Original Research Article

Central and peripheral neurological manifestations during Human Immunodeficiency Virus infection at the Fann National Hospital in Dakar (Senegal)

Abstract

Introduction: Neurological manifestations associated with HIV are frequent, with variable clinical signs. The aim of our study was to characterize the epidemiological, clinical, paraclinical, therapeutic, evolutionary and prognostic aspects of neurological disorders in HIV.

Methods: This was a descriptive, retrospective and prospective study, from 01 October 2020 to 31 October 2022, conducted in the neurology and infectious and tropical diseases departments of Fann National University Hospital Center (FNUHC) in Dakar (Senegal).

Results: We enrolled 93 patients, 56 of whom were women, i.e. a sex ratio of 1.51. The mean age of the patients was 41 years [18 - 73 years]. The onset of clinical signs was predominantly acute (75%). Headache and confusion were the most common neurological signs, 65% and 57% respectively. Meningoencephalitis was the most common central manifestation (91%), followed by mononeuropathy (19%). The average length of hospitalization was 17.92 days [1 - 78 days] and 20 patients (22%) were put on antiretroviral treatment with an average delay of 32.8 days. Corticosteroid therapy was initiated in 58 patients (62%). Forty-seven patients (51%) died during hospitalization and 46 patients (49%) were followed up. Twenty-nine patients (31%) had a favorable outcome with complete disappearance of signs, and the remaining 17 patients (18%) had neurological sequelae.

Conclusion: During the course of HIV/AIDS infection, morbidity and mortality and neurological damage remain high. Systematic screening for these neurological signs during follow-up of patients living with HIV is necessary in order to improve diagnostic and therapeutic management.

Keywords: neurology, HIV/AIDS, Senegal.

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1. Introduction

HIV infection is a transmissible infection caused by HIV1 and HIV2, with a sometimes-adverse course leading to the acquired immunodepression syndrome known as AIDS [1]. It remains a public health problem in Senegal [2]. During this disease, neurological damage may occur as a result of immunosuppression (opportunistic infections and neoplasia), the neurotropism of HIV or the toxicity of antiretroviral drugs. Neurological damage during HIV infection is common, accounting for 50 and 64.4% [3, 4]. In Senegal, the incidence of neurological involvement in HIV infected patients were 19% in 2005 [5]. Since then, few studies have been carried out on neurological damage during HIV infection. The aim of this study was to describe the profile of neurological damage in HIV-infected patients followed up in the neurology and infectious diseases departments.

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2. Methods

We conducted a descriptive, retrospective and prospective study from 01 October 2020 to 31 October 2022 at the Fann National University Hospital Center (FNUHC), in the Neurology and Infectious and Tropical Diseases Departments. All HIV-positive patients over 18 years of age (positive retroviral serology by rapid diagnostic test and confirmation by ELISA test) with central or peripheral neurological involvement hospitalized in the said departments were included.

Data collected included demographic characteristics (age, sex, place of residence, marital status), clinical features with the mode of onset (acute < 7 days, subacute between 7 and 30 days and chronic > 30 days) and the results of the physical examination, paraclinical data (virological research and imaging (encephalic or medullary), therapeutic data (antiretroviral protocol) and evolutionary data. The data were collected on a standard computerized form using SPHINX V5 software. These data were analyzed using SPSS Statistics V25 software. For descriptive analysis, categorical variables were expressed as absolute frequency and proportion. Quantitative variables were expressed by their position (mean, median) and dispersion (standard deviation, inter-quartile range,) parameters according to their distribution. Patient confidentiality was strictly respected.

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3. Results

We collected 93 patients among 318 HIV infected patients, representing a frequency of 29.2%.

3.1. Epidemiological characteristics

Fifty-six patients (60%) were female, giving a sex ratio (F/H) of 1.5. The mean age was 41 years [range 18 - 73 years]. The [35-54 years] age group was the most represented (56%), followed by the [18-34 years] age group (27%). Sixty-three patients (67.7%) were from the Dakar region. Nine patients (10%) worked in the informal sector, and a further 3 (3%) were teachers. The profession was not specified for 69 patients (74%). Thirty-two patients (34%) knew their HIV status. Sexual transmission was most frequent (76%), followed by mother-to-child transmission (4%). The route of transmission was not specified in 18 patients (19%). The most common comorbidities were hypertension (6.5%) and diabetes mellitus (2.1%). A history of pulmonary tuberculosis was found in 7.5% of cases and 2.1% had a history of meningitis. Three patients (3%) had a history of ischemic stroke.

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3.2. Clinical features

The most common symptoms on admission were fever (75%), headache (65%), confusion (57%), motor deficit (47%), behavioral disorders (28%) and seizures (23%). The mode of onset of clinical signs was acute (75%), subacute (16%) or chronic (9%).

Forty-nine patients (52.6%) had meningoencephalitis, which etiology was tuberculous (20%), cryptococcal (4.3%), presumed viral (16%), non-specific bacterial (7.5%), paraneoplastic related to the presence of breast cancer (1%) and of undetermined etiology (5.4%). The main clinical signs of meningoencephalitis were confusion (42%), headache (30%) and seizures (12%). Other central neurological manifestations were stroke (18%), especially ischemic stroke (15%), intracranial expansive processes (23.6%), HIV-related dementia (3%) and myelopathy (4%) (Table 1).

Peripheral nervous system involvement was found in 24 patients (25.8%) with mononeuropathy involving the 2nd pair of cranial nerves, the 3rd pair of cranial nerves or the facial nerve (23.6%), acute poly-radiculo-neuropathy (3%) and multiple mononeuropathy (1%) involving the III and V.

Forty patients (43%) had extra-neurological signs such as pneumopathy (34.5%) with common germs, clinical immunodepression syndrome (30%), gastroenteritis (13%), adenopathy (9.6%) and osteoarticular involvement (7.5%).

Table 1. *Central neurological damage in people living with HIV.*

Central neurological damage	Number	Percentage %
Meningoencephalitis (n = 49)		
- *Tuberculous*	18	19.3

- *Presumed viral*	15	16.1
- *Non specific bactérial*	7	7.5
- *Cryptococcal*	4	4.3
- *Paraneoplastic*	1	1
- *Not identified etiology*	4	5.4
Stroke (n = 17)		
- *Ischaemic stroke*	14	15
- *Haemorrhagic stroke*	1	1
- *Cerebral venous thrombosis*	2	2
Intracranial expansive process (n = 21)		
- *Cerebral toxoplasmosis*	12	13
- *Intracranial expansive process of unknown etiology*	8	8.5
- *Presumed brain lymphoma*	1	1
Progressive multifocal leukoencephalopathy	1	1
Myelopathies (n = 4)		
- *Compressive myelopathy of tuberculosis origin*	3	3.2
- *Infectious or inflammatory myelopathy*	1	1

3.3. Immuno-virological data

Eighty-six patients (92.5%) were infected with HIV1, 6 patients (6.5%) with HIV2 and one patient was co-infected with HIV1 and HIV2.

CD4 counts were performed in 15 patients with a mean of 122 cells/mm3 [8 - 480 cells/mm3]. Thirteen patients (14%) had a CD4 count less than 200 cells/mm^3 (Table 2). Three patients had a positive hepatitis B serology, and one had a positive syphilis serology result.

Table 2. Main neurological disorders in relation to CD4 count during HIV infection in our study.

CD4 count	Neurological disorders	Number (n= 15, %)
$\leq 50/mm^3$	Tuberculous meningoencephalitis	6 (6.4)
	HIV-related strokes	
	HIV encephalitis	
	Cerebral toxoplasmosis	

	Progressive multifocal leukoencephalopathy	
≤ 100/mm^3	Neuromeningeal tuberculosis Intracranial expansive process not determined	3 (3.2)
≤ 200/mm^3	Cerebral toxoplasmosis Bacterial meningoencephalitis Stroke	4 (4.3)
≤ 500/mm^3	HIV encephalitis Tuberculous meningoencephalitis	2 (2.1)

3.4. Therapeutical data

The mean length of hospitalization was 17.92 days [1 - 78 days]. Antiretroviral treatment was started in 20 patients (21.5%) during hospitalization, with a mean time to start of 32.8 days. The combination of Tenofovir, Lamivudine and Dolutegravir was prescribed in 18 of the 20 patients.

Corticosteroid therapy, in the form of boluses (Methylprednisone, Hydrocortisone or Dexamethasone between 120 and 240 mg per day) and/or oral relay (Prednisone 1mg/kg/day), was initiated in 58 patients (62%) with an average delay of 16.3 days. Anti-tuberculosis treatment was instituted in 35 patients (38%) with an average delay of 32.3 days.

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Evolutionary data

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Forty-seven patients (50.5%) died during hospitalisation. Fourteen patients (15%) were followed for at least 3 months, 23 patients (24.7%) between 3 and 6 months and 9 patients (10%) for more than a year.

Twenty-nine patients (31%) had a favourable outcome with complete disappearance of signs, while the remaining 17 patients (18%) had neurological sequelae such as motor deficits (14%), language disorders (7.5%), memory disorders (3.2%) and sensory disorders (1%).

DISCUSSION

Neurological involvement in HIV infection is common, occurring in 40-75% of cases [6]. Studies associating damage to the central and peripheral nervous systems are rare. In Asia, Dai et al., found a prevalence of central nervous system involvement of 9.7% over a 2-year period [7]. The prevalence of peripheral nervous system disease was 3.12% in Central Africa [8].

In our study, we found a frequency of central and peripheral disorders of 29.2%. The prevalence of these disorders varies between 28.1 and 75% [6,9,10]. Over the years, we have noted an increase in the prevalence of these disorders in HIV infection. This increase in prevalence in recent years may be due to better knowledge of neurological complications and their detection during follow-up of patients living with HIV (PLHIV).

Elsewhere, there is a female predominant, which is consistent with the epidemiology of HIV infection [11]. This female predominance may be explained by the anatomical features of the female genital tract [12].

In our study, we found an average age of 41 years. The average age of patients at the time of diagnosis of neurological disease was relatively young according to the literature [13,14].

The mean CD4 count in our study was 122/mm3. In addition, almost all of our patients in whom CD4 counts were performed had a value of less than 200/mm^3. This indicates the advanced stage of the disease at the time of diagnosis of neuropathy.

Clinical neurological signs varied according to the stage of infection (Table 3).

Neurological damage revealed HIV infection in 65% of cases. El Fane et al., reported that 60% of neurological manifestations were inaugural to HIV infection [14]. Neurological damage during HIV infection could therefore be due to HIV or to opportunistic infections.

The frequency of disease varies according to geographical location. The most frequent opportunistic infections were cryptococcal meningitis (22%), cerebral toxoplasmosis (17%) and central nervous system tuberculosis (11.7%) in Asia [7]. In Africa, it was peripheral neuropathy (34.3%), isolated headache (5.2%), stroke (0.7%), cerebral toxoplasmosis (0.3%) and bacterial meningitis (0.3%) [10]. This distribution of different disorders is similar to that found in our study, with mononeuropathy (20%), tuberculous meningoencephalitis (19.4%), cerebrovascular accidents (18%), cerebral toxoplasmosis (13%) and dementia syndrome (3.2%).

According to De Broucker, in the case of pulmonary tuberculosis, tuberculous meningoencephalitis is 10 times more frequent in the context of AIDS than in the general population. These data are consistent with our study, in which 7.5% of patients had a history of pulmonary tuberculosis [15].

Numerous studies have highlighted the relationship between HIV infection and stroke, and it is currently established that HIV is a risk factor for the onset of stroke through lesions of vasculopathies, induced coagulopathies or through opportunistic infections and the use of antiretroviral therapy [16].

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In our study, 20 patients (22%) were started on antiretroviral therapy during hospitalization. Given that opportunistic infections predominated, prevention of the inflammatory immune restoration syndrome postponed the use of antiretrovirals. Neurological complications in PLHIV are a frequent cause of morbidity and mortality, ranging from 32% to 68.5% depending on the study [5,13]. Forty-seven patients (51%) died during hospitalization in our study. Data in the literature indicate that most patients die within a short time of the first neurological manifestations, as we observed in our study [17]. Neurological complications are the second most common cause of admission to intensive care, accounting for 10-25% of cases, after respiratory failure [18]. Seventeen patients (18%) were discharged home with neurological sequelae such as motor deficits and language disorders.

CONCLUSION

Neurological complications in people living with HIV are frequent, with a significant morbidity and mortality rate. The prognosis for neurological complications in HIV is sometimes poor, with a high death rate and loss of motor autonomy and major cognitive and linguistic impairment in most survivors. Hence the importance of knowing the various signs of these neurological manifestations, which are found during HIV infection whatever the stage of the disease, for primary prevention.

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