

POLYVASCULAR DISEASE AT JOSEPH RAVOAHANGY ANDRIANAVLAONA HOSPITAL : PREVALENCE AND RISK FACTORS

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Abstract :-

Introduction : Polyvascular disease is a public health issue in the whole World. It is an incidental finding or it is discovered when there are manifestations due to low perfusion. The aim of this study is to report epidemiological, diagnosis and therapeutic aspects of this disease in JRA Hospital Antananarivo Madagascar.

Patients and methods. It's a retrospective and analytic study of 446 patients, from first January 2010 to 31th December 2019.

Results :This study counted 330 men and 116 women. They are between 50 and 60 (47.53%). The main risk factors are the age, the male gender, smoking and inactivity. The discovery circumstances is the lower extremity artery disease. The anti-atheromatous treatment is the base of the management. Only one third of the patients attend the periodic check up. Among them, five percent have bad outcomes and the others have steady arterial damage.

The prevalence of multisite artery disease is higher in this study compared to the others. Some of them are performed in general population and some other in people with cerebro-vascular disease. The main background discovery is the lower extremity artery disease while in other studies, it is either the coronary artery disease or the systematic screening. The open surgery is performed here, except the sus renal aorta aneurism, the coronaropathy due to a lack of technical equipment.

Conclusion : Polyvascular disease needs to be searched in high cardio-vascular risk factors patients or in symptomatic patients. Risk factors control is the condition of an efficient management.

Keywords :- Aneurism ; Coronary artery disease ;Cerebro-vascular disease ; Lower extremity artery disease ; Polyvascular disease.

INTRODUCTION

The polyvascular disease is the presence of at least two arterial lesions in two different anatomic and physiologic territories [1]. These arterial territories include : carotid arteries, coronary arteries, the abdominal aorta, the renal arteries and the lower limbs arteries. It's a new concept in a developing country like Madagascar. However, the cardio-vascular risk factor prevalence indicates that this disease does exist in our country. According to the WHO : 22% of Malagasy people have high blood pressure, four percent have diabetes mellitus, five percent are obese and 16% are inactive [2]. In Madagascar, this disease is only detected when one of the artery disease shows symptoms. In another countries, it is found out by systematic screening. Thus, the main goal of this study is to determine the prevalence of the polyvascular disease among Malagasy people, the second one is to identify the prevalence of each arterial lesions, the third one is to search for the main risk factors associated to the polyvascular disease and finally to show the link between the different arterial atheromatous lesions.

METHOD

It's a retrospective, descriptive and analytic study at the Joseph Ravoahangy Andrianavalona (JRA) hospital for ten years. The inclusion criterion is the presence of two or more atherosclerosis in two different territories. The non inclusion criteria are the inflammatory arteritis and the vessels lesions due to conjonctive tissues abnormalities. We excluded the patients which hadn't complete investigations. The patient with incomplete data and those who didn't give their consent are excluded. In this study, we searched for the socio-demographic parameters, the cardio-vascular risk factors, the background circumstances, the clinical features, the paraclinical evaluation and the treatment.

The socio-demographic parameters are the age, the gender, the adress and the profesion. The cardio-vascular risk factors are divided in two groups : the unchangeable and changeable risk factors. The unchangeable risk factors such as heredity, the age, the male gender. The changeable factors are the high blood pressure, the diabetes mellitus, the overweight, abdominal obesity, inactivity, smoking and metabolic syndrom.

The background circumstances are the first low perfusion manifestation which bring the patients to the emergency or on medical check up.

Many definitions have been included. The instable angina, non-Q wave myocardial infarction and ST elevated myocardial infarction represents the acute coronary syndrome. The cerebro-vascular disease encompasses the transitory and settle stroke with 50% stenosis of extra-cranial internal carotid artery. The definition of lower extremity artery disease is ABI lower than 0.9. Abdominal aorta aneurism is defined as a transverse diameter superior to 30mm seen at the CT angiography. We diagnose renal arteries stenosis if there is a reduction of more than 50% of the arteries diameter associated with high blood pressure.

RESULTS

We counted 446 (17,57%) patients that fullfil the inclusion criteria. Among people who have atherosclerosis, 47.30% have polyvascular disease. This population is composed of 330 men and 116 women with a sex ratio= 2.84. The majority of the population are more than 60 years old (47.53 %). Fifty eight percent of our patients live in the capital and 50% work in offices. The main risk factors are the age, the male gender (79.32%), smoking (70%) and inactivity (55%). The other risk factors are not major. Indeed, cardio-vascular heredity was seen only in 10,31% of the patients, high blood pressure in 40.35%, diabetes mellitus in 33.63%, overweight in 35.87%, abdominal obesity in 35.42% and metabolic syndrom in 20% of patients. The table 1 below shows the repartition of these cardio-vascular risk factors.

Table 1 : Repartition of the cardio-vascular risk factors

Risk factors	Population	Percentage	p-value
Cardio-vascular heredity	46	10,31%	0,1
Age > 60 years old	417	47,53%	1
Male gender	330	79,32%	0,08
High blood pressure	180	40,35%	0,04
Diabetes	150	33,63%	0,01
Overweight	160	35,87%	0,06
Abdominal obesity	158	35,42%	0,1
Smoking	312	70%	0,06
Inactivity	232	55%	0,008
Dyslipidemia	178	40%	0,001
Metabolic syndrom	89	20%	1,73

The risk factors which are highly associated with the numbers of affected arterial sites are : inactivity (p-value= 0.008), high blood pressure (p-value= 0.04), diabetes (p-value=0.01) and dyslipidemia (p-value= 0.001).

The lower extremity artery diseases (LEAD) are the main circumstances in which we discovered the polyvascular disease (57.84%). It is followed by the carotid artery stenosis (23.76%), the abdominal aorta aneurism (12.55%), the coronary artery disease and the renal arteries stenosis (2.91%).The diagram 1 below illustrates these repartitions.

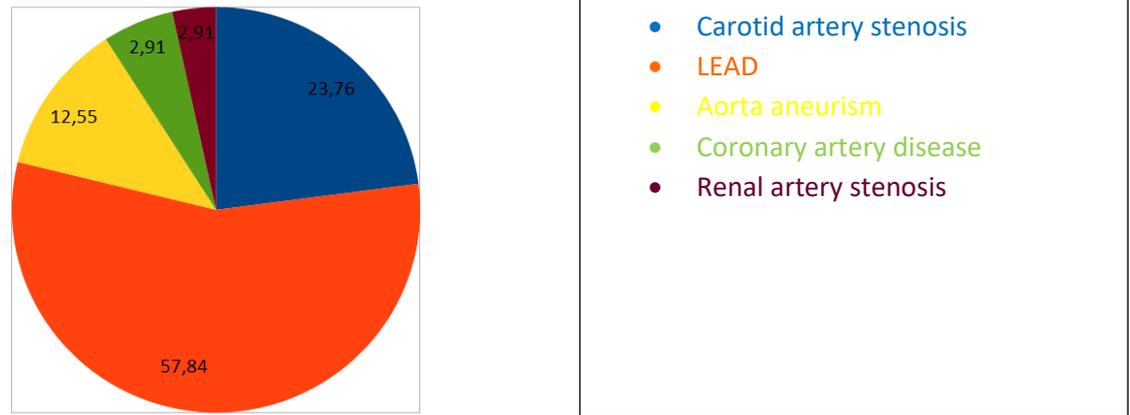


Diagram 1 : Patient repartition according to the background circumstances

For the lower extremity artery diseases, 37.79% of the patients have debilitating rest pain, 31% have nonhealing ulcer and gangrene, 22.48% have claudication and the 8,52% are asymptomatic. The main carotid artery stenosis feature is the settle ischemic stroke (43.39%). The abdominal aneurism clinical finding is mainly the abdominal pain in 71.42%, It is asymptomatic in 10.71% and ruptured in 17.85%. The coronary artery disease was discovered mostly by stable angina (61.53%). Only 2% of the patients have myocardial infarction and 36.46% have NSTEMI. The main manifestation of renal arteries stenosis is the severe and persistent high blood pressure.

We also analyzed the association between these arterial atheromatous damage.

LEAD is frequently linked to all the atheromatous arterial disease. In fact, we diagnoses LEAD in 44.44% of the patients consulting for angina. Coronary disease (p-value= 0.0005) are more likely associated with lower extremity artery disease than carotid artery stenosis. We also found LEAD in 53.33% of the patients diagnosed with renal artery stenosis. For the abdominal aorta aneurism, 57.14% of the patients have LEAD. The 65.68% of patients with carotid artery stenosis have LEAD.

The prevalence of carotid artery stenosis in LEAD is 41.09%. While only 15,47% of the patients with abdominal aorta aneurism have carotid artery stenosis at the same time. For coronaropathy, 33.33% of the patients presents carotid stenosis. Among patients suffering from renal arteries stenosis, 29,33% have confirmed carotid artery stenosis.

Coronary artery disease is oftenly associated with LEAD as it concerns 30.82% of the patients. For the other pathology it is minor : carotid artery stenosis (17.15%), abdominal aorta aneurism (20.23%), renal arteries stenosis (12%).

The abdominal aorta aneurism is not oftenly associated with the LEAD, the coronary artery disease, the carotid artery stenosis and the renal arteries stenosis. We found that 14.38% of the patients presenting LEAD have abdominal aorta aneurism. The prevalence of aorta aneurism is less than 10% in patients with carotid artery stenosis (7.35%) and renal arteries stenosis (5.33%). It is 18.51% in patients with coronary artery disease. In fact, the abdominal aorta aneurism (p-value= 0.015) is more likely associated with lower extremity.

We notice the same low prevalence for renal arteries stenosis because it is present in less that 10% of patients with carotid artery stenosis (9.80%), abdominal aorta aneurism (7.14%), coronary artery disease (3.7%). For the patients suffering from LEAD, 13.69% of the patients have renal arteries stenosis.

The paraclinical evaluation is based on the ultrasound with doppler and the CT angiography. Medical treatment (antiplatelet, ACE Inhibitor, statins) and dietetic measures have are introduced for all of our patients. For the lower extremity disease, revascularisation technics are used in 29.07% of the patients while 22.94% underwent amputations. Medical treatment alone was given to 47.01% of patients. Table 2 illustrates these treatments.

Table 2: Treatment of LEAD (Lower Extremity Artery Disease)

TREATMENTS	EFFECTIFS N=292	PERCENTAGES 100%
Medical only	140	47,94%
Endarterectomy of femoral artery	20	6,84 %
Aorto-femoral bypass	16	5,47 %
Femoral-popliteal bypas	6	2,05 %
Crossed bypass	7	2,39 %
Thrombectomy by Fogarty's balloon catheter	36	12,32%
Amputations	67	22,94%

The carotid artery stenosis is treated with endarterectomy for 49.01% of the case. Open surgery was performed in 60.71% of patients which have subrenal abdominal aorta aneurism. Aorto coronary bypass are performed abroad for the coronary artery disease. Patient with renal artery stenosis received medical treatment only.

The one third of our patients could attend the Day 7, Day 21, Day 30 and the monthly check up. Five percent of the patients died of cardio-vascular complications.

DISCUSSION

This study recorded 17.57% of polyvascular disease in the JRA Hospital cardio-vascular surgery care unit. The ESC (European Society of Cardiology) study found lower prevalence (0.04%) among people between 40 and 60 years, and 3.6% among those between 81 and 90 years [3]. These studies have been performed in general population, without symptoms while ours has been made in hospitalized and sick patients. It's the limit of this article because it only included the patients from one hospital of the capital. Another Serbian study reported higher rate : 46%. This work aimed to evaluate the prevalence of polyvascular disease in patients with carotid artery stenosis and lower extremity artery disease [4]. These patients had important predisposition to polyvascular disease.

The ESC found a median age of $63,2 \pm 12,2$ years old [3]. It is close to our findings as most of our patients are more than 60 years old. Another study reported that 56,8% of their patients are more than 65 years old [4]. The multisite artery disease arises mainly in elderly.

Male gender predominance was found in many studies. In the ESC study, the sex ratio was : 2,23 [3]. In this article, the male gender is not highly associated with polyvascular disease (p-value= 0,08). Vlajinac et al, gave the same conclusion (p-value= 0,1)[4].

Smoking is an important and independent cardio-vascular risk factor. In our study, it concerns 70% of the patients. A Serbian article gets closer to our results : 75,9%. It included passif and active smoking. The ESC study found 59,9% tobacco use among polyvascular patients because in European countries there are many anti-tobacco compain [3]. According to our results, smoking is not strongly linked to the numbers of affected arterial territories. While, Vlajinac et al affirmed this link (p-value= 0,001) [4]. Even after smoking cessation, the risk remains (p-value= 0,005).

Dyslipidemia was diagnosed in 40% of our polyvascular patients. The ESC and Vlajinac et al showed lower percentages : 30% and 26,3% [3,4]. The diet habits changes in developing countries explain these differences. Dyslipidemia is tightly associated with the multisite artery disease in this article and in Vlajinac et al article too (p-value= 0,0001)[4].

High blood pressure is present in 40,35% of our patients. Higher percentages was shown in other studies : 69% in a Serbian study [4] and 58,6% in a European study [3]. It is mainly due to ageing population in these countries. According to our analysis, high blood pressure and polyvascular disease are frequently associated (p-value= 0,04). The same result was found by Vlajinac et al (p-value= 0,001) [4].

Diabetes mellitus is one of the main cardio-vascular risk factors because it causes micro angiopathy and macroangiopathy. It is present in 59,8% of the polyvascular patients in the ESC study [3]. Compared to our percentages, it is higher because overweight which is a risk factor of non insulin-dependent diabetes is very high in Europe. However, a Serbian study results get closer to ours (39,9%). It also demonstrates that diabetes is specially linked to many atheromatous lesions (p-value < 0,05) [4].

Overweight concerns 63,1% of the polyvascular patients in the ESC article. This gap is the result of lowered calory intake in Malgasy diet. Indeed, malnutrition is rather important in our country. As result, overweight is not higly linked with multisite artery disease in this article.

Abdominal obesity wich is oftenly associated with overweight, involves 46,1% of patients in the ESC study and 48,2% in the article of Vlajinac et al [3,4]. These percentages don't differ from ours.

Metabolic syndrom which is the traduction of metabolic disorders affects 60,1% of the patients in the ESC study and 59,6% in a Serbian study. It's quietly different from our findings because metabolic syndrom occurs mostly in overweight patients.

The most dominant polyvascular disease risk factors are : diabetes mellitus, high blood pressure, dyslipidemia and inactivity. These results match with Vlajinac et al study in 2019 [4].

Lower extremity artery disease

In this work, the discovery circumstances of the polyvascular disease is the lower extremity artery disease, while for the ESC it's rather the screening [3]. Other studies concludes that we should screen for polyvascular disease only before revascularisation surgery [5]. An algerian work found that the coronary artery disease is the discovery pattern of multisite artery disease (L. Nazim, personal communication, 2019). In our article, 22.48% of the patients consult for claudication. Ashiwhinkumar et al counted 23,2% of claudication in patients with LEAD [6]. Our results are likely the same. In another study, claudication was more important as it was done in a diabetic population [7].

Carotid artery stenosis was diagnosed in 41.09% of patients presenting LEAD. Razzouk et al obtained the same result in 2009 [11]. However, Ahmed B et al found lower percentages (14%) as it has only counted the asymptomatic carotid stenosis [12]. The LEAD and renal arteries stenosis association is only seen in 13.69%. Aboyens V et al found a percentage between 10 to 23%. [13]. Aorta aneurism appears in 14.18% of the patients suffering from LEAD. It is alike Barba et al study [14] as it found 13% of aorta aneurism among lower extremity artery disease.

Coronary artery disease

In this article, coronary artery disease represents 2,91% of the circumstances discovery. A kenyan study, found that 5,1% of the patients consulted for acute coronary syndrom [15]. Another african study discovered that 3,4% of the polyvascular patients were admitted for acute coronary syndrome [15]. The coronary artery disease is under diagnosed. In addition, diabetes increases the silent ischemia. The main manifestation of coronary artery disease is stable angina in this article. Another study made in the USA found that 50% of coronaropathy manifested by stable angina . These results are not far from ours. The myocardial infarction prevalence is 2% in our study when it's only 0,23% in a study conducted in Mississipi [16]. The goal of this study was to check the prevalence of myocradial infarction among people receiving secondary prevention for coronary artery disease. According to Naylor AR et al, 17.6% of the patients diagnosed with coronary artery disease have carotid stenosis [17]. It is lower than our results because the definitions used were different. We affirm carotid artery stenosis if there is a reduction of 50% of the artery diameter while they consider a stenosis only for 70% of lumen reduction. A brasilian article, found the same prevalence : 17,4% of cerebro-vascular disease in candidates for aorto-coronary by pass [18]. The ESC recomanded screening of carotid artery stenosis before revascularisation surgery only for symptomatic stenosis [3]. In our study, LEAD is highly linked to coronary artery disease. Bauersachs et al, gave different result (28%) as our population have higher cardio-vascular risk factors, mostly smoking [19]. According to PEGASUS trial, LEAD is associated to high mortality after cardiac surgery [3]. Aorta aneurism and coronaropathy are not highly linked. It is confirmed by the literature (personnal communication). For the renal arteries stenosis associated with coronary artery disease, the ESC found 5 to 15%. It approaches our results. Renal arteries stenosis is related to bad out comes after coronary surgery repair [3].

Abdominal aorta aneurism

For the abdominal aorta aneurism, 71.42% showed symptoms such abdominal or groin pain. It is due to organ compression but it is oftenly a sign of pre-rupture. Simone K et al, affirmed that 65% to 90% of inflammatory aneurism are symptomatic compared to other aortic aneurism [20]. In spite of the non-inflammatory origine of our aneurisms, most of our patients are symptomatic. In fact, they only consult in late stage with large aneurism. Thus, only 10.71% of aobdominal aorta aneurism are asymptomatic and detected during abdominal palpation. There is a great proportion of LEAD among patients with abdominal aorta aneurism in our studies. Hassan et al gave lower percentages(13%) because the didn't use ABI to detect the LEAD [21]. Asymptomatic LEAD could have been missed. According to Hassan et al, 36% of the patients with abdominal aorta aneurism have coronaropathy. It is superior than our findings because the population was greater. For the carotid artery stenosis associated with abdominal aorta aneurism, we found 15,47%. Kosmas et al obtained a higher prevalence (30.4%) [22]. We couldn't explain the gap but the goal of that study was to demonstrate that LEAD, abdominal aorta aneurism and carotid artery stenosis are the sides of the same coin. That is why we tend to affirm that the polyvascular disease is a general pathology.

Renal arteries stenosis

Renal arteries stenosis are discovered at the ultrasonography and doppler of renal arteries in patients with severe and persistent high blood pressure. In other study, it is discovered at a late stage : ischemic nephropathy [23]. Many studies have affirmed the high prevalence of coronaropathy amonng patients with renal arteries stenosis : 66.1% according to Prewzevloeki et al [24] and 30% acoording to Duke study [25]. It is important compared to our results because the diagnosis of coronary artery disease is only based on clinical findinds. In these two studies, it was based on coronarography.

Carotid artery stenosis

Multisite artery disease is also discovered by the management of carotid artery stenosis in this article. In fact, 23,76% of polyvascular patients checked with doctors for carotid artery stenosis related symptoms. An Egyptian article provided

lower results (13,6%) because, it only included people beyond 60 years old [15]. In our research, 17.15% of the patients which suffered from cerebro-vascular disease have coronary diseases. Calvet et al showed the same results : 18% [26]. The patients were treated according to the international recommendations. Only open surgery can be performed in our country while non-invasive endovascular technics are available in developed countries [1]. As a result, the coronary artery disease, the sus-renal aorta aneurism have to be operated in a foreign center. The outcomes depends on the number of affected arterial territories. In fact, the occurrence of stroke is respectively 12.6%, 21.1% and 26.6% for patients who have one, two and three sites involved [27]. We regret the absence of data about the follow up. This is another limit of our study.

CONCLUSION

Polyvascular disease is settled in Madagascar even though it's still a new concept. This health issue leads to systematic screening for all symptomatic atherosclerosis in one localisation. The prognosis of some arterial stenosis depends on the presence of other artery disease. The risk factors should be assessed and treated. It's the base of multisite artery disease management.

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