Barriers to peripheral artery disease interventions in Sub-Saharan Africa- Review article

Abstract

Peripheral Arterial Disease (PAD) is on the increase in sub-Sahara Africa with a great impact on the quality of life among these patients. These patients are also at risk of coronary artery disease and ischemia; atherosclerosis being the underlying factor. The peripheral arterial disease tends to present asymptomatically, typical or atypical symptoms and is associated with comorbidities.

In sub-Sahara Africa region, PAD intervention challenges ranges from diagnosis and management subjects with Peripheral arterial disease, differences lack of access to the equipment needed, late presentation, inadequate education and training of health care providers to test for the condition, low level of public awareness to advocate for receiving testing, lack of funding for interventional cardiology/radiology procedures. All these issues pose important challenges associated with Peripheral arterial disease interventions in Sub-Sahara Africa.

Of note, this region is underdeveloped with most patients sicking health care paying from their pocket. Health care infrastructures are poorly developed in the region. As a consequence, several challenges regarding diagnosis and management issues should be acknowledged, and recommendation/research gaps should be addressed in order to successfully deal with this major health issue.

Keywords: diagnosis, management, and interventions of peripheral arterial disease, sub-Sahara Africa

Edafe Emmanuel A[1,2*], Dodiyi-Manuel Sotonye T[1] and Akpa Maclean R[1]

[1]Department of Internal Medicine, University of Port Harcourt Teaching Hospital, Nigeria
[2]Unit of Cardiovascular, Bayelsa Specialist Hospital, Nigeria

**Author for correspondence: dremmanueledafe@gmail.com*

Introduction

Peripheral Artery Disease (PAD) refers to clinical conditions causing narrowing of the branches of the aorta excluding the coronary and cerebral circulation. These diseases could affect the lower limb, renal, upper limb, the renal or other aortic branches within the circulation [1,2]. These conditions could be functional or structural (organic).

Various interventions ranging from endovascular to surgical therapies are available for renal artery stenosis, aortic aneurysm/dissection, carotid stenosis, critical lower limb ischemia. These procedures have existed for decades in developed and many middle-income countries [3]. In sub-Sahara African countries, these procedures are scanty and non-existing in many cities in the region. These have led to the development of various guides from the European Society of Cardiology and the American Heart Association/American College of Cardiology. For this reason, many of our patients are referred to either Western countries, India or South Africa for endovascular procedures [4,5]. In this review, we identify the challenges of peripheral artery disease interventions in the sub-Saharan Africa region.

Prevalence of Pad in Sub-Sahara Region

Johnston et al. in a review of the prevalence of PAD in sub-Sahara Africa found a prevalence ranging from 3.1% to 24% of adults aged 50 years and older, and 39% to 52% among diabetic individuals. Their review showed that the prevalence of PAD is similar to what is obtained in developed countries [6]. The traditional risk factors like diabetes mellitus, hypertension, smoking, dyslipidemia are common in the sub-Sahara Africa region. The same risk factors are common to atherosclerosis. The diagnosis of

PAD in the sub-Sahara Africa is made either by history, palpation or by ankle-brachial pressure index or Duplex ultrasound. The prevalence depends on the tools and the study population used in making the diagnosis.

Amissah et al. evaluated 200 adults living with DM attending a tertiary hospital in Ghana for the prevalence of lower PAD using ABPI. The study showed a PAD prevalence of 17.5% and 18% for left and right lower limb respectively [7]. Included in these patients were hypertensive subjects. However, subjects with lower limb amputation were excluded. Okello and his colleagues in southwestern Uganda studied 229 diabetic patients [7]. The prevalence of PAD diagnosed with ABPI ≤ 0.9 was 24% [8]. Of these, 87.27% had mild PAD (ABPI 0.71-0.9) while 12.73% had moderate to severe PAD (ABI<0.7) [8]. Amongst those with PAD, 43.64% reported claudication by the Edinburgh Claudication Questionnaire (ECQ). It was a hospital-based study involving diabetic patient's ≥ 50 years [8]. The investigators used ABPI calculated from the posterior tibial artery or the dorsalis pedis. Paquissi et al., in a cross-sectional study of 115 subjects (66.95% hypertensive, 6.95% diabetic and 9.56% smoking) and age ≥ 40 years showed PAD prevalence by ABPI of 42.6%. The study involved patients age 40 years. Most of the PAD was reported in patient's ≥ 60 years and above [9]. Among patients with PAD, 95.92% had mild disease and 4.08% had moderate to severe disease [9]. A study from South Africa involves 542 subjects and showed a prevalence of 29.3%. The patients were of ages above 50 years, and among the included patients, females were more diabetic, obese and hypertensive than men [10].

In Nigeria, most studies on the prevalence of PAD were hospital-based. There was varying prevalence from one study to another. The reason in part depended on sample size and stage of the disease. A hospital-based study in southwest Nigeria involved 219 diabetic subjects and of aged 50-89 years. They reported a prevalence of 52.5% among diabetic subjects [11]. Among those with PAD, 28.7% were symptomatic while asymptomatic were 71.3%. Patients with amputation and diabetic foot disease were included [11]. In another study from Obafemi Awolowo University, Ife, Nigeria enrolled 74 diabetic patients and of age ≥ 52 years. The study demonstrated a prevalence of PAD was 25.7% (using clinical palpation method) and 55.4% using ABPI<0.9. These patients were with T2DM, with 62.2% having diabetic foot disease [12]. Umuerri and Obasohan, at the University of Benin Teaching Hospital, evaluated 388 diabetic patients aged ≥ 35 years. The study showed the PAD prevalence of 35.5% using ABPI<0.9 [13]. In this study, the ratio of symptomatic to asymptomatic using the Edinburgh questionnaire was 1:7.6 [13].

Risk Factors and Co-Morbidities

In sub-Sahara Africa, the practicing physician should be aware of concomitant risk factors and co-morbid conditions that may either increase or preclude the suspicion of PAD. Traditional risk factors include diabetes mellitus, hypertension, and dyslipidemia, smoking elevated homocysteine, high sensitive CRP and chronic kidney disease [14]. PAD patients are increased risk of coronary and carotid artery disease [15,16]. Heidrich et al., have shown that subjects with PAD have a prevalence of 38.5% of orthopedic diseases such as arthritis and arthrosis [17,18]. These co-morbidities could exist in female or male and increasing age. Chronic kidney disease patients may have Bone Mineral Disease (BMD) that has a higher prevalence of atherosclerotic vascular disease (coronary artery disease, ischemic stroke or PAD) [19].

Healthcare Providers and Equipment

Availability of cardiac catheterization laboratory presently in the few regions. Using Nigeria with a population of about 200 million people with many cities, cath lab facilities are located in few cities like in Abuja, Lagos, Yenagoa, Enugu, Owerri, Uyo, Ado-Ekiti and Backok University in Ogu state. These facilities serve about 200 million people in Nigeria.

Human resources are few. The numbers of interventional cardiologists in the region of sub-Sahara Africa are few. The reason may be the cost of training as an interventionist and lack of dedicated training centers in the region. There limited cath lab nurses in the country. The reason for this may be due to the growing field of interventional cardiology and no active training center in the country for cath lab nurses. The field of biomedical engineers is new in the region. We have a few biomedical engineers and cath lab technicians. Few cath lab technicians in the country were trained in India, most without sponsor or aid.

Invasive treatment of PAD and CAD are expensive in the region. Peripheral and coronary

angioplasties are currently funded by the patient or relatives. There no current national or state scheme for funding patients requiring coronary or peripheral interventions in the region. This has left most patients that require these interventions to be left out without treatment. There is a large pull of patients requiring this treatment modality but can access it because of the cost of the intervention. This has reduced it to a few patients to access it.

Diagnostic Challenges

■ Clinical presentation

Awareness of PAD in sub-Sahara Africa is low compared with the knowledge of infection diseases [19]. This makes the diagnosis less suspected and many health care providers do not look for it. Most of the patients were in their late middle-aged to elderly at presentation [12]. At presentation, co-morbid conditions such as obesity, hypertension, diabetes and degenerative bone diseases of the knee, hip, and vertebrate overshadow the complaints of claudication or rest pain of peripheral artery disease. The symptoms of PAD may be denied and interpreted as knee or hip pain. This delay in presentation would lead to ulcers of the foot that would extend to the leg or thigh at presentation. Even though who recognizes their problem might first seek help from prayer houses or herbal medicine thinking that such spiritual help would lead to healing. Many only presents when all these have failed.

Although history and physical examination are of utmost importance for overall cardiovascular risk evaluation and PAD assessment, the use of an objective diagnostic method is critical for proper PAD diagnosis. Both invasive and noninvasive methods are available for the diagnosis of peripheral artery disease.

Non-invasive tests include the Ankle-brachial index/Toe brachial index, Segmental limb pressures, Pulse volume recordings, Doppler velocity waveform analysis, Treadmill exercise testing, Duplex scanning, and CT angiography and MRA. The ankle-brachial index which is the commonest and effective means of diagnosing peripheral artery disease is not routine being practiced in the region.

Invasive tests include the following: Catheter angiography and digital subtraction angiography, fractional flow reserve, intravascular ultrasound, and Optical coherence tomography. Most of the varieties of investigations are available in most cardiac cauterization laboratory in sub-Sahara Africa.

Treatment Challenges

The treatment of PAD includes risk-factor reduction and, in symptomatic patients, exercise-training therapy, pharmacologic intervention and, when indicated, revascularization [4,5]. Revascularization is typically considered in patients with PAD who have developed any 1 of 3 distinct clinical presentations [4,5].

1. lifestyle-limiting claudication no longer responsive to conservative therapy (IC)
2. Critical Limb Ischemia (CLI) Or
3. Acute Limb Ischemia (ALI)

The challenges we encounter are extensive calcification with total long segment occlusion, the interventionist need floppy 0.014 to chronic total occlusion wire with extra support. This may help to cross the lesion before changing to other wire and dilating. But in these range of flexibility are limited in the region due to the fact patient cannot pay for the cost of these consumables.

Barriers to Peripheral Artery Disease Care in Sub-Sahara Africa

We did not find any information on specific barriers in the PAD interventions in sub-Sahara Africa health care. PAD in Africa is often unrecognized, under-diagnosed, and under-treated. PAD interventional barriers in Africa include:

-Lack of interventional cardiologist or radiologist trained in peripheral interventions

-lack of access to the equipment needed

-late presentation

-inadequate education and training of health care providers to test for the condition

-low level of public awareness to advocate for receiving testing

-lack of funding for interventional cardiology/radiology procedures

Recommendations

The government of the region has a lot to do in making healthcare affordable in patient management. There should be a policy by the

government to cut down the cost of various devices used in the management of peripheral artery disease intervention. The government could invite the device manufacturing companies to a round table meeting to work out a way to reduce the cost for the sub-Sahara Africa region. The government should create a soft landing for device companies. This will make their product cheap accessible and affordable. Training of human resources locally and abroad for the use of these devices could be done by the government and the companies. Government and device companies in conjunction with the private sector should fund research in the region into the development of affordable devices for the population. Regional governments should set up regulatory bodies to ensure implementation and adherence of the policy for the growth of the cardiovascular health of sub-Sahara Africa.

Conclusion

This review highlighted the challenges that are being faced by a vascular interventionist in Nigeria. Suggested recommendations to overcome these challenges are also noted.

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