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Slow Tumor-Related Spinal Cord Compression, Well-Known Diseases with a Worrying Prognosis: Experience of Dakar

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Abstract

Introduction: Slow spinal cord compression refers to the intra- or extra-medullary development of an expansive lesion in the spinal canal. It represents a diagnostic and therapeutic challenge in our setting, sometimes leading to a poor prognosis. In this study, we examine the epidemiological, diagnostic, and therapeutic aspects of slow spinal cord compression in our setting, while identifying prognostic factors. **Patients and Method:** This is a retrospective study conducted over a period of six years, from January 1, 2019, to December 31, 2024. It focused on the medical records of 47 patients who were hospitalized in the neurosurgery department of Fann Hospital in Dakar during the study period. Study parameters included epidemiological, diagnostic, histological, therapeutic, and prognostic factors. **Results:** The average age of our series is 51.06 years, with a predominance of males (63.8%). The time to consultation was greater than 3 months in 78.7% of cases. Neurological examination suggested a picture of slow spinal cord compression, which was confirmed by CT scan in 70.2% of cases and MRI in 78.7%. The predominant location was dorsal (53.19%), followed by dorsolumbar (23.41%) and cervical (23.4%). In this series, 41 patients (87.23%) underwent surgery, while 6 patients (12.77%) did not undergo surgery due to severe deterioration in their clinical condition. Treatment was based on anterior and/or posterior decompression with biopsy or excision, followed by osteosynthesis as indicated. **Conclusion:** Slow tumor compression of the spinal cord is rare in neurosurgical practice in Dakar. Clinical suspicion leads to imaging, particularly MRI, followed by histological analysis of the surgical specimen. The etiologies are dominated by spinal metastases, and the prognosis is guarded given the late consultations and delayed diagnosis fueled by poverty, cultural convictions, and endogenous beliefs.

Key Words: Delayed diagnosis, Prognosis, Slow spinal cord compression, Tumors

Introduction

Slow-Growing spinal cord compression (SGSCC) is caused by several pathological processes originating in the spinal cord or within the spinal canal, compressing the spinal cord and gradually leading to loss of function. Spinal cord injuries result from ischemic and/or compressive mechanisms.[1] In this study, we focus primarily on the neoplastic etiologies of this syndrome, which may be primary or secondary. The symptoms of this pathology are based on a combination of a lesion syndrome indicative of root involvement, a sublesional syndrome indicative of spinal cord damage, and often a spinal syndrome indicative of osteoarticular and ligament damage.[2,5] In Europe, tumor etiology is predominant.[1]

The etiologies of slow tumor-related spinal cord compression (STSCC) are traditionally divided into

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three groups. These are extradural lesions, intradural extramedullary lesions, and intramedullary lesions. The multiplicity of causes, as well as the diversity of location and degree of intensity, explain the symptomatic polymorphism of spinal cord compression.[2,3,6,8]

For investigation, computed tomography (CT) and magnetic resonance imaging (MRI) are generally performed to confirm the diagnosis by specifying the level of the lesion and the nature of the compression. Although MRI has become the predominant method for diagnosis and etiological investigation, CT remains important, especially in cases of spinal (bone) lesions. It continues to perform excellently, even when compared to MRI.[1]

The problem with spinal cord compression is that it can worsen if treatment is delayed, with the possibility of total and irreversible interruption of the spinal cord pathways. The possible reversibility of neurological deficits when they are partial determines the urgency of treatment. Any slow spinal cord compression is therefore a medical and surgical emergency. In this study, we share our experience with STSCC, based on epidemiological, diagnostic, and therapeutic aspects, which we have compared with the data available in the literature.

PATIENTS AND METHOD

This was a retrospective study of a consecutive series of 47 cases hospitalized in the neurosurgery department over a period of 6 years, from January 1, 2019, to December 31, 2024. It focused on the medical records of 47 patients who were hospitalized in the neurosurgery department of Fann Hospital in Dakar during the study period. The parameters studied were epidemiological, clinical-radiological, histological, and therapeutic. The FRANKEL classification was used to classify our patients according to the severity of their neurological signs.[9]

Table: I FRANKEL classification

A: Complete motor and sensory deficit
B: Complete motor deficit and incomplete sensory deficit
C: Weak muscle strength (1 or 2), preserved sensitivity
D: Useful muscle strength (≥ 3), normal sensitivity.
E: Normal neurological examination.

This study includes patients who presented with STSCC, whether primary or secondary, and were hospitalized in the neurosurgery department of Fann University Hospital. All selected patients met our inclusion criteria, namely: clinically detected spinal cord compression syndrome; compression confirmed by medical imaging. The tumoral origin was confirmed by histological examination or strong radiological presumption. We did not include in the study the files of patients who presented with spinal cord compression of non-tumor etiologies, cases of SGSCC not confirmed by medical imaging, or incomplete files.

We used the KoboCollect mobile application to enter the data, which was then analyzed using KoboToolbox statistical software. The graphs were created using Microsoft Excel 2020, the text was entered using Microsoft Word, and the bibliographic references were processed using Zotero software in accordance with Vancouver standards. The study was submitted in advance to the ethics committee for approval, and confidentiality was maintained throughout the study period. Informed consent was obtained from parents and/or guardians for all patients.

RESULTS

During the period of our study, we recorded 47 cases of CML of tumoral origin. In this sample, males were the most affected with 30 patients, or 63.8%, compared to 17 female patients, or 36.2%, and a sex ratio of 1.76 in favor of males. The average age of our sample was 51.06 years, with extremes of 14 and 76 years. The most affected age group was between 50 and 59 years, while the least affected was between 10 and 19 years. The majority of patients (74.4%) were over 40 years of age. Functional impotence (FI) of the lower limbs, associated to varying degrees with low back pain, was the most common reason for consultation, with 37 cases, or 78.72%. The majority of patients (78.7%) consulted a doctor more than three months after the onset of symptoms, 17% consulted between three and 12 weeks after the onset of symptoms, and only 4.3% consulted less than three weeks after the onset of symptoms. For 85.11% of patients, the main reason for the delay in consultation was lack of financial means, and for 57.45%, the delay was not only due to lack of financial means but also because they initially thought it was "witchcraft or a curse (bad spell)."

The medical history was dominated by prostate cancer with 12.7%, tied with high blood pressure (12.7%). This was followed by breast cancer at 8.38%. Other pathologies were found in equal proportions (2.13%). Surgical history was dominated by prostatectomy with 6.38% and prostate adenocarcinoma surgery with 2.13%. Mastectomy and other pathologies were performed in equal proportions.

We found a lesion syndrome in 42 patients (89.36%), and 46 patients (97.87%) had a sublesion syndrome. The latter was clearly dominated by motor disorders (97.87%) of cases, sensory disorders in (70.21%) of patients, as well as genito-sphincter disorders in 59.57% and trophic disorders in 8.51%. Motor disorders were paraparesis in 19.15% of cases, paraplegia in 55.32% of cases, tetraparesis in 8.51% of cases, and tetraplegia in 14.89% of cases (**Table II**).

Table II: Distribution of patients according to motor disorders.

Motor Disorders	STAFF	PERCENTAGE
Paraparesis	9	19.15%
Paraplegia	26	55.32%
Tetraparesis	4	08.51%
Tetraplegia	7	14.89%

Genitourinary disorders included urinary retention, chronic constipation, dysuria, and erectile dysfunction. Trophic disorders were present in 8.51% of cases. These were mainly amyotrophy, and half of the patients had developed pressure sores. Spinal syndrome was found in 21 patients, or 44.68% of cases. A syndrome of general deterioration consisting of asthenia, anorexia, and especially weight loss was found in 11 patients, or 23.4%. FRANKEL grade A was the most common, with 25 cases, or 53.19%. This was followed by FRANKEL grades C and B, distributed as follows: 27.66% and 17.02%, then 2.13% with grade E. (**Table III**)

Table III: Distribution of patients according to FRANKEL score

	STAFF	PERCENTAGE
FRANKEL A	25	53.19%
FRANKEL B	8	17.02%
FRANKEL C	13	27.66%
FRANKEL D	0	0.00%
FRANKEL E	1	2.13%

Biological tests showed anemia in 27.66% of cases and nonspecific inflammatory syndrome (SINS) in 21.28% of cases. Thirty-three patients underwent CT scans of the spine (**Table IV**), representing 70.21% of cases. MRI (**Table V**) was the most commonly requested morphological test among patients. Thirty-seven patients, or 78.72% of cases, underwent spinal MRI. **Fig. 1** and **Fig. 2.a** and **2.b**.

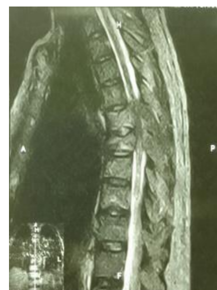

Fig.1: Sagittal T2 spinal MRI: Spinal metastases from breast cancer in a 57-year-old woman.

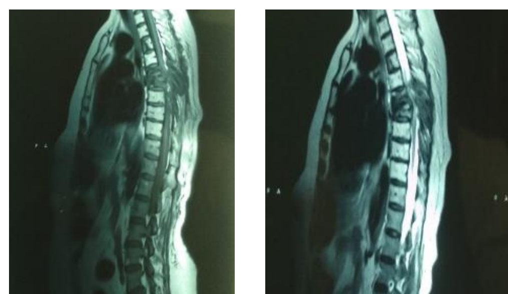

Fig.2: Spinal MRI, T1 and T2 sagittal sequences: Slow spinal cord compression related to an extensive bone tumor from D5 to D4 with vertebral collapse and involvement of the posterior arches.

Table IV: Different types of lesions on CT scans

Type of Lesion	STAFF	PERCENTAGE
Vertebral compression	3	6.38%
Bone lysis	21	44.68%
Geodes	2	4.26%
Total	26	55.32%

Table V: Tumoral lesions on MRI

Signs	STAFF	PERCENTAGE
Vertebral compression	05	10.64%
Lytic process/Epiduritis	23	48.84%
Intramedullary lesions	7	14.89%
Intradural extramedullary lesions	1	2.13%
Total	36	76.5%

Thoracoabdominal pelvic (TAP) CT scans were performed in patients with metastases to search for a primary focus and found prostate lesions in 23.4% of patients. In our study, we noted that the dorsal region was the most affected area, with 53.19%, followed by the dorsolumbar region with 23.41%, and the cervical region in last place with 23.40%. **Fig. 3**

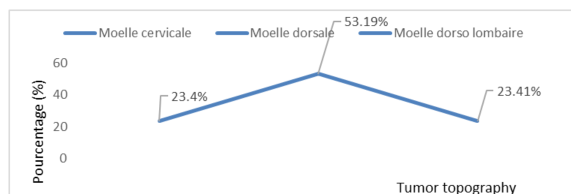

Fig.3: Distribution according to tumor topography

Extradural tumors were by far the most common, accounting for 85.1% of cases, followed by intramedullary tumors at 10.64%, with intradural and extramedullary tumors coming in last at 4.26%. (**Table VI**)

Table VI: Distribution according to tumor location in the spinal canal

Compression site	Staff	Percentage
Extradural	40	85.1%
Intradural Extramedullary	2	4.26%
Intramedullary	5	10.64%
Total	47	100%

Histological examination revealed that 36 patients (76.6%) had a malignant tumor and 11 cases (23.4%) had a benign tumor. Primary tumors of the spinal cord and/or its membranes accounted for 40.43%: 23.41% for benign tumors and 17.02% for malignant tumors. Secondary tumors or spinal metastases from primary neoplasms accounted for 59.57%.

At the intramedullary level, we found a total of five benign tumors, representing 10.64% of cases: four ependymomas and one hemangioblastoma. At the intradural and extramedullary level, two cases of benign tumors were found in our series, representing 4.26% of cases. These were one case of meningioma and one case of neurinoma. Twelve cases of extradural tumors were found, representing 25.53%. Among these, there were four cases of benign tumors (8.51%), distributed as follows: two vertebral hemangiomas, one giant cell tumor, and one neurofibroma (Table VII). There were eight cases (17.02%) of malignant extradural tumors of primary origin, distributed as follows: five cases of vertebral plasmacytoma, two cases of osteosarcoma, and one case of non-Hodgkin's lymphoma (**Table VIII**).

Table VII: Benign extradural tumors of primary origin

Primary/Benign Tumors	STAFF	PERCENTAGE
Vertebral hemangioma	2	4.26%
Giant cell tumor	1	2.13%
Neurofibroma	1	2.13%
Total	4	8.51%

Table VIII: Malignant extradural tumors of primary origin in the spine

Primary/Malignant tumors	STAFF	PERCENTAGE
Vertebral plasmacytoma	5	10.64%
Osteosarcoma	2	4.26%
Non-Hodgkin lymphoma (follicular lymphoma)	1	2.13%
Total	8	17.02%

Secondary cancers affected 28 patients, or 59.57% of cases. The search for the primary site revealed 11 cases of prostate cancer, 5 cases of breast cancer, 3 cases of lung cancer, and 4 cases of other cancers (1 case of gastric cancer, 1 case of hepatocellular carcinoma, and 2 cases of cervical cancer). (**Table IX**)

Table IX: Primary sites of spinal metastases

Primitive Sites	STAFF	PERCENTAGE
Prostate cancer	11	23.4%
Breast cancer	5	10.64%
Lung cancer	3	6.38%
Other cancers	4	8.51%
Not found	5	10.64%
Total	28	59.57%

All our patients received general treatment based on analgesics, anti-inflammatories/corticosteroids, and heparin therapy. Other treatments included blood transfusions for anemia, muscle relaxants, rehydration, vitamin therapy, and nursing care. In our series, 41 patients (87.23%) underwent surgery, while 6 patients (12.77%) did not undergo surgery due to a severe deterioration in their clinical condition. We performed decompressive laminectomy in 33 patients, representing 80.48% of those who underwent surgery. Of these, 27 (27/33) underwent simple laminectomy + biopsy, i.e.,

81.81%, and 6 patients (6/33), i.e., 18.18%, underwent simple laminectomy + biopsy + posterior osteosynthesis. In addition, surgical excision + double approach osteosynthesis (anterior and posterior arthrodesis) was performed in 8 patients among those who underwent surgery (8/41), or 19.51%. Among those who underwent surgery, 9 patients (21.955%) underwent radiotherapy, 12 (29.26%) underwent chemotherapy, and three patients underwent hormone therapy, representing 7.31%.

For rehabilitation purposes, some patients (28 patients), or 68.29%, underwent physical therapy sessions after their surgery. Progress was disappointing in patients who did not undergo surgery. We noted that, among all the patients studied, 18 cases (38.3%) showed no improvement following treatment. However, one year post-operatively, the outcome was favorable, with remission noted in 25 patients, or 60.97% of those who underwent surgery, two of whom showed complete recovery (4.89%). Eight patients still had neurological sequelae. Four were lost to follow-up and ten deaths were recorded among all patients (operated or not).

Discussion

Our study showed that STSCC accounted for an average 14.5% of SGSCC treated in our neurosurgery department. In our sample of 47 patients, males were the most affected, with a sex ratio of 1.76 in favor of males. Benachour[10] reported in his study 56% of men versus 44% of women, i.e., a sex ratio of 1.28. Other data in the literature highlight similar proportions.[11,12] The average age of onset of slow tumor spinal cord compression in our patients was 51.06 years, with extremes of 14 and 76 years. This is similar to that found in the study by Kassegne et al (53 years).[13]

In our series, back pain + partial functional impairment of the lower limbs were the most frequent reasons for consultation, with 37 cases, or 78.72%. These results are consistent with those of Kone[14], who found in his study that functional impairment of the lower limbs was the most frequent reason for consultation, with 75% of cases. In Doumbia's series[15], motor deficit associated with back pain was the most common, accounting for 60% of cases.

The consultation delay for most of our patients was longer than 3 months (78.72%). This result is also comparable to the work of Kaba et al[11], who found 68% in their series of 50 cases, and TOSSOU et al[16], who reported a long delay in 72.5% of cases. In our context, the long delay could be explained by a delay in diagnosis following delays in consultation, often related to:

- Passage through the lower levels of the healthcare pyramid or treatment failure, forcing them to seek care at a level 3 center offering specialized neurosurgery services.
- Discreet signs in the early stages or a clinical picture that is not obvious, with the majority suffering only from mild to moderate back pain without any signs of impairment.
- Lack of social security coverage for patient care.
- Lack of patient awareness of the irreversible nature of SGSCC syndrome if treatment is delayed.
- Traditional treatment initially.
- Prejudices (belief in witchcraft, curses, demonic possession, etc.) as in the work of Konate S in Bamako.[17]

Certain medical histories were significant and related to the pathology in question: 14 patients had already been diagnosed with and were being treated for cancer: 6 cases of prostate cancer, 3 cases of breast cancer, 1 case of bronchopulmonary cancer, one uterine, one gastric, one intramedullary, and one lymphoid. This relationship between medical history and etiology has been reported in the work of Kaba[11] and Benachour.[10]. The clinical picture of slow spinal cord compression is typically summarized in three syndromes: the lesion syndrome, the sublesion syndrome, and the spinal syndrome. The clinical picture was complete in 40.43% of our patients (19 cases). Genitourinary and sphincter disorders were found in the majority of our patients, i.e., 59.57%. Kaba[11] and SY[18] found 78% and 85%, respectively. Pressure sores were present in 8.52% of cases in our series and 20% in Kaba's series.[11] These disorders were urinary (dysuria, urinary incontinence, urinary urgency), sexual, or anorectal (constipation). It should be noted that sphincter disorders are not generally the most prominent.[19] According to the literature, these are signs that occur very late in spinal cord compression. On the other hand, in advanced spinal cord compression,

genitourinary and sphincter disorders are almost constant and are almost always part of spinal cord neurological damage.[20]

FRANKEL A and B scores (sensory-motor deficit) were the most common, with 33 cases, or 70.21%. This pattern of sensory-motor deficit could be explained by the fact that in our countries, patients with SGSCC consult very late, which was the case for our patients. Thus, the diagnosis is most often made at the stage of complete sensorimotor deficit, which not only worsens the prognosis for survival but also, and above all, the quality of life. This confirms our findings, as epidemiological studies show that patients are no longer able to walk at the time of diagnosis.[21] This reflects the large number of patients who are not quickly referred to specialized centers, especially in our countries, but also the intellectual level of some patients, which prevents them from being aware of their illness. This deficit can also be explained by the fact that in our countries, many patients first consult “traditional healers” before coming to the hospital. This phenomenon can lead to a considerable delay in diagnosis, explaining the frequency of sensorimotor deficits.

Spinal CT scans were performed in 33 of our patients (70.21%) and were contributory in 55.32% of cases. CT scans without contrast allow certain differential diagnoses involving bone involvement to be ruled out.[22] MRI is currently the gold standard for investigating spinal cord compression, and its value has been highlighted by various authors.[23] It has a sensitivity of 93% and a specificity of 97%.[24]

Anatomopathological examination is the only way to formally confirm a cancer diagnosis.[25] This was the case in our series, as all patients underwent this examination. This enabled us to formally diagnose the tumor.

In our study, all levels were affected. However, we found that in the majority of cases (53.19%), the lesion was located in the dorsal region, followed by the cervical region (23.4%). These figures are comparable to those reported in the study by Mammass[26], who found 62.5% of lesions to be located in the dorsal region and 20% in the cervical region. According to currently available data, the dorsal region is the site of choice for tumoral-induced spinal cord compression in 60 to 80% of cases.[27] This is probably related to the natural kyphosis of the thoracic spine and the large proportion of spinal cord occupied at this location. In our study, extradural localization predominates with a percentage of 85.1%. Our results are consistent with those reported in various studies.[10, 22, 28, 29]

In our series, intramedullary tumors accounted for 6.38% of tumor causes. The average age was 44 years, with a female predominance of 66%. Intradural meningioma accounts for 15 to 20% of tumor-related spinal cord compression. There is a clear predominance of females, particularly after the age of 50. The topography is mainly upper dorsal.[12] In our study, we found that meningioma accounted for only 2.13% of causes. Contrary to what is described in the literature, there was a clear predominance of males, but the ages were below 30 years. The topography was exclusively dorsal, as described in the literature. Neurinoma accounted for 2.13% of etiologies and its topography was exclusively cervical.

Extradural tumors accounted for 25.53% of the causes of slow tumor compression of the spinal cord in our series, with 8.51% being benign and 17.02% malignant. In our study, vertebral metastases dominated the picture, accounting for 59.57% of cases. This problem is partly related to the fact that patients were generally diagnosed at a very advanced stage of their cancer, at which point the metastases had already spread to several organs, complicating the search for the primary site. Financial resources were also lacking, to the extent that some patients were unable to cover the costs of additional tests. According to the literature, primary cancer is most commonly located in the following organs: the lung, breast, prostate, and kidney. In our study, primary cancer was located in the prostate in 23.4% of cases, in the breast in 10.64% of cases, and in the lung in 6.38% of cases.

Treatment remains medical and surgical, with corticosteroid therapy, heparin therapy, and even antibiotic therapy playing a major role depending on the indications. However, surgical treatment of spinal cord compression is essential and must be performed as soon as possible to prevent irreversible motor and sensory disorders.[22] This surgical treatment depends on the location of the tumor and consists of releasing the spinal

cord. The goal of treating spinal metastases remains palliative. Patients with spinal metastases generally succumb to systemic complications of the primary cancer, and aggressive treatment of spinal metastases has not been shown to have a positive effect on survival. Apart from benign tumors, where radical surgery remains the therapeutic option, the management of slow spinal cord compression of tumoral and pseudotumorous origin requires a multidisciplinary approach involving neurosurgeons, oncologists, and radiation therapists.

For intradural and extramedullary tumors, treatment decisions are less complicated. As a general rule, surgical resection is indicated to prevent the onset or worsening of neurological disorders.[30] Surgical resection has the advantage of providing diagnostic confirmation, but the final diagnosis remains anatomopathological.[22] The treatment of primary and secondary spinal cancers is often disappointing in our context, given the significant delays in consultation times. Postoperative sensory-vesico-sphincteric physical therapy, when indicated, can improve or even restore pre-existing neurological disorders. In our series, rehabilitation was performed in 68.29% of the patients followed.

We noted that, among all patients studied, 18 cases (38.3%) showed no improvement following treatment. Furthermore, one year post-operatively, the outcome was favorable, with remission noted in 25 patients, or 60.97% of those operated on, two of whom showed complete recovery (4.89%). Eight patients still had neurological sequelae. Four were lost to follow-up, and ten deaths (21.3%) were recorded among all patients (whether operated on or not). This result is comparable to that of Kaba et al[31], who reported a 24% mortality rate. In our case, this result can be explained by the advanced age of some patients, late consultations, and above all by poverty coupled with a lack of health coverage for optimal care. We therefore believe that these factors directly affect the progression and prognosis of the disease.

Conclusion

Slow tumor-related spinal cord compression is a diagnostic and therapeutic emergency. It requires greater knowledge on the part of practitioners, from emergency physicians to specialists. The major risk is the possibility of sudden decompensation, leading to disabling neurological disorders. Treatment is based on anterior and/or posterior decompression with fixation as indicated. Resection has the advantage not only of decompression but also of histological and histochemical confirmation through the study of the surgical specimen for oncological treatment. We have noted that late consultation by patients is related to a lack of financial resources. This leads to a delay in diagnosis, which will directly affect the functional and vital prognosis.

Abbreviations:

NUHC: National University Hospital Center
SGSCC: Slow spinal cord compression
STSCC: Slow tumor-related spinal cord compression
HBP: High Blood Pressure
FI: Functional Impotence
MRI: Magnetic Resonance Imaging
NISS: Non-Specific Inflammatory Syndrome
TAP: Thoraco-Abdomino-Pelvic
CT: Computed Tomography

Contributions

All authors contributed to the study conception and design. Data collection and analysis were performed by Hugues Ghislain ATAKLA, the first draft of the manuscript was written by El hadji Cheikh Ndiaye SY, and all authors commented on previous versions of the manuscript. All authors read and approved the final manuscript.

Ethics declarations

Ethics approval

The study was approved by the institutional review board of National teaching hospital Fann of Dakar. All patients in this study provided their informed consent for the inclusion of their clinical data in this manuscript.

Consent to participate

Informed consent was obtained from all individual parents of participants included in the study.

Consent for publication

Informed consent was obtained from all individual parents of participants included in the study.

Competing interests

The authors declare no competing interests.

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