Pattern of Cerebral Aneurysms in a Kenyan Population as Seen at an Urban Hospital

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■ BACKGROUND: **Intracranial aneurysms constitute a significant part of the caseload for any neurosurgical service. Despite the occurrence of intracranial aneurysms and the availability of advanced diagnostic tools and management options, there is a paucity of published data concerning aneurysm patterns in Kenya.**

■ METHODS: **This was a combined retrospective and prospective quantitative descriptive study. Following ethical approval, all patients with cerebral aneurysms seen on computed tomography angiography who presented at Nairobi Hospital between May 2010 and June 2014 were included. A standardized questionnaire was used to collect data on patient characteristics, indications for imaging, and radiologic findings. Analysis was carried out SPSS for Windows version 15.0.**

■ RESULTS: **The study included 121 patients with a female (71.9%) predominance; most (30.58%) of the patients were aged 50–59 years. There were 151 aneurysms observed, with 85.95% of patients having solitary aneurysms and 14.05% having multiple aneurysms; 82.1% of the aneurysms were located in the anterior circulation. Mean aneurysm size was 6.92 mm, mean neck diameter was 2.79 mm, and the range of diameter/neck ratio was 1–11.88 (mean 1.16). The rate of subarachnoid bleeding displayed an exponential increase with aneurysms 3 mm in size and appeared to plateau thereafter despite increasing aneurysm size. Most (78.8%) of the observed anterior communicating artery aneurysms were ruptured.**

■ CONCLUSIONS: **Most patients were postmenopausal women, who had a higher rate of aneurysms with an elevated risk of rupture for small aneurysms; this suggests that clinicians need to be more vigilant and have a higher index of suspicion in such patients with subtle clinical signs. This study revealed a pattern of aneurysms in accord with previous reports and is expected to serve as a basis for further research on aneurysm management, outcome, and prognostic indicators in the Kenyan population.**

INTRODUCTION

Ruptured intracranial aneurysms are the most common cause of subarachnoid hemorrhage (SAH) and can cause significant morbidity and mortality.[1,2] The incidence of SAH in Western populations is about 10–15 per 100,000 persons per year with 70% of such patients having ruptured aneurysms on imaging studies.[2] Furthermore, the prevalence of asymptomatic intracranial aneurysms is estimated to be about 2%.[1-4] Understanding of the pattern of intracranial aneurysms is helpful in the management of this disease. Thus, the epidemiology of intracranial aneurysms in Western populations is well reported in the literature and includes the size, location, and prevalence of multiple aneurysms.[1-4]

Treatment of ruptured and unruptured intracranial aneurysms requires a detailed study of the vascular anatomy. Computed tomography (CT) angiography is noninvasive, is relatively inexpensive, and can be performed immediately after routine unenhanced CT scanning of the brain in patients with suspected aneurysmal SAH.[5,6] In addition, CT angiography permits the viewer to observe the aneurysm from any angle or perspective, while depicting important bone landmarks, aiding in the selection of the optimal surgical approach.[7] Despite these advances with the

Key words
- Cerebral aneurysm
- Computed tomography (CT) angiography
- Kenyan

Abbreviations and Acronyms
AComA: Anterior communicating artery
CT: Computed tomography
DSA: Digital subtraction angiography
ICA: Internal carotid artery
ISUIA: International Study of Unruptured Intracranial Aneurysms
MCA: Middle cerebral artery
SAH: Subarachnoid hemorrhage

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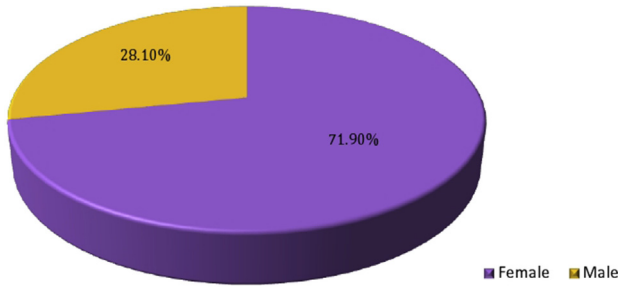

Figure 1. Pie chart representing distribution of patients with cerebral aneurysms by sex.

advent of CT angiography, there has been a local challenge in Kenya in convincing neurosurgical practitioners to move from the traditional gold standard of digital subtraction angiography (DSA) to hasten patient evaluation and management.

A review of the few studies published in the literature on intracranial aneurysms in Kenya revealed that ruptured aneurysms, similar to elsewhere in the world, were the most common cause of primary SAH, accounting for slightly more than 70%. Some data showed intracranial aneurysms among Kenyans were common in the posterior communicating artery and the anterior communicating artery (AComA). These were studies comprising 55–147 patients and done mainly using DSA, meaning many of the aneurysms would be diagnosed after rupture. In Kenya today, noninvasive imaging modalities such as CT angiography and magnetic resonance angiography are readily available, leading to increased diagnoses, including incidental diagnoses. Because of this increase in diagnosed aneurysms and the dearth of published literature on the patterns of intracranial aneurysms in our population, we decided to conduct a study with the aim of obtaining more recent data on the patterns of intracranial aneurysms in terms of size, location, and prevalence of multiple aneurysms.

MATERIALS AND METHODS

Following approval from the Nairobi Hospital Research, Ethics, and Standards committee, all patients with cerebral aneurysms seen on CT angiography done at the Nairobi Hospital Radiology Department between May 2010 and June 2014 were included in the study. In all patients, cerebral CT angiography was performed using a multidetector Philips Brilliance 64-slice CT scanner (Philips Healthcare, Best, The Netherlands) based on a standardized protocol. The scanner is equipped with a flying spot adaptive array matrix and a gantry rotation time of 352 ms. It is augmented with a Medrad Stellant injector pump (Bayer), pressure injector, and P_3T bolus software (Bayer). This equipment facilitated an automated run with a selected threshold of 150 mg/mL of nonionic contrast media (iohexol [Omnipaque 350; GE Healthcare]), which was injected through an 18-gauge antecubital Venflo catheter in all cases with a pressure injector rate of 5 mL/second. After obtaining a scout view to determine the three-dimensional CT angiography scan range, the 18-gauge intravenous catheter was connected to a dual head power injector. Dynamic scanning was started after the injection of 60 mL of nonionic contrast media (Omnipaque 350) at a rate of 5 mL/second, followed by a chaser bolus of 30 mL of saline. The scan parameters were 120 kV/300 mAs, 325 ms per rotation for 64 rotations, 512 × 512 matrix, and 64 sections of 0.625 mm.

A standardized questionnaire was used to collect data. A data entry interface was created, and data analysis was carried out using SPSS for Windows version 15.0 (SPSS, Inc., Chicago, Illinois, USA). Frequencies, means, median, and interquartile ranges were computed for description of the different variables.

RESULTS

During the study period, 121 patients met the inclusion criteria. Of these patients, there was a clear female predominance, with 87 (71.9%)

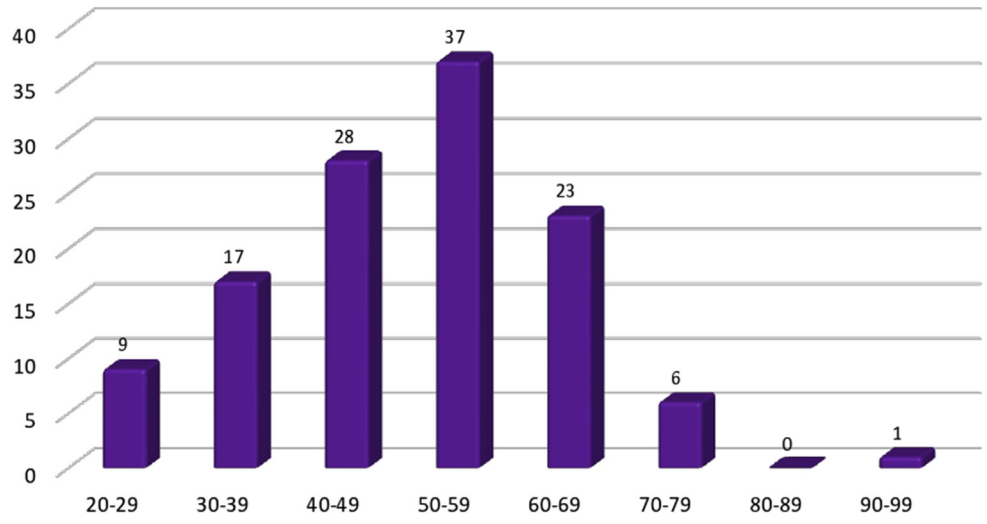

Figure 2. Distribution of patients with cerebral aneurysms by age.