

# Pattern of Extracranial Peripheral Aneurysm at a Referral Hospital in Kenya

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## Abstract

### Background

Peripheral aneurysms are important because of concurrence with aortic ones and potential to thromboembolise or rupture. Their distribution shows population variations yet reports from Africa are scarce and altogether absent from Kenya.

### Objective

To describe the pattern of peripheral aneurysms in a Kenyan national referral hospital.

### Patients and methods

Records of in-patients with a diagnosis of peripheral aneurysms at Kenyatta National Hospital between January 1998 and December 2007 were analyzed for presentation, diagnostic method, risk factors, site, age and gender distribution. Only records containing all these data were included. Data were analyzed using SPSS version 13.0 and presented using tables, and bar charts.

### Results

Ninety six cases involved the femoral (24%), common carotid (15.6%); brachial (12.5%); brachiocephalic (11.5%) and popliteal (10.4%) arteries. They presented with pulsatile mass (37.5%), painful swelling (22.9%) and pressure on subjacent structures (13.5%). Diagnosis was confirmed by Doppler ultrasound (37.5%), conventional angiography (30.2%) and plain ultrasound (14.6%). Mean age was 45.6 years (range 13 – 79 years); with 50% of them occurring in individuals aged 40 years and younger. Common risk factors were trauma (39.6%), hypertension (13.5%) and atherosclerosis (9.4%). Male:female ratio was: 1.5:1 for femoropopliteal, 5:1 for brachial; 1:1 for common carotid and 1:2.6 for brachiocephalic trunk.

### Conclusion

Characteristics of peripheral aneurysms in the Kenyan study population vary from those of Caucasians. They are more widespread, trauma related, and occur in younger individuals. Prudent management of risk factors is recommended.

## Introduction

Peripheral aneurysms are rare compared to aortic ones but they are important because of their predictive value for existence of aortic aneurysms, and potential to thromboembolise or rupture (1-3). Their localization, age and gender distribution display ethnic and regional variations (1-4). In Sub-Saharan Africa, as cardiovascular risk factors increase (5), rise in aneurysms is imminent. Reports of aneurysms from the continent are however scarce and altogether absent from Kenya. The objective of this study was to describe the characteristics of peripheral aneurysms seen at a Kenyan referral hospital.

## Patients and Methods

This was a retrospective cross-sectional study at Kenyatta National Hospital, Nairobi, Kenya, over a ten (10) year period from 1st January 1998 to 31st December 2007. Ethical approval was obtained from Kenyatta National Hospital-Ethics and Research Committee. Hospital records of in-patients with diagnosis of aneurysm outside the aorta and intracranial arteries (WHO classification codes I-72) were retrieved. The files were categorized

into those of females and males. Each gender was then further subdivided into nine age groups of ten years each, starting from the age of one year. Each category was examined for clinical presentation, diagnostic method, risk/comorbid factors and site. Risk/comorbid factors evaluated included hypertension, diabetes mellitus, smoking, atherosclerosis, infections including HIV, alcohol, chronic renal disease, connective tissue and autoimmune disorders. Only records with complete data as specified above were included. The data were analyzed using SPSS version 13.0 for Windows (Inc Chicago Illinois) and presented using frequency tables and bar charts.

## Results

One hundred and thirteen records were retrieved. Seventeen were excluded, 10 for unconfirmed diagnosis, five in whom age was not specified and two where site was not clear. Ninety six records were analyzed. In seven cases there were concurrent abdominal aortic aneurysms associated with femoropopliteal ones.

Age Range	Femoral	Common carotid	Brachial	Brachiocephalic	Popliteal	Subclavian	Internal thoracic	Common iliac	Posterior tibial	External iliac	Radial	Interosseus	Total
1-10	0	0	0	0	0	0	0	0	0	0	0	0	0
11-20	0	0	2	0	0	1	0	0	0	0	0	0	3
21-30	6	4	5	1	2	2	0	0	2	0	0	0	22
31-40	4	3	3	2	1	0	6	3	0	0	1	0	23
41-50	6	0	2	0	1	2	0	0	0	1	0	0	12
51-60	2	3	0	0	5	0	0	0	0	0	0	0	10
61-70	2	5	0	3	1	4	0	2	0	0	0	0	17
71-80	3	0	0	5	0	0	0	0	0	0	0	1	9
81-90	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	23	15	12	11	10	9	6	5	2	1	1	1	96

Table 1: Age spread of peripheral aneurysms

### Presentation and Diagnosis

The most common presentations were pulsatile mass (37.5%), pain and swelling (22.9%), and pressure on subjacent structures (16.7%). Other recorded presentations included pain alone (8.3%), bleeding (7.3%) and gangrene (1.0%). In 6 cases (6.3%) there was more than one feature. In 87 cases diagnosis was confirmed by doppler ultrasonography (37.5%), angiography (30.2%) conventional ultrasound (14.6%), CT scan (10.4%) and MRI (2.1%). Nine cases were diagnosed clinically; three (3.1%) before, and six (6.3%) during surgery.

### Site localization of aneurysms

The most commonly affected site was femoral (24%) followed by common carotid (15.6%), brachial (12.5%), brachiocephalic (11.5%); popliteal (10.4%); subclavian (9.4%); internal thoracic (6.3%); and common iliac (5.2%) arteries. Posterior tibial, external iliac, radial and anterior interosseus arteries were involved in only isolated cases (Figure 1).

### Risk/comorbid factors

Trauma was the leading risk factor (39.6%). Others included hypertension (16.7%); atherosclerosis (12.5%); smoking (7.3%), and alcohol, diabetes and autoimmune disease (5.2% each). In four cases (4.2%) no factor was identified. Infection was implicated in only 2 cases (2.1%).

### Age and Gender Distribution

The mean age was 45.6years with range of 13 – 79 years. Notably, 48 (50%) of the patients were aged 40 years and younger. The most frequently affected age group was 21 – 40 (46.9%), followed by 51 – 70 (28.1%). There were no aneurysms below 10 years, and only 9 (9.4%) of the aneurysms occurred after 70 years. The age distribution varied with the vascular field (Table 1). There was a male predominance in most cases except the brachiocephalic and subclavian in which the male:female ratio was 1:2.6; and 1:2 respectively. In common carotid artery, the male:female ratio approached 1:1 (Figure 2).

### Discussion

Peripheral aneurysms are rarely reported in Africa (4). Reports from western countries indicate that they are rare, but considered important because their presence may point to the concurrent involvement of the abdominal aorta (1,2). In the present study for example, half of the cases of popliteal aneurysms presented with concurrent abdominal aortic aneurysms.

The clinical features of pulsatile masses, painful swellings, pressure effects, bleeding and gangrene are consistent with literature reports (2,3,6). Similarly the diagnostic modalities of doppler ultrasound, angiography and CT are typical for reported series (7,8). Indeed the ultrasonography provides a non invasive and relatively inexpensive technique for accurate and prompt diagnosis.

Pattern of Peripheral Aneurysms in a Kenyan National Referral Hospital

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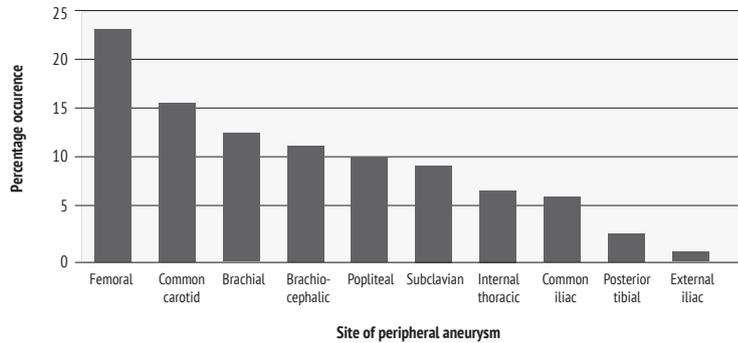


Figure 1: Sites of peripheral aneurysms

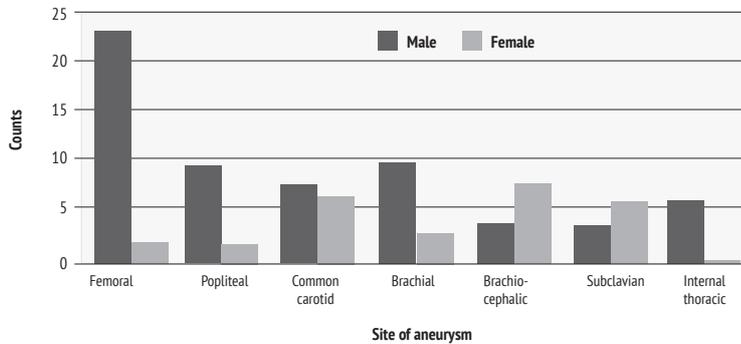


Figure 2: Gender distribution of some peripheral aneurysms:

Author	Artery	Population	Mean age	N
Ravn et al., 2007(18)	Popliteal	Swedish	71	571
Diwan et al., 2000(1)	Femoro-popliteal	American	73.4	313
Lotina et al., 1997(11)	Carotid	Serbian	58.22	12
Hamish et al., 2009(19)	Popliteal	53 studies	65	2854
Present study	Several	Kenyan	45.6	98

Table 2: Comparison of some mean ages reported in literature

sis of aneurysm (8).

The result of site localization in this study is unique. The popliteal artery is the most common site of peripheral aneurysms in Caucasian populations, accounting for 70 – 85% of the total, followed by femoral artery (1,2,10-14). In the current study, at variance with these reports, popliteal artery aneurysms ranked 5th and accounted for only 10.4% of the total, behind femoral (24%), common carotid (15.6%), brachial (12.5%) and

brachiocephalic (11.5%). For the upper extremity aneurysms the frequency of reported involvement is subclavian followed by axillary, brachial, ulnar and radial in that order (15). Our observations show more frequent brachial artery involvement with no case involving the axillary artery, attesting to inter-population differences. In Japan, popliteal artery aneurysms account for 15 – 28% while femoral ones comprise about half of the cases (16), possibly related to a combination of unique environmental, genetic and lifestyle risk factor profiles (17-19).

In Western studies with predominantly Caucasian populations, majority of peripheral aneurysms are caused by atherosclerosis (1,2) and cardiovascular risk factors such as hypertension, smoking, dyslipidaemia diabetes mellitus and obesity (17). Observations of the current study reveal, however, that only 16.7% of the cases are due to atherosclerosis, and 26% are associated with modifiable cardiovascular risk factors. A large number of the aneurysms are associated with trauma, suggesting that they are pseudoaneurysms. Pertinent observations in support of this suggestion are, first that a significant number present as painful pulsatile swellings, features classically ascribed to false aneurysms (20). Secondly, they occur in younger individuals more vulnerable to traumatic false aneurysms (19). The mean age of 45.6 years observed in the present study is significantly lower than those reported in literature (Table 2) where different risk factors operate (4). Thirdly, many of them affect the femoral and brachial arteries, frequent sites of accidental and iatrogenic arterial injury (21,22).

The non-trauma risk factors are modifiable. For this young cohort, the control for the risk factors may have to commence early. The male predominance observed in the this study compares with that reported for the femoral and subclavian-axillary arteries (23). This appears to support the view widely held that in atherosclerotic aneurysms female hormones may confer protection. In conclusion, peripheral aneurysms in this Kenyan study population are more widespread, trauma related,

and occur in younger individuals. Trauma and cardiovascular risk factors predominate. Prudent management of the modifiable cardiovascular risk factors is recommended.

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## References

1. Diwan A, Sarkar R, Stanley JC, et al. Incidence of femoral and popliteal artery aneurysms in patients with abdominal aortic aneurysms. *J Vasc Surg* 2000; 31: 8963-8969.
2. Thomson MM, Bell PRF. ABC of arterial and venous disease: Arterial aneurysms. *BMJ* 2000; 320:1193-1196.
3. Ravn H, Bergqvist D, Bjorck M. Nationwide study of the outcome of popliteal artery aneurysms treated surgically. *Br J Surg* 2007; 94:970-977.
4. Kitchen ND. Racial distribution of aneurysms in Zimbabwe. *J R Soc Med.* 1989;82:136-138.
5. Akinboboye O, Idris O, Akinboboye O, Akinkugbe O. Trends in coronary artery disease and associated risk factors in Sub-Saharan Africa. *J Hum Hyperten* 2003; 17: 381-387.
6. Yetkin U, Yurekli I, Gurbuz A. Extracranial internal carotid aneurysms. *Internet J Thorac cardiovasc surg* 2007; 10 (2).
7. Alonso SE, Azcona CM, Heredero AF, de Cubas LR. Post sternotomy intercostals pseudoaneurysm. Sonographic diagnosis and thrombolysis by ultrasound guided percutaneous thrombin injection. *Int cardiovasc Thorac Surg* 2009; 9: 722.
8. MacGowan SW, Saif MF, O'Neill G, et al. Ultrasound examination in the diagnosis of popliteal artery aneurysms. *Br J Surg* 2005;72: 528-529.
9. Maydew MS. Dorsalis pedis aneurysm: ultrasound diagnosis. *Emerg Radiol* 2007;13:277-280.
10. Lotina S, Davidovic L, Kostic D et al. Aneurysms of carotid arteries. *Srp Arh Celok Lek* 1997; 125: 141 -153.
11. Mori H, Okamura Y, Mochizuki Y et al. A surgical case of concomitant aneurysms of the brachiocephalic and coronary arteries: case reports. *Ann Thorac cardiovasc Surg* 2005; 11: 128 – 131.
12. Bin HG, Kim MS, Kim SC, et al. Intrathoracic aneurysm of the right subclavian artery presenting with hoarseness: a case report. *J Korean Med Sci* 2005; 20: 674 – 676.
13. Tadao K, Mikio C. Non-trauma induced aneurysms of the left Internal thoracic artery with ischaemic heart disease. Report and review of the literature. *Jap J Cardiovasc Surg* 1999; 28: 260 – 263.
14. Parry DJ, Kessel D, Scott DJA. Simplifying the internal iliac artery aneurysm. *Ann R Coll Surg England* 2001; 83: 302-8.
15. Al-Omran M. True ulnar artery aneurysm of the hand in an 18-month old boy: Case report. *J vasc Surg*2007; 45: 841-843.
16. Hashimoto W, Yamada T, Matsumaru I. Popliteal artery aneurysms and popliteal phymas:case report. *Ann Thorac Cardiovasc Surg* 2009; 15: 64 – 67.
17. Fowkes FGR, Housle E, Riermersma RA et al. Smoking, lipids, glucose intolerance and blood pressure as risk factors for peripheral atherosclerosis in the Edinburgh Artery Study. *Amer J Epidemiol* 1992; 135: 331 – 340.
18. Mac Sweeney STR, Skidmore C, Turner RJ et al. Unravelling the familial tendency to aneurismal disease. Popliteal aneurysm, hypertension and fibrillin genotype. *Eur J Vasc Surg* 1996; 2: 162 – 166.
19. Hamish M, Lockwood A, Cosgrove C, et al. Management of popliteal artery aneurysms. *ANZ J Surg* 2009; 76: 912 – 915.
20. Ritchie DA, Hill D, Fullarton GM, Calvert MH. Ultrasound diagnosis of profunda femoris pseudoaneurysm following a nail-plate fixation of a transcervical femoral fracture. *Br J Rad* 1987; 60: 502 – 504.
21. Darbari A, Tandon S, Chandra G. et al. Post-traumatic peripheral arterial pseudoaneurysms: our experience. *Ind J Thorac cardiovasc surg* 2006; 22: 182 – 187.
22. Moini M, Rasouli MR, Rayatzadeh H, Sheikholeslami G. Management of femoral artery pseudo-Aneurysms in Iran: a single centre report of 50 cases. *Acta chir belg* 2008; 108: 226 – 230.
23. Pairolero PC, Walls JT, Payne WS et al., Subclavian-axillary artery aneurysms. *Surgery* 1981; 90: 757 – 763.