-onset neurological symptoms, non-compressive spinal cord disorders (such as myelitis or vascular myelopathy), or incomplete or non-interpretable MRI examinations were excluded.

MRI examinations were performed using a FUJIFILM 1.5 Tesla high-field MRI system. Standard sequences included T1-weighted, T2-weighted, and T2 STIR (Short Tau Inversion Recovery) sequences, systematically performed in cases of suspected spinal cord compression.

Gadolinium contrast administration was not routinely used. It was performed when clinically indicated and when an infectious, neoplastic, inflammatory, or other pathological process requiring further tissue characterization was suspected.

In patients who did not receive gadolinium, the etiological assessment was based on the combination of lesion morphology, anatomical distribution, signal characteristics on T1- and T2-weighted sequences, fluid-sensitive sequences, diffusion characteristics when available, associated bone and soft-tissue abnormalities, and the presence or absence of spinal cord involvement.

When contrast-enhanced sequences were available, the pattern and distribution of enhancement were assessed, including peripheral, homogeneous, heterogeneous, or leptomeningeal enhancement, according to the suspected etiology.

Imaging was primarily acquired in sagittal planes, with axial sequences obtained in areas of interest.

Etiological diagnoses were primarily established based on the MRI findings, taking into account the location of the lesion, its relationship with the spinal cord and surrounding structures, signal characteristics on different MRI sequences, enhancement patterns when contrast administration was performed, and associated bone, discal, epidural, or paravertebral abnormalities. MRI findings were interpreted in conjunction with the available clinical information and laboratory data when available.

The etiological diagnosis was based on characteristic imaging features and the overall clinicoradiological correlation.

Data were collected retrospectively from MRI reports, the MRI unit registry, archived imaging studies, and a standardized data collection form.

Variables analyzed included age, sex, clinical indication, imaging findings, eti-

ological diagnosis, and associated spinal cord complications. Data were processed using Microsoft Excel 2016 and analyzed using Epi Info version 7. Confidentiality and patient anonymity were strictly maintained.

Ethical Considerations

Approval for this study was obtained from the administration of Kati University Hospital. All patient records were handled confidentially and anonymized.

3. Results

During the study period, 364 spinal cord MRI examinations were performed, among which 64 cases were diagnosed with spinal cord compression, corresponding to a frequency of 17.6%.

The mean patient age was 49.4 years (range: 11 - 84 years). The most affected age groups were 50 - 59 years and 60 - 69 years (Figure 1).

Males predominated (n = 48), with a sex ratio of 3:1. Radicular pain was the most common indication for MRI referral (40.6%, n = 26).

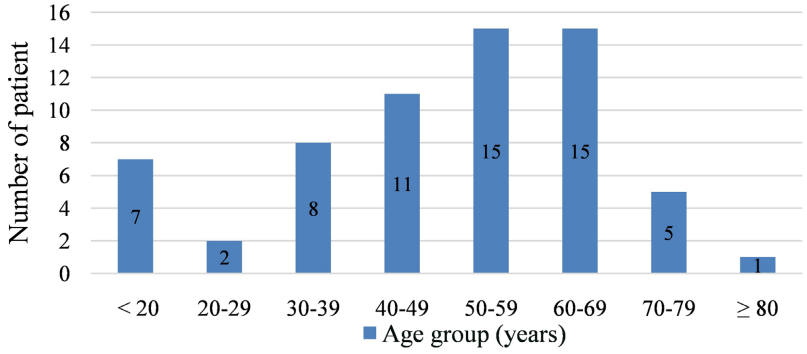


Figure 1. Distribution of patients by age group (n = 64).

All our patients benefited from the sequences: sagittal (T1, T2) and axial T2. Among them 54% received an intravenous injection of the gadolinium.

The cervical spine was the most frequently involved level (45.3%, n = 29), followed by the thoracic spine (35.9%, n = 23) (Table 1). The extradural compartment was predominantly affected (93.7%, n = 60) (Table 2).

Degenerative etiologies were the most frequent (53.1%, n = 34) (Figure 2). Disc herniation accounted for 64.7% of degenerative lesions (n = 22).

Table 1. Distribution of spinal level involvement.

Spinal level	Number	Percentage
Cervical	29	45.3%
Thoracic	23	35.9%
Lumbar	8	12.5%
Multiple levels	4	6.2%
Total	64	100%

Table 2. Distribution by spinal canal compartment.

Compartment	Number	Percentage
Extradural	60	93.7%
Intradural extramedullary	04	6.3%
Intramedullary	00	00.0%
Total	64	100.0%

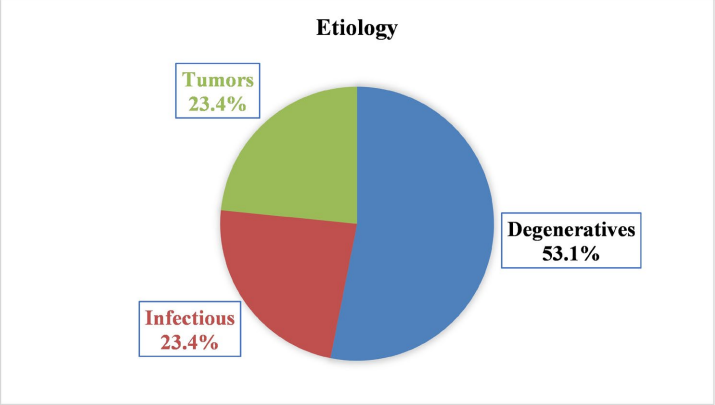


Figure 2. Distribution of etiological groups.

Infectious lesions were mainly represented by spondylodiscitis, whereas tumoral lesions were predominantly metastatic (60%, n = 9) (**Table 3**).

Table 3. Etiological distribution by compartment.

		Compartment		
	Etiology	**Extradural**	**Intradural extramedullary**	**Total**
Degenerative	Disc herniation	22	0	22
	Degenerative spondylosis changes	11	0	11
	Posterior longitudinal ligament ossification	1	0	1
Infectious	Spondylodiscitis	15	0	15
Tumor	Metastatic epidural disease	9	0	9
	Meningioma	0	4	4
	Schwannoma	1	0	1
	Arachnoid cyst	1	0	1
	Total	**60**	**4**	**64**

Spinal cord compression was associated with spinal cord signal abnormalities (myelopathy) in 56.2% of cases, while spinal cord atrophy was observed in 6.2% (**Figure 3**).

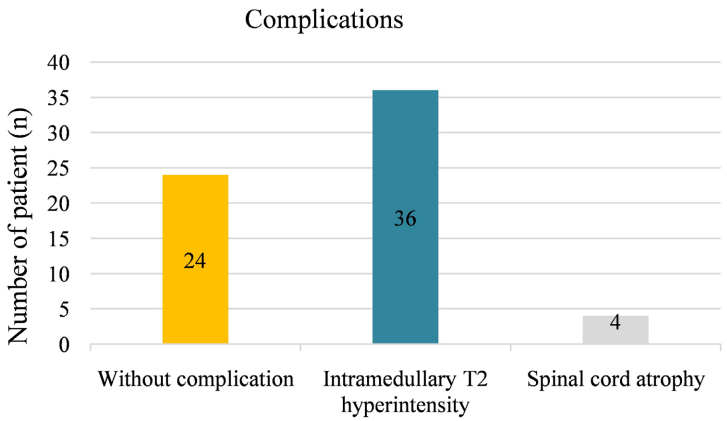


Figure 3. Distribution of spinal cord complications.

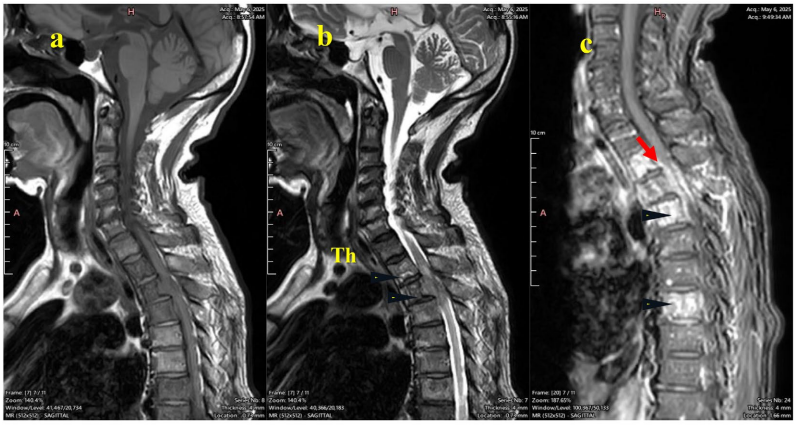


Figure 4. Vertebral metastases. Sagittal T1-weighted (a), T2-weighted (b), and post-contrast T1-weighted (c) MRI.

Figure 4 demonstrates multiple areas of abnormal signal intensity involving the T2, T3, T4, and T7 vertebral bodies, appearing hypointense on T1-weighted SE images and hyperintense on T2-weighted SE images (arrowheads), with avid enhancement following intravenous contrast administration. Soft-tissue infiltration of the epidural spaces from T2 to T4 is also noted (red arrow).

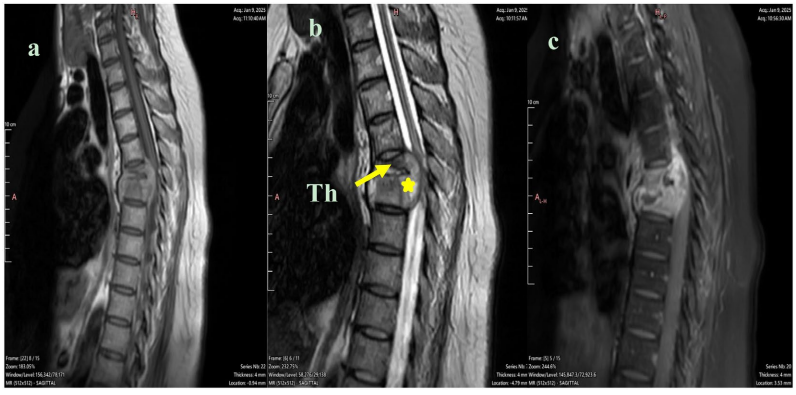


Figure 5. Spondylodiscitis with associated paravertebral abscess. Sagittal T1-weighted (a), T2-weighted (b), and post-contrast T1-weighted (c).

Figure 5 shows an osteolytic lesion of the T5 vertebral body (arrow) demonstrating enhancement on post-gadolinium T1-weighted images, associated with an anterior epidural fluid collection with peripheral enhancement (asterisk), causing spinal cord compression.

4. Discussion

The limitations of this study were:

- Retrospective study: Absence of old results of imaging and histology for operated patients.
- Patients lost to follow-up.

Slow spinal cord compression accounted for 17.6% of all MRI examinations in our series, which is lower than the 30.5% reported by Camara MA *et al.* [9], but higher than the 4.29% reported by Dagbé M *et al.* [7].

The mean age of patients was 49.4 years (range: 11 - 84 years), which is comparable to previous reports (El Ganouni *et al.* [10]: 48 years; Camara MA *et al.* [9] and Kassegne I *et al.* [11]: 53 years). The most affected age groups were 50 - 59 and 60 - 69 years, consistent with published literature [7] [12].

A male predominance was observed (sex ratio: 3), in agreement with most studies [7] [9] [11], although some authors have reported a female predominance [8] [10].

The cervical spine was the most frequently involved region (45.3%), followed by the thoracic spine (35.9%), consistent with previous studies [7] [9]. This predominance may be explained by the high mobility of the cervical spine, making it more susceptible to degenerative changes. However, other studies have reported thoracic predominance [8] [11].

Extradural involvement was predominant (93.7%), which is consistent with most published series [7]-[11].

Degenerative lesions were the most frequent etiologies (53.1%), followed by tumoral and infectious causes (23.4% each). Similar findings were reported by Dagbé M *et al.* [7], whereas other African studies have reported tumoral predominance [11]. These differences may be related to study design, recruitment patterns, and regional epidemiological variations.

Degenerative lesions were mainly represented by disc herniation (64%), followed by degenerative arthropathy (32.2%), consistent with previous reports [7].

Spinal tuberculosis represents a significant proportion of osteoarticular infections, with spinal involvement accounting for 40 - 60% of cases. Neurological complications due to spinal cord compression occur in 5 - 21% of cases [10].

In our study, infectious lesions accounted for 23.4% (n = 15), all corresponding to spondylodiscitis complicated by epidural extension or abscess formation, in agreement with previous African studies [7] [9].

MRI features of spondylodiscitis typically include T2 hyperintensity of the intervertebral disc and adjacent vertebral bodies, with corresponding T1 hypointensity. Paravertebral abscesses demonstrate peripheral rim enhancement after gad-

olinium administration, while epidural extension appears isointense on T1-weighted images and shows enhancement after contrast injection [2] [13].

Extradural tumors were the most frequent tumoral lesions (73.3%), predominantly metastatic disease (81.8%). European studies report that metastatic epidural disease accounts for approximately 90% of extradural tumors and mainly affects elderly patients [5] [6].

Intradural extramedullary tumors were exclusively meningiomas in our series, consistent with the literature [7].

Intramedullary tumors are rare, representing approximately 10% of spinal tumors [14], and were not observed in our study, likely due to sample size limitations.

T2-weighted intramedullary hyperintensity at the level of compression is a key imaging biomarker of spinal cord injury, reflecting myelopathy. It has been widely recognized as a prognostic factor, associated with more severe neurological deficits and poorer postoperative recovery [15]-[17]. In our study, it was observed in 56.2% of cases.

5. Conclusion

Slow spinal cord compression is a relatively frequent condition and represents a true diagnostic and therapeutic emergency. MRI is the reference imaging modality for diagnosis. Etiologies are diverse, with a predominance of degenerative lesions followed by tumors and infectious. MRI provides a comprehensive assessment of lesion level, extent, and nature, thereby guiding appropriate management and enabling postoperative follow-up.

Author Contributions

All the authors contributed to the conduct of this work.

All authors also declare that they have read and approved the final version of the manuscript.

Conflicts of Interest

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

References

[1] Désert, J.F., Bussel. B. and Maury, M. (2001) Traumatic and Medical Spinal Cord Lesions. Editions Frison-Roche. (in French)

[2] Decq, P., Palfi, S. and Ricolfi, F. (1993) Slow Spinal Cord Compressions. Encyclopédie Médico-Chirurgicales, Neurologie, 232. (in French)

[3] Morandi, X., Riffaud, L., Chabert, E., Haegelen, C. and Brassier, G. (2001) Spinal and intraspinal tumors. Encyclopédie Médico-Chirurgicale, Neurologie, 122-125. (in French)

[4] Smith, S.S., Stewart, M.E., Davies, B.M. and Kotter, M.R.N. (2021) The Prevalence of Asymptomatic and Symptomatic Spinal Cord Compression on Magnetic Resonance

Imaging: A Systematic Review and Meta-Analysis. *Global Spine Journal*, **11**, 597-607. https://doi.org/10.1177/2192568220934496

[5] Payer, M. (2008) Spinale Tumoren. Teil 2: Intradural-Extramedulläre Tumoren. *Swiss Medical Forum—Schweizerisches Medizin-Forum*, **8**, 729-733. https://doi.org/10.4414/smf.2008.06604

[6] Braun, M., Anxionnat, R. and Marchal, C. (2003) Spinal Cord and Spinal Imaging. Encyclopédie Médico-Chirurgicale, Neurologie, 1-20.

[7] Dagbe, M., N'timon, B., Gbande, P., Yaye, I., Ntankeu Tankoua, P.P., *et al.* (2023) Apport de l'IRM dans le diagnostic étiologique de la compression médullaire lente à Lomé: à propos de 72 cas. *Journal Africain d'Imagerie Médicale* (*J Afr Imag Méd*), **14**, 275-280. https://doi.org/10.55715/jaim.v14i4.449

[8] Badji, N., Deme, H., Akpo, G., Ndong, B., Toure, M.H., Diop, S.B., *et al.* (2016) Apport de l'irm dans la prise en charge des compressions médullaires lentes non traumatiques. *Pan African Medical Journal*, **24**, Article 221. https://doi.org/10.11604/pamj.2016.24.221.8525

[9] Camara, M.A., N'Diaye, M., Coulibaly, M.B., Traore, M.M., Diarra, H., Toure, B.M., *et al.* (2020) MRI Contribution in the Diagnosis of Non-Traumatic Medular Compressions at the Mali Hospital of about 179 Cases. *Open Journal of Medical Imaging*, **10**, 186-195. https://doi.org/10.4236/ojmi.2020.104017

[10] Cherif Idrissi El Ganouni, N., Khalil, M.R., Hiroual, M.R., El Idrissi, I., Haddi, M., Aït Benali, S., *et al.* (2009) Apport de l'irm dans les compressions médullaires lentes d'origine tumorale et infectieuse. *Feuillets de Radiologie*, **49**, 251-262. https://doi.org/10.1016/s0181-9801(09)72375-9

[11] Kassegne, I., Sakiye, K., Kanassoua, K., Beketi, A.K., Badiane, S.B. and Balogou, K.A.A. (2013) Management of Spinal Cord Compression in Togo. *Médecine et Santé Tropicales*, **23**, 206-210. https://doi.org/10.1684/mst.2013.0177

[12] Diomandé, M., Tano, M., Kouakou, E., Djaha, K., Eti, E. and Kouakou, M. (2015) Myélopathies cervicarthrosiques: Aspects épidémiologiques et cliniques au Centre Hospitalier Universitaire de Cocody à Abidjan, Côte d'Ivoire. *La Revue Médicale de Madagascar*, **5**, 501-504. https://doi.org/10.62606/rmmao00136

[13] Cosnard, G. and Lecouvet, F. (2001) Imaging of the Spine, Meninges, and Spinal Cord. 1st Edition, Masson, 256.

[14] Hachicha, A., Karmani, N., Khrifech, M., Ayedi, K., Abderrahmene, K. and Kallel, J. (2020) Les tumeurs intra-médullaires: Étude multicentrique à propos de 120 cas. *Neurochirurgie*, **66**, Article 341. https://doi.org/10.1016/j.neuchi.2020.04.043

[15] Matsumoto, M., Toyama, Y., Ishikawa, M., Chiba, K., Suzuki, N. and Fujimura, Y. (2000) Increased Signal Intensity of the Spinal Cord on Magnetic Resonance Images in Cervical Compressive Myelopathy: Does It Predict the Outcome of Conservative Treatment? *Spine*, **25**, 677-682. https://doi.org/10.1097/00007632-200003150-00005

[16] Takahashi, M., Yamashita, Y., Sakamoto, Y. and Kojima, R. (1989) Chronic Cervical Cord Compression: Clinical Significance of Increased Signal Intensity on MR Images. *Radiology*, **173**, 219-224. https://doi.org/10.1148/radiology.173.1.2781011

[17] Morio, Y., Teshima, R., Nagashima, H., Nawata, K., Yamasaki, D. and Nanjo, Y. (2001) Correlation between Operative Outcomes of Cervical Compression Myelopathy and MRI of the Spinal Cord. *Spine*, **26**, 1238-1245. https://doi.org/10.1097/00007632-200106010-00012