

Prevalence of HIV infection among the patients with an avascular necrosis of the femoral head in Ouagadougou, Burkina Faso

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The preliminary results of this work were displayed and presented during the 23rd Congress of the French Society of Rheumatology from November 28, 2010 to December 1, 2010 in Paris-La Defense (France)

Abstract

Objective: To study the prevalence of HIV infection among the risk factors associated with the avascular necrosis of the femoral head in Ouagadougou, Burkina Faso.

Design: Multicenter retrospective study.

Setting: Rheumatology consultations and Orthopedic-Traumatology Surgery Department Of The University Hospital Yalgado Ouédraogo, at the Medico-Surgical Private Clinic "Notre Dame de la Paix" and the Medical Center 'Paul VI' in Ouagadougou, Burkina Faso.

Patients and methods: The study was conducted on recorded cases from January 2007 to December 2009. All patients received during the study period for an avascular necrosis of the femoral head that was confirmed by X-ray and / or CT were included. The search for HIV antibodies was performed for all patients by the ELISA test confirmed by the Western Blot test.

Results: There were 79 men (56%) and 62 women (44%). It shows a sex ratio of 1.2. The average age of patients was 43.95 ± 15.36 years with extremes of 7 and 79 years. The average duration of disease before diagnosis was 6 ± 6.5 years with extremes of 1 and 39 years. The affected area involved the left hip in 67 cases (47.5%), the right hip in 48 cases (34%) and was bilateral in 26 cases (18.5%). Among the risk factors, alcohol consumption was reported in 30/67 (44.8%), steroids in 09/67 (13.4%), sickle cell disease in 12/141 (8.5%). Six patients (4.25%) among the 141 had an HIV infection.

Conclusion: HIV infection has a place among the risk factors of an avascular necrosis of the femoral head. A HIV serology test should be systematically

carried out in all patients with an avascular necrosis of the femoral head in sub-Saharan Africa, particularly in the absence of other risk factors.

Key words: Avascular necrosis of the femoral head, HIV, sickle cell disease, sub-Saharan Africa.

Introduction

The aseptic osteonecrosis of the femoral head is an ischemic degeneration of a wide epiphysis area. Its location at the femoral head causes an Avascular Necrosis (AVN). It represents 1.11% of rheumatology consultations in Burkina Faso¹. If in the Western countries, etiologies are dominated by alcoholism and corticotherapy², in Black Africa, the sickle cell disease seems to be the primary risk factor^{3,4}. For many years, HIV infection has been recognized as another risk factor for the AVN⁵. An American study on 38 patients with non-traumatic AVN of the femoral head reported in seven cases (18.4%) an association with infection by Human Immunodeficiency Virus (HIV); among these seven patients, 4 (10.5% with AVN of the femoral head) had no other classic risk factors⁶. Despite Africa being the continent most affected by HIV infection⁷, the prevalence of this infection during the AVN of the femoral head is unknown, to our knowledge, in sub-Saharan Africa. Recently, Eholié *et al*⁸ in Ivory Coast reported three cases of AVN of the femoral head in patients infected with HIV but with sickle cell disease⁸.

The objective of this study was to describe the prevalence and semiological features of HIV infection among the risk factors associated with AVN of the femoral head in Ouagadougou, Burkina Faso.

Materials and Methods

This was a multicenter retrospective study conducted on recorded cases from January 2007 to December 2009 at the rheumatology consultation and Orthopedic-Traumatology Surgery Department Of The University Hospital Yalgado Ouedraogo, the Medical and Surgery Clinic Private 'Notre Dame de la Paix', the Medical and Surgery Center 'Paul VI', in Ouagadougou, Burkina Faso. The latter two hospitals receive once a year services provided by an international team specialized in prosthetic hip surgery.

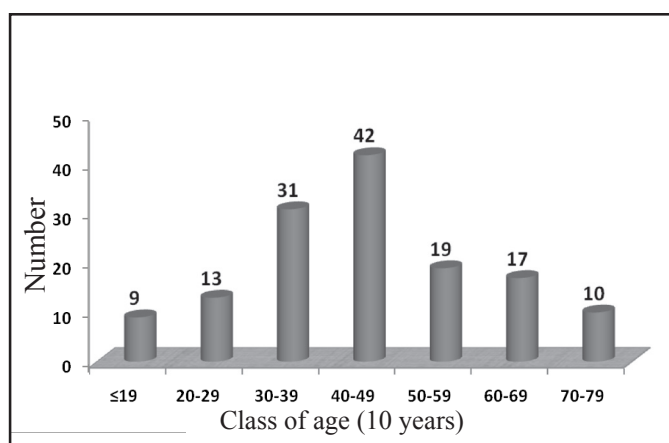
All patients received during the study period for AVN of the femoral head confirmed by X-ray and / or CT were included. The infectious, inflammatory coxites, the septic osteonecrosis of the femoral head were excluded. All patients underwent a complete blood count, erythrocyte sedimentation rate, a C-reactive protein (CRP), a hemoglobin electrophoresis and serology testing for anti-HIV antibodies.

All these patients recruited consecutively, have previously had, on venous blood at the elbow a hemoglobin electrophoresis test at alkaline pH and an Emmel test in the presence of hemoglobin S. The HIV serology test was performed by the ELISA test and confirmed by the Western Blot test. Patients were defined as "consuming alcohol", when they regularly drank more than two glasses of beer per day. Data confidentiality was assured. The various variables were entered using a pre-computerized form, then analyzed with an Epi Info version 3.5.1.

Results

Characteristics of the study population: One hundred and forty-one patients were included during the study period. There were 79 men (56%) and 62 women (44%) giving a sex ratio of 1.2. The average age of patients was 43.95 ± 15.36 years with extremes of 7 and 79 years. The age group 40 to 49 years was most concerned. The distribution of patients by age is shown in Figure 1.

Figure 1: Distribution of patients by age



The average duration of disease before diagnosis was 6 ± 6.5 years with extremes of 1 and 39 years. The affection

concerned the left hip in 67 cases (47.5%), the right hip in 48 cases (34%) and was bilateral in 26 cases (18.5%). The amyotrophy was investigated in 71 patients; it was present in 10 (14.1%) and involved the quadriceps. The shortening of the affected lower limb, studied in 75 patients, was observed in 38 (50.7%) cases. The average shortening was $1.5 \text{ cm} \pm 0.4 \text{ cm}$ with extremes of 1 and 5 cm, resulting in an average reduction of the walking distance to $800 \pm 250 \text{ m}$ with extremes of 100 and 2000 m; 19.73% was at a stage of functional impairment. On radiographs, 118 patients (83.7%) were at stage IV of the classification of Arlet and Ficat. Table 1 shows the distribution of patients according to the classification of Arlet and Ficat. Thirty three patients (23.4%) underwent a total hip prosthesis with 16 cemented and 17 uncemented. A girl-patient of 19 years old was treated with an osteotomy of varization.

Table 1: Distribution of patients according to the classification of Arlet et Ficat

	No.	(%)
I	0	0
II	4	2.8
III	19	13.5
IV	118	83.7
Total	141	100

Risk factors associated to the AVN of the femoral head: Among the 67 patients who underwent a complete search of the traditional factors, 15 (22.4%) had no risk factors. Table 2 shows the distribution of patients according to risk factor.

Table 2: Distribution of patients according to risk factors associated with AVN of the femoral head

	Number n/N*	(%)
Classic		
Alcohol consumption	30/67	44.8
Steroids**	09/67	13.4
Femoral neck fracture	09/141	8.9
Sickle cell SC	12/141	8.5
HIV infection	06/141	4.25
Dislocated hip	01/67	1.5
Discussed		
Obesity	14/53	26.4
Smoking	08/67	11.9
Gout	02/67	2.98

* n / N: number of cases over the total number of patients surveyed. ** Four (04) molecules were involved: betamethasone, prednisone, metylprenisolone, and triamcinolone prescribed for sinusitis (4 cases) dermatitis (2 cases), asthma (1 case), renal disease of unknown aetiology (1 case), a chronic gout (1 case) for a period of two years to 15 years.

Table 3: Characteristics of the HIV infected patients with AVN of the femoral head

Case	Age (years)	Sex*	Others RF**	HIV subtype	Treatment***	Duration (years)	Localization
1	54	M	Alcohol	HIV ₁	AZT+3TC+NVP	2	Bilateral
2	39	F	Sickle cell SC	HIV ₁	None	-	Right
3	46	M	None	HIV ₁	None	-	Left
4	42	M	None	HIV ₁	D4T+3TC+NVP	8	Right
5 †	30	F	None	HIV ₁	D4T+3TC+NVP	2	Bilateral
					D4T+3TC+LPV/r	3	
6	48	M	Steroids	HIV ₁	D4T+3TC+NVP	6	Bilateral

*sex : M= male, F= female ; **RF= risk factors ;

***AZT : zidovudine ; 3TC : lamuvidine ; NVP : névirapine ; D4T : stavudine ; LPV/r : lopinavir boosted by ritonavir.

† Because of a failure in the treatment at the end of 2 years, the nevirapine was replaced by the lopinavir boosted by the ritonavir (both inhibitors of protease).

No cases of sickle cell SS or S beta thalassemia have been reported. Six (4.25%) among the 141 had an HIV infection. Table 3 lists the characteristics of patients with HIV infection.

Discussion

One hundred and forty cases of AVN of the femoral head in a multicenter study conducted in 2 years are reported. This series is, to our knowledge, the most important that was reported in West Africa^{9,10}. The risk factors have been dominated by the consumption of alcohol (44.8%), steroids (13.4%), sickle cell disease SC (8.5%). HIV infection was reported in six (4.25%) including three with Highly Active Antiretroviral Therapy (HAART). The average age of patients (43.9 years) was higher than that reported by Oniankitan *et al*¹⁰ (38.5 years) in Togolese patients with hemoglobin AA and AS. Coulibaly *et al*⁹ in Mali reported an average age of 31 years in a study involving a pediatric surgery department. The other semiological features were identical to the other African and Caucasian series^{2,3} apart from the severity of the cases reported in sub-Saharan Africa⁹. This severity could be caused by the delay before consultation in our series (6 years on average). However an anomaly in the vascularity of the femoral head could contribute to the severity of injury but remains to be confirmed. The risk factors have been dominated by alcohol consumption, steroids and SC sickle cell. The importance of alcohol consumption (44.8%) could result from the given definition.

Six patients (4.25%) had HIV infection. Among these, three had other risk factors (cases 1, 2 and 6), in the other three, no other risk factor could be found. The first cases of AVN of the femoral head in patients infected with HIV have been reported in literature since the 1990s. The association of HIV infection and AVN of the femoral head, now seems established. The crude incidence of osteonecrosis of 1.2 cases per 10 000 persons-years in subjects not receiving HAART treatment increase from 4.0 cases per 10 000 person-years for those with less than 12 months of HAART treatment to 15.9 cases per 10 000 person-years for those with 60 months or more¹¹. The mechanism of

this association remains unclear. The protease inhibitors have long been accused¹², however, recent studies seem to implicate all classes of anti-retroviral¹³. One patient (case 5) in our series received a protease inhibitor. HIV is known to cause a syndrome of antiphospholipid antibodies that may cause thrombophlebitis and an AVN¹⁴. Furthermore, patients infected with HIV are likely to cause protein S deficiency which also predisposes to thrombosis¹⁴. Recently, hyperlipidemia during therapy with protease inhibitors has been mentioned as a possible factor for the development of AVN in patients infected with HIV¹⁵.

HIV infection has a place among the risk factors of AVN of the femoral head, justifying its systematic search in all patients with epiphyseal necrosis in sub-Saharan Africa particularly in the absence of other risk factors. Indeed, the virus itself, could stimulate the production of proinflammatory cytokines such as interleukin 6 and tumor necrosis factor involved in bone resorption¹⁶. In a study on 33 cases of AVN of the femoral head, the virus has been found as the only risk factor in 33%¹⁷. Ries *et al*⁶ also reported seven patients with AVN of the femoral head associated with HIV, four (57%) with no other risk factor for epiphyseal necrosis. In case 3 of our series, AVN of the femoral head was the circumstance of the discovery of the HIV infection and no other risk factor was found. In a previous study of 366 patients infected with HIV and on treatment for more than 12 months, no cases of AVN of the femoral head had been reported, probably because of the absence of systematic X-ray of the pelvis¹⁸. Yombi *et al*¹⁹ in a similar study of 815 patients had reported a prevalence of 0.74% of AVN of the femoral head. Furthermore, magnetic resonance imaging and scintigraphy remain the ideal means of early diagnosis²⁰. Indeed, Miller *et al*²¹, in a comparative study of 339 HIV-infected patients and 118 healthy patients, had reported 15 cases (4.4%) of AVN of the femoral head in the group infected with HIV and no cases in the control group, using MRI as a diagnostic tool. HIV infected patients are at 100 fold greater risk of developing osteonecrosis than the general population²².

Nevertheless, the results of our study have been limited by biases due to the absence of research of

anti-phospholipid antibodies, protein S deficiency and lipid profile. However, these results are suggestive and demand the setting up of a multidisciplinary team to be in charge of the adverse effects of HIV and HAART treatment in the various countries of sub-Saharan Africa. Besides, the absence of study in population concerning the AVN of the femoral head, does not allow to assert that its prevalence is more higher in our series than in the general population.

Conclusion

HIV Infection has a role as a risk factor in AVN of the femoral head in Burkina Faso. Its mechanism (viral or iatrogenic) remains controversial. Considering the extent of the HIV pandemic in sub-Saharan Africa, studies of a larger scale are needed to define the exact place of this affection. Multidisciplinary teams are needed for the management of adverse effects related to the virus or the HAART. A HIV serology test should be performed routinely in all patients with AVN in sub-Saharan Africa, particularly in the absence of other risk factors.

Conflict of interest: The authors declare no conflict of interest.

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