

Child Spinal Cord Compression without Trauma about 113 Cases in Senegal

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Abstract

Introduction: No-trauma spinal cord compressions are serious conditions not often described in children population. This study will discuss the epidemiological, clinical, biology and radiology assessment, the etiologies, the therapeutic and evolutionary aspects of this condition in children in Senegal. **Patients and Methods:** 113 children aged between 15 months and 18 years were managed in a 10 years period (from January 2005 to July 2015) for a non-traumatic spinal cord compression (average 8.3 years). **Results:** There was 66 males (58%) and 47 females (42%) with sex ratio of 1.40. The main reasons for consultation were spinal deformity (90 %). The syndrome was complete in 52 patients (46%) and incomplete in 61 patients (54%). Plain radiography performed in 63 patients. The CT scan was performed in 21 patients and myelography performed in 4 patients. MRI was performed in 22 patients. There was intradural extramedullary process (33.33%), the extradural lesions (14.28%) and intramedullary process (28.57%). Dorsal lesions were predominant (46%) followed by the lumbar spine (27%). The majority of the etiology was Pott's disease (80%) followed by tumors (17%). Spondylitis to banal germs (2%) and parasitic spinal cord compression (1%) were rare. The histology of 6 patients was revealed 5% neurofibroma Type II, 5% extramedullary intradermal arachnoid cyst, 5% intramedullary arachnoid cyst with cytochemistry of the CSF—like content, 5% Anaplastic pilocytic astrocytoma, 5% ganglioneuroma I terminal cone and 5% meningotheelial meningioma. Pott's disease has been cured by TB chemotherapy associated with a corset in 88.89% of cases. 2 patients of this group had benefited fixation after laminectomy. 68% of the patients had a favorable recovery, and 20% had com-

pletely recovered after an average of 7 months of treatment and three (3) patients had died. The compression by bilharzias is cured by myelotomy and praziquantel with a favorable outcome. We have 94.74% decompressive laminectomy or laminotomy with tumor resection and four (4) Patients of this group benefited fixation; the patients who had intramedullary tumor benefited myelotomy and tumor resection; 3 patients in this group had benefited fixation after laminectomy 58% of patients had good recovery and 1 patient had died. **Conclusion:** In Africa, particularly in the tropics, Pott's disease remains the first etiology followed by vertebra-medullary tumors for no traumatic spinal cord compression of child.

Keywords

Spinalcord Compression, Child, Pott's Disease, Tumors, Spondylitis, Bilharzia

1. Introduction

Child's no-trauma spinal cord compression is neurological suffering related to compression of the marrow and its roots beyond any trauma. Diagnosis and/or therapeutic delay is risk of leaving definitive neurological sequelae. That is why it is a neurosurgical emergency and the interest of early diagnosis and management especially in the child with an unstable spine because it is growing.

In Africa, in the tropical zone, Pott's disease remains the first etiology of spinal cord compression in children followed by tumors [1].

Nowadays magnetic resonance imaging is the best exam who reveals the diagnosis of the medullary pathology with more precision.

Moreover, in the absence of the MRI we can be satisfied with the clinical data associated with the scan of the spine coupled to myelo-scan, the standard x-ray incidence profile or in 3/4.

Anatomy cytopathology confirms the diagnosis and gives the histological type regardless of etiology.

Very few studies have been done in recent years concerning this children's pathology.

Our objective is to study epidemiological, clinical, paraclinical aspects, responsible etiologies and the therapeutic and evolutionary aspects of no-traumatic spinal cord compression in children.

2. Materials and Methods

It was an retrospective study about 113 children hospitalized in Senegal for no-traumatic spinal cord compression in the neurosurgery departments of Grand Yoff General Hospital and CHNU FANN Dakar, in the pediatric wards of the Aristide LeDantec Hospital and General Hospital of Grand Yoff and the Albert Royer Children's Hospital, the surgery department of the Regional Hospital

Center of Thiès and the Neurology Department of the CHNU FANN Dakar from January 1, 2005 to July 31 2015.

The patients included were children whose age was less than or equal to 18 years and whose diagnosis had been accepted in the clinic (pain, stiffness, functional impotence) and neuroradiology (MRI, myeloscanner, standard radiographs). Patients not included were children hospitalized for traumatic spinal cord compression.

We studied and analyzed the following data:

- Identity, Gender, patient age
- Geographic origin
- History of the disease and Personal history
- Clinical data (signs of onset, neurological and extra neurological signs)
- Paraclinic data (Standard radiography of the spine, Myelography, CT, Magnetic resonance imaging, Biology, Anatomy cytopathology, other)
- The etiological data
- Treatments received and progress under treatment.

3. Results

3.1. Socio-Epidemiological Data

We have, 113 children aged 1 year 3 months to 18 years with an average age of 8 years are be hospitalized for non-traumatic spinal cord compression.

The majority of the children had less than 10 years (60.18%) and came from the regions of Dakar (61.95%), Diourbel (11.50%) and Thiès (8.85%). Mauritania and The Gambia were the regions of origin of patients who came from abroad (1.77%). There was a predominance of 66 Males (58%) for 47 Females (42%) with a sex ratio of 1.40.

3.2. Clinical Data

The main reasons for consultation were spinal deformity (90.26%), spinal pain (71.68%), and functional limb impairment (63.72%).

The clinical symptomatology was polymorphous. Spinal cord compression syndrome was complete in 52 patients (46.02%) and incomplete in 61 patients (53.98%). The physical examination found a lesion syndrome (61.95%) and/or a syndrome under lesion (89.39%) and/or a spinal syndrome (90.26%). The onset of symptomatology was insidious in 66.37% of cases and acute in 33.63% of cases.

Some patients had extra-neurological signs: 42 patients (37.17%) had altered general state, 47 patients (41.59%) had pleuropulmonary involvement, 14 patients (12.39%) had adenoma, and 25 patients (22.12%) had a clinical anemic syndrome.

3.3. Paraclinic Data

The standard radiography performed in 63 patients, showed vertebral (53.12%),

disco-vertebral (34.37%), or disc (7.81%) lesions associated with kyphosis (18.75%) and/or scoliosis 19.17%).

Spine scanning performed in 21 patients revealed an expansive process compressing the marrow (18.28%) and myeloscanning performed in four (4) patients revealed a stop of the contrast agent.

MRI performed in 22 patients showed extramedullary intradural processes (33.33%), extradural lesions (14.28%) and intramedullary processes (28.57%). The myelography carried out in two (2) patients also showed a stop of the opaque column and of the contrast agent. Vertebral lesions were lytic-type geodesics, destruction of vertebral bodies, osteocondensation, aspects of vertebrae in patties; disc lesions were pinching or destroying. The dorsal stage was the majority (46%) followed by lumbar (terminal cone) (27%) and mixed or multi-stage (23%), cervical lesions were rare (3.33%).

In biology, 63 patients (59.43%) had hypochromic microcytic anemia, 31 children (29.24%) had high leukocytosis, 35 children (33.02%) had thrombocytosis and one (1) had thrombocytopenia. The CRP and sedimentation rate were high in 73 children (64.60%).

3.4. Etiologic and Evolutionary Data

Pott's disease was the majority (80%) followed by tumors (17%). Spondylodiscitis with mild bacteria (2%) and parasitic spinal cord compression (1%) were rare.

All children who suffered from Pott's disease be cured by TB chemotherapy associated with a corset in 88.89% of cases, 2 Patients of this group had benefited fixation after laminectomy. 68% of the patients had a favorable recovery, and 20% had completely recovered after an average of 7 months of treatment and 3 Patients had died. The child with medullary compression by bilharzia who first simulated an intramedullary tumor had benefited from laminectomy and treatment based on Praziquantel and had a favorable outcome. Patients with mild spondylitis had benefited from non-specific treatment and 2/3 had complete recovery of their neurological disorders. We have 95% of children with tumors had benefited from decompressive laminectomy or laminotomy or myelotomy with tumor excision, 3 Patients in this group had benefited ostéosynthésis after laminectomy 58% of patients had good recovery and 1patient had died.

4. Discussion

4.1. Epidemiology

In our series, the majority age groups were small children aged 3 to 10 years, with a total of 54 patients (48%), followed by Grand children aged 10 years to 15 years with a total of 32 patients (28%). Our results are substantially comparable with most studies [2] [3] [4] [5]. We have a predominance of Males (58% of cases), which agrees with the data of the literature [3] [6] [7] [8].

4.2. Clinical and Paraclinical Aspects

4.2.1. Clinical Aspects

The spinal syndrome was made of, spinal pain (71.68%), stiffness (61.95%) and spinal deformity (90.26%). Our results are comparable to other studies [3] [8] [9] (Table 1).

The lesional syndrome was radiculalgia with radicular deficit in 70 patients (61.95%).

This lesional syndrome was found in 40% of cases in the Obilat study [8].

The syndrome under lesion was found in 101 patients (89.39%); it was made of motor disorders (78.76%), sensory disorders (17.70) and sphincter disorders (13.27%). Our results are consistent with most literature data [9] [10] [11] (Tables 2-4).

Table 1. Spinal cord syndrome.

Authors	Pain %	Stiffness %	Deformity %
Obilat [8]	13	20	11.11
Arthuis et Turpin [9]	49.30	64	30
Elboukili [3]	67.67	27	27
Our Study	71.68	61.95	90.26

Table 2. Motor disorders under lesion.

Authors	Percentages %
Obilat [8]	91
Arthuis et Turpin [9]	82
Lewis [11]	67
Elboukili [3]	84
Our Study	78.76

Table 3. Sensitive lesions under lesion.

Authors	Percentages %
Elboukili [3]	33
Bernardi [10]	14.44
Our Study	17.70

Table 4. Sphincter disorders under lesion.

AuThors	Percentages %
Obilat [8]	51.10
Arthuis et Turpin [9]	30
Bernardi [10]	39.40
Elboukili [3]	28
Our Study	13.27

4.2.2. Paraclinical Aspects

MRI is the fundamental paraclinical exam in the medullary pathology [12] [13] [14].

That is not invasive and be tolerated well and have several advantages over other investigations.

In our series 19.47% of our patients had benefited from MRI, it showed precisely the mapping of the lesions. On the other hand, in the Obilat series, 20 patients (44.4%) had benefited from this examination and in Elboukili 84% of the cases.

These results do not correspond to our results, this has explained by our socio-economic realities in our regions in Senegal, and The MRI is not available to all our patients for reasons of poverty and lack financial resources.

However, any suspicion of spinal cord compression should benefit from an emergency MRI. The spine scanner can be used quickly, with excellent performance in the spinal canal [15] [16].

However, the contribution of scan in the diagnosis of intracanal expansive processes had reduced.

The marrow is rarely found on axial cuts, except for the cervical upper region or the arachnoid spaces are broad [3] [12] [17] [18] [19]. 17 patients (15.04%) had the spine scan.

Myeloscanner is the technique of choice for exploring and obtaining a fine tomographic analysis of the lesions inside the spinal canal: the size, the shape of the medullary cord and the spaces under arachnoid. The medullary parenchyma remains difficult to assess [20]. It was performed in 04 patients (3.54%). Since the advent of MRI, myelography has lost his predominant place in the exploration of the marrow and its envelopes. Currently, the only indications for the use of myelography are the contraindications of MRI [20].

2 patients (1.77%) had benefited from standard myelography before 2008.

The face and profile shots, accompanied by shots of three quarters allowed us to study the entire segment considered. If necessary, localized plaques may be made, either in an area that is difficult to analyze, such as the cervico-occipital hinge, or in a clinically suspected area [15] [21].

In our series, 63 patients (55.75%) benefited from the standard radiography.

Spinal injuries were found in most dorsal cases (46%) followed by lumbar involvement (27%). This is consistent with the results of numerous publications (Table 5).

5. Etiologic and Evolutionary Data

In the Diallo.S study, tuberculosis remains the first etiology of the child's spinal cord compression with 67.50% of cases and the tumors come second with 15% [1].

In our study, infectious causes were predominant (83%) with a high frequency of Pott's disease (80%), followed by tumor etiology (17%). These results are

Table 5. Global seat.

Seat	Obilat [8] %	Our Study %	Elboukili [3] %	Arthuis [9] %
Cervical		4	08	
Dorsal	37.7	46	64	53.33
Lumbar		27	12	
Mixte	24.4	23	32	23

consistent with the data from Diallo.S 10, however, compared with other studies in Morocco and America, a predominance of tumor etiology was found [22].

5.1. Pott's Disease

The frequency of Pott's disease in Senegal in pediatric patients has estimated at 2.37% [23].

Children aged 0 to 15 years account for 24% to 55.09% [24] [25].

Pott's disease remains the first etiology encountered in our study, 80% of children suffering from Pott's disease responsible for spinal cord compression.

The mean age was 7.3 years with extremes of 1 year 3 months and 17 years, Mabiala *et al.* [26] had returned to an average age of 7.5 years with extremes of 11 months and 17 years.

We also report a male predominance with 60% of cases. These data is are be found it in other works [2] [4] [5].

The concept of counting was be found in 23 patients (25.55%) of the cases, in the Ndiaye series 25.92% and in that of Mabiala *et al.* 50% [26].

We have 52 Patients (57.78%) had received BCG vaccination (Bacille de Calmette and Guérin), 12 patients (13.33%) had not been vaccinated in the study of Mabiala *et al.* 36 patients (39.13%) had not been vaccinated with BCG [26].

The concomitant involvement of the pleuropulmonary system was be found in 47.78% of our cases. Our results are relatively comparable to the results of Ndiaye, Eric, Loembe, Mabiala *et al.* Which gave 29.62%, 31%, 25.32% and 44.56%, respectively.

Apart from pleuropulmonary involvement, we obtained 15.55% lymph node location and 7.78% neuro-meningeal localization, which illustrates perfectly the data of the literature: all the viscera and noble organs of the organism can be affected [25] [26] [27] [28].

The HIV had not be found about all patients who be tested, we think that because they are young people and their parents was not HIV and the child had not any contexte to contract this.

The intradermal-tuberculin reaction was positive in 64 patients (84.37%) of the cases that has be clinically tested. This result agrees perfectly with the results of Ndiaye [4] which found 83.33% and other data from the literature which vary between 62% to 91.61% of cases [24] [25] [26] [29].

In our series, 66.67% of our patients had paralysis of the lower limbs. HOFFMAN found 39.06% in a series of children with Pott's disease [29].

Eric found 66% in a general population [27], Mabiala *et al.* Accounted for 37%.

However, Ndiaye had 100% lower limb paralysis in his series. Our results are perfectly because our series of studies was multicentric (Pediatrics, Neurology, Neurosurgery) whereas the Ndiaye series has only used for neurology and most of the children in his series came to consult Paralysis of the lower limbs.

The second major sign in our series was a spinal deformity of 53.33% kyphosis, 26.67% gibbosity, 23.33% scoliosis. Ndiaye [4] found a gibbosity in 55.55% in his series we find rather 53.33% kyphosis, however Eric and Loembe [25] [27] had regained a gibbosity in 38.31% to 52%, our results approach significantly.

The rate of sedimentation was high and CRP (chain reaction protein) was highly positive in 75.55% of the cases. These results are comparable to other studies [4] [26] [27].

The koch bacillus was searched in 62 patients (68.89%) and was found in 6.45% of the cases, Loembe found in 28.12% of its patients [25].

The anatomy of cytology and pathology revealed a multinucleated giant cell histiocytic granuloma with tuberculoid or tuberculous tuberculous necrosis in the patient of our series.

Dorsal location was the most frequent in our study series (46.67%), followed by lumbar localization (26.67%), which is comparable to the data in the literature (Table 6).

The number of vertebrae reached at the imaging performed in 79 patients was two in the majority of cases 49.36% as reported in other series, 65.38% in the Ndiaye series, 44% Hoffman and 36% in the Garst series [4] [28] [29]. (Figure 1)

All authors agree on the principle of antituberculous chemotherapy for 9 to 12 months of treatment for patients with Pott's disease. This treatment is associated with a corset, this association is indicated in the child with a minimal deformation and a neurological deficiency less severe [24] [25] [30] [31] [32].

Table 6. Comparative table of vertebral sites during Pott's disease.

Seat	our study %	Ndiaye [4] %	Hoffman [29] %	Myung [31] %	Loembe [25] %	Mabiala [26] %
Cervical	3.33	7.69		11.11		6.5
Cervico-Dorsal	3.33	3.84	3			1.1
Dorsal	47.78	73.07	55	88.88	36.40	43.5
Dorso-						
lumbar	15.55	7.69	10		10.30	17.4
Lumbar	26.67	7.69	28		33.60	23.9



Figure 1. T2 Spinal Cord MRI, D4-D5 tuberculosis disco-vertebrae infection with Kyphotic angulation and pre-vertebral and epidural abscess.

In our series, Pott's disease has occurred on the AS sickle cell (10%), we have 13% of malnutrition, 03 cases of type 1 diabetes, 01 case of acute lymphoid leukemia type 1, trisomy 21 (01 case), congenital heart disease (02 cases).

All our patients benefited from antituberculous chemotherapy associated with a corset in 88.89% of cases. 02 patients had benefited from decompressive laminectomy and ostéosynthésis in neurosurgery with anti-tuberculosis treatment.

5.2. Spondylodiscitis with Banal Germs

In children, we observe rather spondylodiscitis, The attack can sometimes be brutal thus achieving a picture of vertebral osteomyelitis [33].

We report three (03) cases of spinal cord compression in our series.

We have two girls for one boy. The extreme ages were 5 years and 12 years 6 months, the average age was 8.5 years. The affected levels were lumbar in all cases. All our patients had a standard X-ray. The spinal sites were disc and vertebral lumbar in the 3 patients. The isolated germs were, Aureus Meti Staphylococcus, Gram Negative Anaerobic Bacillus, Streptococcus A.

In the Zomaleto series the predominant disco-vertebral lesions were lumbar associated with neurological suffering and the predominant isolated bacteria were gram negative bacilli [34].

5.3. Spinal Cord Compression by Bilharzia

The treatment of this localization is above all medical, the excision of the intramedullary granulomas is discouraged by the majority of the authors [3].

In our patient the diagnosis was selected after laminectomy T12 to L2, myelotomy and total excision of intramedullary macroscopic lesion simulating an intramedullary tumor for anatomy pathological cytology which had demonstrated a granulomatous rearrangement with microabscess associated with parasitic structures suggestive of bilharziasis. (Figure 2, Figure 3)

The authors report that this is a rare cause of bone marrow compressions BA.MC *et al.* [35].

5.4. Tumors Etiology

They represent 17% of the causes of spinal cord compression in our series. This is consistent with Diallo's findings, which found tumor causes in 15% of cases [1].

We report 36.84% intramedullary lesional process, 42.11% intradural and extramedullary process and 21.05% extradural process. These lesions were extended in height in 09 patients, in width in 3 patients, in comparison with the posterior vertebral arches in 05 patients, and in 02 patients in the lower ones.

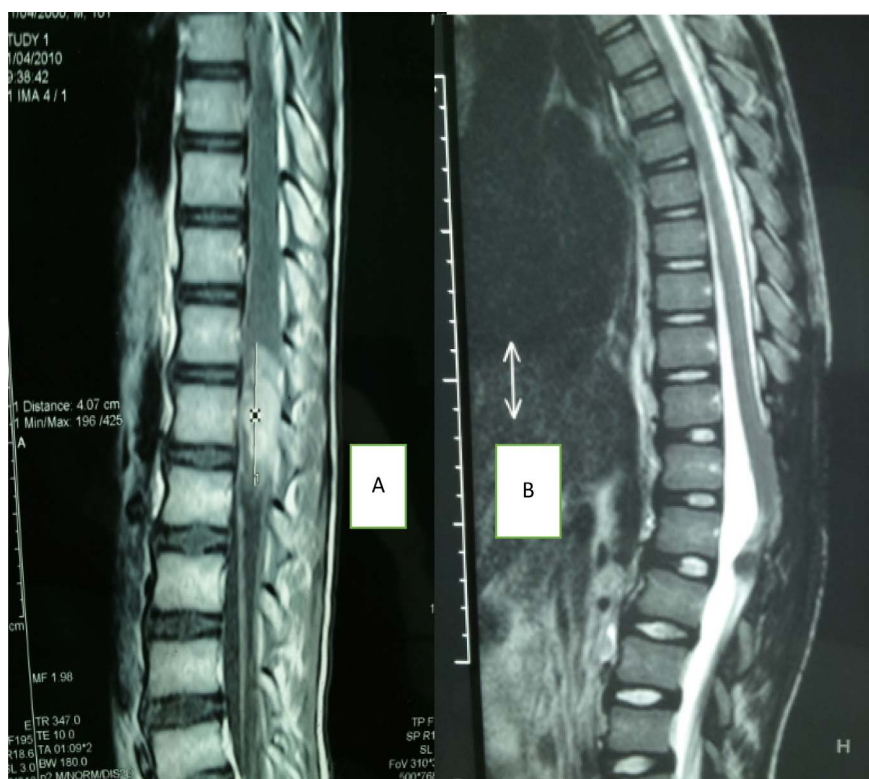


Figure 2. (A) MRI, intramedullary process at L1 measuring 4 cm in height and 1.5 cm in transverse diameter. (B) MRI of control, marked regression of the lesions of the terminal cone, with marked decrease of the medullar caliber and an expansion in the anterior arachnoid space. Bilharzia.



Figure 3. Cervical MRI, intradural process in hyper signal T2 of 9 mm pushing the bulbar marrow to the left, voluminous expanded cervical intramedullary process extended from C3 to C7. Intradural arachnoid cyst.

Our results are somewhat closer to the results of Obilat [8] who had 33.3% of extramedullary intradural tumors in his study series, Elboukili [3] who had 28% intramedullary tumors in his series.

EL Mahdi *et al.* [36] found 33.33% for each topographic type of process, and Lefebvre *et al.* [37] who had recovered 61.11% extradural tumor process.

The majority of the dorsal floor was in our series, ie 47.37%. EL Mahdi *et al.* [36] found it in 58.77% of the cases in their series.

The histology in 6 patients showed 5.26% type II neurofibroma (**Figure 4**), 5.26% extramedullary intradural arachnoid cyst, 5.26% intramedullary arachnoid cyst with cytochemistry of the CSF - like content, 5.26% 5.46% grade I terminal cone ganglioneurinoma and 5.26% meningothelial meningioma. Our results are comparable to data from the literature [3] [36] [38].

Elboukili [3] found 8% arachnoid cyst in his series, 12% ependymoma. Saouab



Figure 4. CT scan “hourglass appearance” neurofibroma Type II extra and intra canal Dorsal expanding foramen D9 and D10.

[39] reported a case of ganglioneurinoma in his series with 3.64% astrocytomas, EL Mahdi [36] found 4.83% of meningiomas.

94.74% of our patients had benefited from decompressive laminectomy with tumor excision.

Some authors prefer a laminotomy to laminectomy in all cases where it is possible to minimize the risk of destabilization of the spine after the opening of the spinal canal [38].

6. Conclusions

Non-traumatic spinal cord compression is a serious condition and is a diagnostic and therapeutic emergency especially in the growing child.

In Africa, particularly in the tropics, Pott’s disease remains the first etiology followed by vertebro-medullary tumors. They are also due rarely to dis-co-vertebral lesions with mere germs and intramedullary parasitoses such as bilharziosis. Imaging is of paramount importance, especially magnetic resonance imaging, which remains the exam of choice for a precise neuroradiological diagnosis of medullary pathology. Depending on the etiology, the treatment is medical and/or neurosurgical. The progression under treatment is often favorable with some sequelae; some patients recover totally from their neurological deficit, other patients can develop complications and die.

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