

Two young men with STEMI in Rwanda: a case report

Authors: D. Hopkinson¹, W. Mucyo¹, M. Nkeshimana^{1,2}

Affiliations: ¹University of Rwanda School of Medicine and Pharmacy; ²Centre Hospitalier Universitaire de Kigali, Department of Accident & Emergency

ABSTRACT

Cases: A 34-year-old and a 48-year-old man presented to a referral hospital in Rwanda with chest pain. ECG demonstrated anterior wall ST-segment elevation myocardial infarction. Because reperfusion therapy was unavailable, the patients received standard medical therapy with dual antiplatelet therapy, anticoagulation, beta blocker, and statin, and were discharged home in good condition.

Discussion: These cases demonstrate the need for epidemiologic data on acute coronary syndrome (ACS) in Rwanda. These cases were unusual because of the young age of the patients who possessed the sole risk factor of past smoking. This raises the hypothesis of unrecognized risk factors for ACS in Africans. The lack of reperfusion therapy will likely result in increased morbidity and decreased productivity during the lives of these men and other young Rwandese who suffer from myocardial infarction.

Keywords (MeSH): Acute coronary syndrome; ST Elevation Myocardial Infarction; Rwanda; Sub-Saharan Africa; reperfusion therapy; epidemiology; tobacco use; ECG; Case Report

INTRODUCTION:

The burden of noncommunicable disease (such as cardiovascular disease) is on the rise in sub-Saharan Africa, shifting the burden of infectious diseases to a less central position [1]. This epidemiological transition is fueled in part by increasing wealth and urbanization. The accompanying lifestyle changes come with an increased risk of chronic diseases including diabetes mellitus, hypertension, and obesity [2]. These conditions are all risk factors for the development of cardiovascular disease, and are all on the rise in Rwanda [3].

The cases presented below describe two patients with ST-segment elevation myocardial infarction (STEMI) who are both young and have the sole risk factor of being former tobacco smokers. These cases highlight the need for key epidemiology data such as prevalence, age distribution, and risk factors which are not known in our population and where management is generally limited to the second-line therapy of medical management, as opposed to the first-line therapy of primary percutaneous coronary intervention (PCI).

CASE PRESENTATIONS:

Case 1: A 48-year-old Rwandese man with no known medical history presented to the accident and emergency department at a public referral hospital in Rwanda with a ten-hour history of severe substernal chest pain, described as a “tightening.” The pain radiated to his jaw and down his left arm and was accompanied by vomiting. The patient reported a history of minimal cigarette smoking of 2.5 pack-years twenty years ago and denied family history of heart disease. Physical exam was notable for a generally-well appearing, non-overweight man with normal cardiac and lung examinations.

An ECG on presentation demonstrated ST elevations in leads V1 – V4, Q waves in leads V2 – V4, and T wave inversions in V2 – V5 (Figure 1). Cardiac enzymes were elevated, with a CK MB of 636 u/L (reference 5-25 u/L). A lipid panel was within normal limits and hemoglobin A1C was 6.2% (reference 4.8 - 5.6%). An anterior wall ST-segment elevation myocardial infarction was diagnosed (Figure 1), and he was treated with aspirin loading dose of 300mg PO followed by 100mg PO daily, clopidogrel 75mg PO daily, atenolol 50mg PO daily, rosuvastatin 20mg PO daily, therapeutic anticoagulation dose enoxaparin (80 mg subcutaneously twice daily), as well as sublingual nitroglycerin 5mg and morphine 5mg subcutaneously as needed for chest pain.

Corresponding author: Dennis Hopkinson, dahopk@gmail.com **Potential Conflicts of Interest (Col):** All authors: no potential conflicts of interest disclosed; **Funding:** All authors: no funding was disclosed; **Academic Integrity.** All authors confirm that they have made substantial academic contributions to this manuscript as defined by the ICMJE; **Ethics of human subject participation:** The study was approved by the local Institutional Review Board. Informed consent was sought and gained where applicable; **Originality:** All authors: this manuscript is original has not been published elsewhere;

Review: This manuscript was peer-reviewed by 3 reviewers in a double-blind review process;

Original submission; Original decision: 09th March 2019; **Revised submission;** 21st March 2019 **Revised submission accepted:** 22nd March 2019

Copyright: © The Author(s). This is an Open Access article distributed under the terms of the [Creative Commons Attribution License \(CC BY-NC-ND\)](#) (click here), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited. **Publisher:** Rwanda Biomedical Centre (RBC)/Rwanda Health Communication Center, P.O.Box 4586, Kigali.

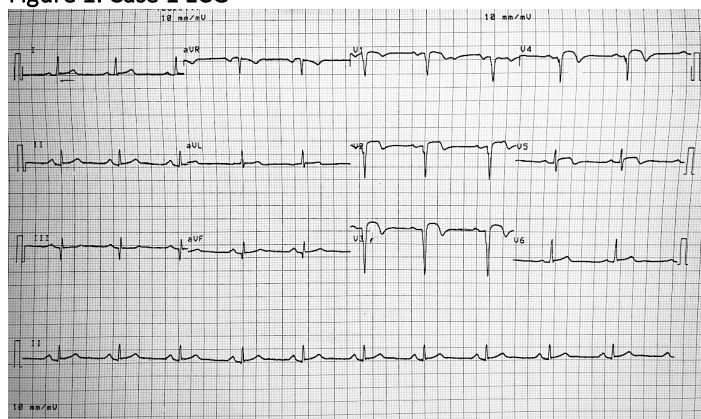
ISSN: 2079-097X (print); 2410-8626 (online)

Citation for this article: Hopkinson DA, Mucyo W, Nkeshimana M. “Two young men with STEMI in Rwanda: a case report”, *Rwanda Medical Journal*. Vol 76, no 2, pp 1-4, 2019

A transthoracic echocardiogram was notable for septal hypokinesis, mild pericardial effusion, and a left ventricular ejection fraction of 40%. Chest x-ray was unremarkable. The patient's symptoms improved, and cardiac enzymes normalized over the next 48 hours and the patient was discharged home with the medication regimen as above, with discontinuation of morphine. After diagnosis with an anterior wall STEMI, the patient requested percutaneous coronary intervention as he was aware that this is the first-line treatment for his condition. At the time of this writing, the patient has stated that he will pursue angiography in a country that has a cardiac catheterization laboratory.

Case 2: A 34-year-old previously healthy Rwandese man presented to the same accident and emergency department with a 3-hour history of left-sided chest pain that began while he was jogging. The pain radiated to his left shoulder and down his left arm. He also reported generalized weakness and diaphoresis. The patient reported a history of smoking 9 years ago (2 pack-years)

Figure 1: Case 1 ECG



An ECG demonstrated ST-segment elevations in leads V1 - V4 with Q waves in these same leads (Figure 2). Cardiac enzymes were remarkable for a CK MB of 129 u/L (reference 5-25 u/L). A lipid profile was within normal limits and blood glucose on presentation was 131 mg/dL (reference 72 - 106 mg/dL). A transthoracic echocardiogram was notable for normal wall motion and a left ventricular ejection fraction of 60%.

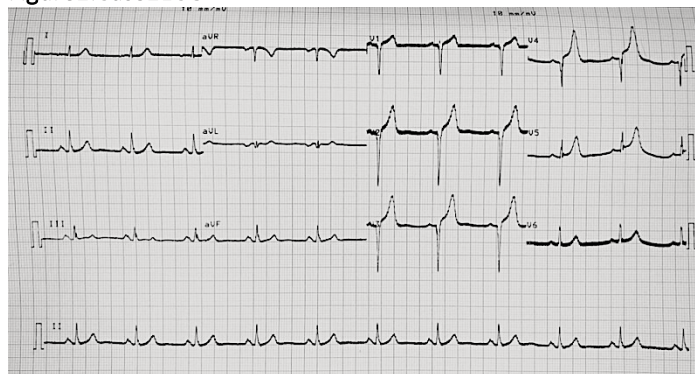
The patient was diagnosed with an anterior wall ST-segment elevation myocardial infarction and was treated with aspirin load of 300mg PO followed by 100mg PO daily, clopidogrel load of 300mg PO followed by 75mg PO daily, atenolol 25mg PO daily, captopril 12.5mg PO twice daily, atorvastatin 40mg PO daily, therapeutic anticoagulation dose enoxaparin (80mg subcutaneously twice daily), as well as sublingual nitroglycerin 5mg and morphine 5 mg IV as needed for chest pain. His chest pain resolved after commencement of therapy. The patient was discharged home with aspirin 100mg PO daily, clopidogrel 75mg PO daily, carvedilol 6.25mg PO twice daily, and atorvastatin 40mg PO daily, and was to follow up with cardiology outpatient. This patient was also interested in pursuing angiography in a different country.

DISCUSSION

These patients with STEMI were both young and previously healthy and had distant tobacco smoking as the only risk factor.

and denied a family history of heart disease. Physical exam revealed a well-appearing and not overweight man and unremarkable cardiac and lung examinations.

Figure2:Case2ECG



These cases highlight the need for a greater understanding of the epidemiology of ACS in sub-Saharan Africa and raises the question of whether young patients in Rwanda and other countries in sub-Saharan Africa have unidentified risk factors for coronary artery disease.

Given the increasing prevalence of established risk factors for cardiovascular disease and subsequent ACS in Rwanda and other countries in sub-Saharan Africa, it is possible—and even likely—that the burden of ACS is on the rise. However, there is not sufficient epidemiologic data on ACS in Rwanda [4]. Of further concern, there appears to be a general, unfounded consensus that ACS is rare in Rwanda, even though a number of trends suggest the opposite. In short, it is very possible that prevalence of ACS is grossly underestimated, resulting in many possible undiagnosed and untreated cases [5]. While management of ACS in sub-Saharan Africa has improved in recent years, patients continue to present late and access to thrombolysis and cardiac catheterization laboratories remains limited [6-8].

Moreover, these young and employed patients will likely face increased morbidity in their lives. ACS in young patients likely impacts the community and the economy significantly—as the quality-adjusted life years (QALYs) has been shown to be 0.77 in patients with myocardial infarction (a QALY describes the value of a health state measured on a scale where 0 is a health state equal to death and 1 signifies full health)—highlighting the need for consideration of reperfusion therapy in sub-Saharan Africa [9]. Patients in sub-Saharan Africa who suffer ACS tend to be younger than patients in Western countries—these patients are more likely to be in their productive years and the associated morbidity and mortality can have significant economic impact [10]. The patients in this study were both active and employed and given their age, the impact of an acute myocardial infarction may have repercussions that last many years. These cases of young men with ST-segment elevation myocardial infarction demonstrate the importance of acquiring data on and increased awareness of ACS. The value of interventions to decrease cardiovascular disease risk factors and increased availability of reperfusion therapy in Rwanda should also be investigated.

Both patients had only one identifiable risk factor—tobacco smoking. While cigarette smoking has been shown to have deleterious effects at low levels (relative risk for coronary heart disease was 1.48 for smoking one cigarette per day in a large meta-analysis), both had smoked in the distant past and smoking cessation has been associated with reduced risk of myocardial infarction; therefore, the overall impact of their smoking was likely low [11,12]. The lack of any other identifiable risk factors in these young patients suggests that there may be non-traditional or even undiscovered risk factors for myocardial infarction in the young African population that are not addressed in the more available Western literature on the subject. It should be noted, however, that it is possible that these patients were underreporting their duration and amount of smoking.

Further, regarding the risk factor of smoking, it has been shown that smoking tobacco is one of the main risk factors for the development of ACS in sub-Saharan Africa [8,13,14]. While the prevalence of cigarette smoking in Rwanda is slightly lower than the average prevalence in sub-Saharan Africa, at 12.9% versus 13.9% in 2018, initiatives to reduce tobacco consumption, such as smoking cessation support, smoke-free laws in public places, and increased price of cigarettes, are lacking [15,16].

While the patients received appropriate therapy given the lack of availability of reperfusion therapy, the patient in the first case requested percutaneous coronary intervention and the second patient would like to pursue angiography. Although reperfusion therapy is quite limited in sub-Saharan Africa largely due to late patient presentation and excessive cost or lack of reperfusion therapy, these patients may be making a reasonable request [6]. Given the shift towards increased prevalence of risk factors for cardiovascular disease, the prevalence of acute coronary syndrome will likely rise and the necessary infrastructure for reperfusion therapy may be behind the curve if forward movement is not initiated. This is in line with the AFRICARDIO-2 consensus statement of 2015, which was developed by a consortium of ten sub-Saharan African countries that details areas of priority for the management of acute coronary syndrome [6].

CONCLUSION:

To our knowledge, there have been no studies on epidemiology, management, and outcomes of acute coronary syndrome in Rwanda. Understanding these factors is key, as determining prevalence can influence resource utilization. The cases of these young patients who presented within a short time frame have brought the need for further research to the fore. Additionally, it is important that the reader be aware of several key issues related to the management of acute coronary syndrome. First, Accident and Emergency (A&E) departments in Rwanda and abroad should remain vigilant and consider ACS in patients of all ages, who may have few or no traditional risk factors. Secondly, patients experiencing ACS may not present with classic symptoms, and may present with epigastric pain, weakness, syncope, dyspnea alone, and other such atypical symptoms. Finally, Rwandan A&E departments should be well-equipped with the tools and training to diagnose and treat acute coronary syndrome.

Consent: Informed consent was obtained orally from the patients in this case series.

REFERENCES

- [1] S. Yusuf, S. Reddy, S. Ôunpuu, and S. Anand, "Global burden of cardiovascular diseases: part I: general considerations, the epidemiologic transition, risk factors, and impact of urbanization," *Circulation*, vol. 104, no. 22, pp. 2746-2753, November, 2001.
- [2] K. Steyn *et al.*, "Risk factors associated with myocardial infarction in Africa: the INTERHEART Africa study," *Circulation*, vol. 112, no. 23, pp. 3554-3561, December, 2005.
- [3] World Health Organization, "Noncommunicable Diseases (NCD) Country Profiles, Rwanda," *Noncommunicable diseases country profiles 2016*. [2016]. Available from http://www.who.int/nmh/countries/rwa_en.pdf?ua=1 [Accessed: November 21, 2018].
- [4] J. T. Hertz *et al.*, "Acute myocardial infarction in sub-Saharan Africa: the need for data," *PLoS one*, vol. 9, no. 5, p. e96688, May, 2014.
- [5] L. E. Nkoke C, "Coronary heart disease in sub-Saharan Africa: still rare, misdiagnosed or underdiagnosed?," *Cardiovascular diagnosis and therapy*, vol. 6, no. 1, February, 2016.
- [6] M. Kakou-Guikahue *et al.*, "Optimizing the management of acute coronary syndromes in sub-Saharan Africa: A statement from the AFRICARDIO 2015 Consensus Team," *Archives of cardiovascular diseases*, vol. 109, no. 6-7, pp. 376-383, June, 2016.
- [7] R. Chetty, A. Ross, "Chart review of acute myocardial infarction at a district hospital in KwaZulu-Natal, South Africa," *African journal of primary health care & family medicine*, vol. 8, no. 1, pp. 1-5, 2016.
- [8] J. Shavadia, G. Yonga, and H. Otieno, "A prospective review of acute coronary syndromes in an urban hospital in sub-Saharan Africa," *Cardiovascular journal of Africa*, vol. 23, no. 6, p. 318, July, 2012.
- [9] E. Bøhmer, *et al.*, "Health-related quality of life after myocardial infarction, does choice of method make a difference?," *Scandinavian Cardiovascular Journal*, vol. 48, no. 4, pp. 216-222, 2014.
- [10] R. Vedanthan, B. Seligman, and V. Fuster, "Global perspective on acute coronary syndrome: a burden on the young and poor," *Circulation research*, vol. 114, no. 12, pp. 1959-1975, June, 2014.
- [11] D.M. Burns, "Epidemiology of smoking-induced cardiovascular disease," *Progress in Cardiovascular Diseases*, vol. 46, no. 1, pp. 11-29, July, 2003.
- [12] J.A. Critchley, S. Capewell, "Mortality risk reduction associated with smoking cessation in patients with coronary heart disease: a systematic review," *Journal of the American Medical Association*, vol. 290, no.1, pp. 86-97, July, 2003.
- [13] M. Sarr *et al.*, "Acute coronary syndrome in young Sub-Saharan Africans: a prospective study of 21 cases," *BMC cardiovascular disorders*, vol. 13, no. 1, p. 118, December, 2013.

- [14] C. Schamroth, "Management of acute coronary syndrome in South Africa: insights from the ACCESS (Acute Coronary Events—a Multinational Survey of Current Management Strategies) registry," *Cardiovascular journal of Africa*, vol. 23, no. 7, p. 365, August, 2012.
- [15] World Health Organization, "WHO report on the global tobacco epidemic, 2017, Country Profile: Rwanda. 2017," *WHO report on the global tobacco epidemic 2017*, [2017].
- Available:
http://www.who.int/tobacco/surveillance/policy/country_profile/rwa.pdf?ua=1 [Accessed: November 18, 2018]
- [16] World Health Organization, "Age-standardized prevalence of tobacco smoking among persons 15 years and older (%), by WHO region, 2016," *Prevalence of tobacco smoking*, [2016]. Available: <http://apps.who.int/gho/data/node.sdg.3-a-viz?lang=en>. [Accessed: November 21, 2018].

