# Recurrent Stroke in a Ghanaian Patient With Polycythemia

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*Background:* Polycythemia is a rare but important preventable cause of stroke with potential for recurrence when not identified and appropriately managed. *Case Presentation:* This is a case of a 55-year-old Ghanaian who presented to our tertiary facility after a 2-month delay with a history of sudden onset of right-sided hemiparesis and expressive aphasia. He had suffered a previous stroke with left hemiparesis 2 years previously where hypertension and polycythemia were identified and treatment initiated. However, patient defaulted treatment for 18 months prior to the onset of recurrent stroke. A cranial CT scan revealed chronic right and subacute left middle cerebral artery territorial infarcts. Presenting hematocrit was 71%. Treatments initiated included high dose hydroxyurea, venesections, and dual antiplatelet therapy of Aspirin and Clopidogrel. He has since been discharged and remains stable under follow-up with moderate functional deficits– Modified Rankin score of 3/6 and the hematocrit of 54% at 3 months postdischarge. *Conclusions:* Default of therapy for polycythemia is associated with a profound risk of recurrent strokes requiring patient education and support to prevent the devastating consequence of this modifiable but rare cause of stroke. This case report highlights the challenges of instituting secondary prevention for stroke in resource-limited settings.

**Key Words:** Polycythemia—stroke—disability—Ghana



## Background

There is an unprecedented rise of stroke in low-and middle-income countries across sub-Saharan Africa (SSA) with a high morbidity and mortality.[1-6] The rapid surge in stroke burden in SSA has been attributed to the rapid rise in traditional risk factors such as hypertension, diabetes, and dyslipidemia.[7-10] Stroke management in these settings is challenged by the paucity of trained neurologists and lack of health resources leading to fragmented care for stroke survivors.[11] As a result, no reports on rare causes of stroke such as polycythemia have emanated from SSA.

Polycythemia vera (PV), a myeloproliferative disorder characterized by clonal proliferation of pleuripotential bone marrow progenitors leading to abnormal erythroid cells, is a rare but recognized cause of stroke.[12] We present the first reported case of a middle-aged Ghanaian adult male who presented to our tertiary facility with a recurrent stroke from polycythemia. We also discuss the challenges of management of polycythemia associated with ischemic stroke in a resource-limited setting.

### *The Case*

This is the case of a 55-year-old Ghanaian who was referred to our tertiary facility 6 weeks after a sudden onset of right-sided hemiparesis and expressive aphasia. He had a previous ischemic stroke with left hemiparesis 2 years prior to the onset of his current symptoms from which he made full recovery from the ensuing neurological deficits. He had a history of hypertension and polycythemia which were diagnosed after the first stroke. However, patient defaulted all treatments initiated after the index stroke.

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On presentation with his current symptoms, he had no aquagenic pruritus, headache, visual disturbance, chest pain, abdominal pain, chronic cough, breathlessness, hematuria, episodic headache and/or sweating. On physical exam, the patient was afebrile, anicteric, not pale and had conjunctival injection. His blood pressure measured 150/90 mmHg, pulse rate was 92 bpm, regular and of good volume, noncollapsing, arterial wall was not palpable with normal heart sounds. He had locomotor brachialis, and bruits over both carotids and the left renal artery. Abdomen was full, soft, nontender with no masses or organs felt on palpation. Neurological exam revealed expressive aphasia and right hemiplegia. Cranial nerves II-XII were intact.

A cranial computed tomography scan revealed a subacute left middle cerebral artery infarct involving the frontoparietal lobes measuring $9.9 \times 3.7$ cm and a chronic right middle cerebral artery territorial infarct measuring $3.9 \times 2.1$ cm. (Fig 1). Significantly, his complete blood count revealed hemoglobin concentration of 22.3 g/dL with hematocrit of 71%; 390,000 platelets/μl and leucocytes of $11.3 \times 10^9$/L with normal differential cell count. He had a subnormal serum erythropoietin concentration of 9.2 mIU/mL. Hemoglobin $A_{1C}$ measured 6.2% and lipid panel was normal. A carotid Doppler evaluation revealed a thrombus in the right common carotid artery which may not have contributed to his presenting neurologic deficits. Abdominal ultrasonography revealed splenomegaly with a splenic span of 15 cm. Assay for the JAK2 mutation could not be performed locally.

Treatments initiated included high dose hydroxyurea at 2 g daily for 10 days, venesections 3 sessions weekly with hydration using 4 liters of 0.9% normal saline daily and dual antiplatelet therapy of Aspirin 75 mg OD and Clopidogrel 75 mg OD for 12 months. He has since been discharged on Hydroxyurea at 500 mg daily and remains stable under follow-up with a Modified Rankin score of 3/6 and the hematocrit of 54% (down from 71% on presentation) at 3 months postdischarge. His blood pressure measured 136/82 mmHg on Amlodipine 10 mg and Losartan 100 mg daily at his last review.

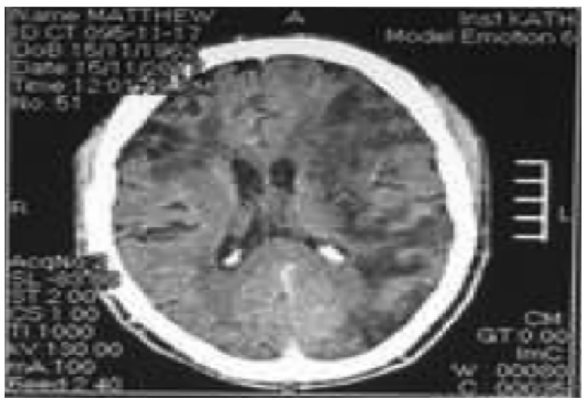

**Figure 1.** *Cranial CT scan shows chronic right and subacute left m.*

## Discussion

This to *the best our knowledge* is the first report of polycythemia presenting with stroke in Ghana. Our patient met one major criterion-hematocrit level of >49% for males and one minor criterion− a subnormal serum erythropoietin level for the diagnosis of polycythemia vera according the WHO criteria.[13] Two other major criteria required for diagnosis namely, bone marrow biopsy demonstration of hypercellularity for age with panmyelosis and JAK2 V617F mutation, or exon 12 mutation could not be ascertained due to limited local laboratory capabilities. Mechanistically, polycythemia is accompanied by an increased blood viscosity promoting rouleaux formation leading to a diminished cerebral blood flow as well as formation of cardiac microemboli which underpins the occurrence thromboembolic phenomena including strokes.[12] Two previous case reports by Crespo et al,[14] and Nezu et al,[15] highlighted recurrent strokes in patients with PV associated with development of intracranial arterial stenosis.

Advanced age, hypertension, dyslipidemia, diabetes mellitus, cigarette smoking, and a history of thrombosis are important risk factors for thrombosis occurrence in patients with polycythemia.[16] The patient in this report had risk factors for stroke recurrence identified after the index event but as is typical in many low-and middle-income countries, secondary vascular risk factor control was challenged by nonadherence to prescribed therapy for hypertension and polycythemia.[17] Evidence-based interventions implemented for prevention of recurrent stroke in the context of polycythemia for our patient included vigorous hydration, phlebotomy, antiplatelet therapy, and cytoreductive therapy using hydroxyurea. Findings from the landmark Cytoreductive Therapy in Polycythemia Vera study provided clear evidence that aggressive phlebotomy with or without cytoreductive therapy using hydroxyurea as was done for our patient to achieve a target hematocrit of <45% was significantly associated with lower rates of cardiovascular deaths and major thrombosis compared to a target of 45%-50%.[18] In this regard, the hematocrit value of 54% attained at 3 months of follow-up from a peak value of 71% for our patient would require further decrements on therapy to reduce the risk of future thrombotic phenomena. Furthermore, our patient is currently on dual antiplatelet therapy comprising of aspirin and clopidogrel, which is in agreement with one interesting case report by Pedersen et al of a patient with PV who experienced 6 recurrent strokes and 1 myocardial infarction and obtained cessation in recurrent arterial thrombotic events by intensifying clopidogrel monotherapy to dual antiplatelet therapy with aspirin and ticagrelor.[19] Crucially, education of patients on the need to comply with hematology review and adhere to therapy on a sustained basis is vital to reduce risk of adverse outcomes associated with polycythemia. This instructive case highlights polycythemia as a rare but modifiable etiology of recurrent strokes in low-and middle-income countries worthy of attention by clinicians in these settings.

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