



Multiple Sclerosis in a Chronic Smoker: A Case and Literature Review at the National General Referral Hospital of N'Djamena (Chad)

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Abstract

Introduction: Multiple sclerosis is characterized by demyelination of the white matter of the central nervous system. Multiple sclerosis (MS) manifests clinically by subacute encephalic and/or medullary pictures. In black Africa; a few cases have been reported in Senegal, Kenya and Ivory Coast. In Chad, no study has been carried out to date on Multiple sclerosis (MS). **Observation:** Mr. AX, 35 years old, a trader with a history of chronic smoking, was admitted on March 13, 2023, for progressive left hemiplegia. The clinical picture began a few days earlier with paresthesias of the right upper limb. These sensory disturbances were followed by rapidly progressive left hemiplegia. She also reported recent blurred vision. The brain scan was strictly normal. During hospitalization, she presented with monoplegia of the right upper limb. Treatment with methylprednisolone at a rate of 1 g of solumedrol in 500 ml of glucose serum was instituted once a day for 5 days. The patient was then urgently evacuated to Senegal. A cerebral and spinal cord resonance imaging (MRI) was performed. It showed several hypersignals at the cerebral level, suggesting Multiple sclerosis (MS). At the medullary level: confluent hyper signals of the MS type. **Discussion:** MS is considered rare in Africa, particularly in Central Africa. Several factors tend to explain this: The existence of a North-South gradient: in fact, the further one moves away from the equator, the more the prevalence of the condition tends to increase, while it is low in neighboring regions; in tropical and intertropical countries, the prevalence of MS varies between 5.0 and 6.5/100,000 inhabitants. Recent studies, notably those of 2021 and 2024, confirm this link. It has been

shown that smoking increases the risk of developing Multiple sclerosis (MS). And that passive smoking can also have an impact, particularly in children. In addition, smoking appears to worsen the course of the disease in people already suffering from MS, increasing the risk of progression to more severe forms and accelerating the occurrence of flare-ups. Smokers have a higher risk of developing MS than non-smokers. The more a person smokes and the longer they smoke, the greater their risk. In people with MS, smoking is linked to faster disease progression and an increased risk of more severe forms. **Conclusion:** MS, although rare in Central Africa, is evolving from its status as a myth to become a reality with the advent of MRI in our medical practice. Chad has a diversity The ethnicity of its population and its geographical location may constitute an interesting field for the study of this condition. The accessibility of beta interferon at a lower cost will be the major future challenge in the management of MS in our country.

Subject Areas

Epidemiology, Neurology

Keywords

Multiple Sclerosis (MS), N'Djamena, National General Reference Hospital (NGHR), MS

1. Introduction

Multiple sclerosis is characterized by demyelination of the white matter of the central nervous system. Multiple sclerosis manifests clinically by subacute encephalic and/or medullary symptoms. The prevalence of MS is higher in European and North American countries than in southern countries (Africa or South America): 100 cases/100,000 inhabitants versus less than 20 cases/100,000 [1]. This situation raises questions, for example, about the possible role of sunshine, geographical latitude or even the individual level of vitamin D reserves on the onset of the disease [1]. Multiple sclerosis (MS) affects approximately 2.5 million people worldwide. The incidence varies considerably depending on the geographical area. It is relatively rare in sub-Saharan Africa [2].

African literature seems to confirm the rarity of the condition at the continental level [3].

In sub-Saharan Africa; a few cases have been reported in Senegal [4], Kenya and Ivory Coast [5].

In South Africa it seems to clearly predominate in the white population [6]. The diagnosis of MS is supported by additional examinations, particularly magnetic resonance imaging (MRI), but in sub-Saharan Africa this exploration is very recently available.

In Chad, no studies have been carried out to date on Multiple sclerosis (MS).

Thus, the scarcity of studies on this subject in our country; the different diagnoses and treatment in the context of countries with limited health resources have motivated the choice of this theme entitled:

“Multiple sclerosis in a chronic smoker”: case study and literature review in the Neurology Department of the National General Reference Hospital of N’Djamena”

The aim of this work is to present 1 observation of a Chadian patient whose neurological pictures and medical imaging had allowed the diagnosis of Multiple sclerosis (MS) to be retained.

2. Observation

This is Mr. AX, aged 35, a trader with a history of chronic smoking, who was admitted on March 13, 2023 for progressive left hemiplegia.

The clinical picture began a few days earlier with paresthesias of the right upper limb. These sensory disturbances were followed by rapidly progressive left hemiplegia. She also reported recent blurred vision. The brain scan was completely normal. During her hospitalization, she developed monoplegia of the right upper limb.

Methylprednisolone treatment with 1 g of solumedrol infused in 500 ml of glucose serum was initiated once a day for 5 days. The patient was then urgently evacuated to Senegal. A cerebral and spinal cord magnetic resonance imaging (MRI) was performed. It showed several hypersignals at the cerebral level suggesting Multiple sclerosis (MS). At the spinal cord level: confluent MS-type hypersignals (**Figure 1**).

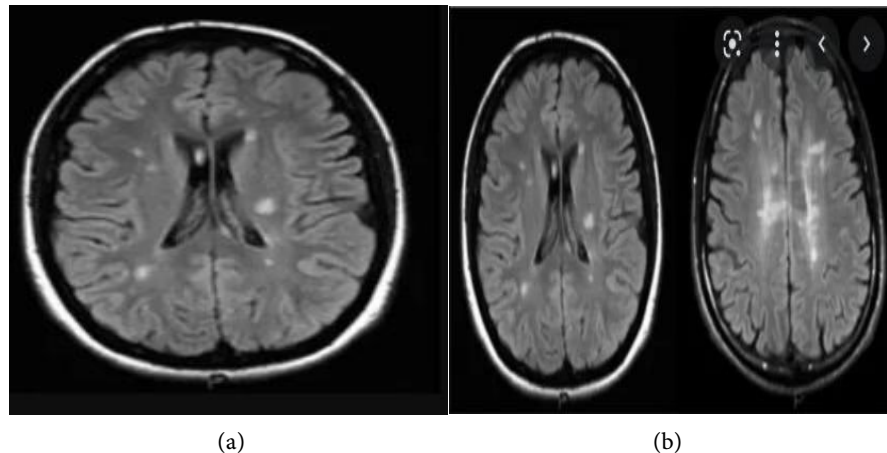


Figure 1. Temporal dissemination: MRI T1 sequence after injection of gado shows more than 6 rounded hyper signals; oval in the periventricular and juxta cortical less than 3 mm thick performed after an interval of 1 month meeting the criteria of Macdonald 2010.

2.1. Biology

The search for tuberculosis and syphilis was negative. The same was true for retroviral and EBSTEIN BARR virus (EBV) serologies. Cytomegalovirus (CMV) im-

munoglobulin G (Ig G) was negative.

Cerebrospinal fluid (CSF) examination showed mild hyperproteinachia with the presence of an oligoclonal band on protein electrophoresis.

The search for rheumatoid factors; antibodies: antinuclear (ANA) anti native DNA; anti SSa anti SSb as well as the salivary gland biopsy (BGSA) were negative.

Solumedrol treatment was resumed, followed by a short period of oral corticosteroid therapy. The patient progressed toward recovery.

The patient presented several episodes of recurrence (with 3 re-hospitalizations for severe motor deficits). The others manifested as exacerbations of sensory or sensorimotor manifestations that resolved under corticosteroid therapy.

The duration of follow-up will depend on the severity of the relapse and the response to treatment.

Our patient's relapse was treated with high-dose corticosteroids (intravenously with Solumedrol 1 g for 5 days followed by prednisolone 1 mg/kg/day) to reduce inflammation. In some cases, plasmapheresis may be considered in cases of severe relapse not responding to corticosteroids. This is not available in our context.

2.2. Background Treatment

He is currently on oral immunosuppressants Azathioprine (Imurel) 50 mg and is being monitored on an outpatient basis with good progress and total regression of sensory-motor manifestations with an EDSS score of 1/10 without functional disability.

3. Discussion

Multiple sclerosis (MS) is considered rare in Africa, particularly in Central Africa.

Several factors tend to explain this:

The existence of a North-South gradient: in fact, the further one moves away from the equator, the more the prevalence of the condition tends to increase, whereas it is low in neighboring regions; in tropical and intertropical countries, the prevalence of MS varies between 5.0 and 6.5/100,000 inhabitants [7].

Environmental factors: some can play a major role in the occurrence of MS. Thus, alongside genetic susceptibility [8]. The involvement of certain infectious agents (viral in particular) and exposure to ultraviolet B (UVB) rays are incriminated in the expression of MS [9]. The greater distribution of MS in areas of low UVB exposure seems to support their protective role.

For some authors [10] UVB stimulates vitamin D3 which itself would cause a modulation of the secretion of melanin from puberty and would be at the origin of the distribution of MS according to race and age.

DUMAS *et al.* [11] [12] hypothesized that UVB rays have a powerful immunomodulatory activity which, through the action of cytokines, can affect the crossing of the blood-brain barrier by circulating autoreactive lymphocytes specific to myelin.

It seems established that the prevalence of Multiple sclerosis is higher in the north-east of France. The incidence varies between 4.1 and 8.2 per 100,000 inhabitants depending on the region. [13].

Recent studies, including those from 2021 and 2024, confirm this link. Smoking has been shown to increase the risk of developing Multiple sclerosis (MS) [14]. And secondhand smoke can also have an impact, especially in children. In addition, smoking appears to worsen the course of the disease in people already suffering from MS, increasing the risk of progression to more severe forms and accelerating the occurrence of flare-ups [14].

Smokers have a higher risk of developing MS than non-smokers. The more a person smokes and the longer they smoke, the greater their risk. In people with MS, smoking is linked to faster disease progression and an increased risk of more severe forms [14].

In South Africa, various studies seem to confirm the predominance of the disease in white populations compared to black and mixed-race populations.

In North Africa, BEN HAMIDA [15] published in 1977 a series of 100 observations, of which 47 were typical cases, 26 probable cases and 20 possible cases. Other clinical series and observations on benign or particular forms of MS were published in Tunisia [2], Morocco [7] and Algeria [16].

In black Africa, all studies tend to show the rarity of the condition in Senegal, Ivory Coast or Kenya.

Even if the racial difference between the populations of North Africa (mainly white) and West Africa (predominantly black) can explain the preponderance of MS in the North of the continent, the integrity of diagnostic means, particularly in MRI, is a factor to be taken into account.

MS is characterized by its clinical polymorphism. It manifests itself by pictures of encephalic, medullary or subacute encephalomedullary involvement. It is characterized by its evolutionary mode and the spatial and temporal dissemination of clinical signs. Tourbah *et al.* [10] believe that the diagnosis of MS is confirmed earlier with the Macdonald criteria than with those of Poser, therefore treatment is instituted more quickly.

The diagnostic criteria proposed by Poser in 1983 [17] were based on the number of attacks and the number of signs of spatial dissemination. Biological tests (oligoclonal bands or elevation of IgG in the CSF), MRI and electrophysiological tests (visual evoked potentials and urodynamic assessment) provide arguments if the clinical definition is not satisfactory.

Other criteria essentially based on imaging have been proposed by Paty *et al.* [17].

Fazekas *et al.* in 1988 [17] and Barkhof *et al.* in 1997 [3] (Table 1). In 2001 Macdonald 2010 *et al.* added to the MRI criteria the number of attacks and the clinical signs of spatial and temporal dissemination (Table 2). From an epidemiological point of view, our patient was aged 34 and 35 years respectively, which is compatible with the classic age of remitting forms of MS, whereas the progressive forms generally begin later.

Table 1. MRI diagnostic criteria suggestive of MS 2010 [3].

Authors	Lesions
Paty and Coll (1988)	4 lesions > 3 mm 3 lesions including one
Fazekas <i>et al.</i> (1988)	periventricular 3 or more lesions with at least 2 of the following criteria: - 1 > 5 mm - 1 periventricular - 1 infratentorial
Barkhoff <i>et al.</i> (1997)	least 9 lesions - 1 active lesion
T2 only	- 1 cortical lesion - 1 periventricular lesion - 1 subcortical lesion
T2 and T1 after injection of Gadolinium	If the 4 lesions are present: the cumulative risk of MS is 80%

Table 2. Diagnostic criteria for MacDonald temporal and spatial dissemination 2010.

Clinical presentation	Additional elements required for diagnosis
At least 2 outbreaks and at least 2 sites affected	None
At least two relapses and a single lesions on MRI	affected site Spatial dissemination of Or subsequent clinical relapse in a site different
1 outbreak and at least 2 affected sites	Spatial dissemination of lesions on MRI or 2nd clinical outbreak
1 single attack	Spatial dissemination of lesions on MRI or at least 2 suggestive lesions on MRI and CSF+ and Temporal dissemination on successive MRIs or 2nd clinical flare
Insidious progression suggestive of	One year of disease progression established progressively or retrospective MS and 2 of the following criteria: - LCR+ - Cerebral MRI + (9 T2 lesions or at least 4 T2 lesions with VEP+) - Medullary MRI + (2 T2 focal lesions)

Our patient had presented several attacks and the clinical signs suggested a spatial dissemination of the lesions (**Figure 2**): hemi-body motor and/or sensory deficits plus spinal cord involvement.

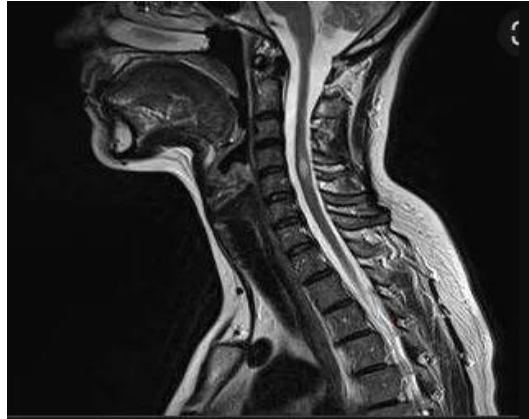


Figure 2. Spatial dissemination: in T2 sequence we note oval hypersignals not exceeding 3 mm in thickness carried out in less than 1 month meeting the criteria of Macdonald 2010.

MRI confirms this dissemination by highlighting hemispheric and spinal cerebral lesions. (**Figure 1** and **Figure 2**) The bolus of methylprednisone (Solumedrol) with short periods of oral corticosteroid therapy each time allowed a more or less rapid recovery of the signs.

4. Conclusions

MS, although rare in Central Africa, is evolving from its status as a myth to become a reality with the advent of MRI in our medical practice. Chad has an ethnically diverse population and its geographical location may constitute an interesting terrain for the study of this condition.

Accessibility of beta interferon at a lower cost will be the major future challenge in the management of MS in our country.

Conflicts of Interest

The authors declare no conflicts of interest.

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