Stroke in Malawi – What do we know about it and How should we manage it?

Karim M Mahawish, Terttu Heikinheimo
1. Dept of Medicine,College of Medicine,University of Malawi

AB is a 63-year-old tobacco farmer. He lives with his wife together with one of his daughter's family and 4 orphans from his deceased son. He occasionally smokes tobacco leaves. He does not have any regular medication. He was once given propranolol for 2 months owing to his high blood pressure, but it made him very tired. He did not go to get more medication after that.

One August morning, he could not get up from his bed, his speech was incomprehensible and he could not move the right side of his body. He was brought to Queen Elizabeth Central Hospital.

CD is a 35-year-old mother of 4 living children, 2 other children having passed away. She is a business lady selling vegetables on Chileka road. A month before admission she had had shingles on her chest, however she was an otherwise healthy woman who did not consume alcohol or tobacco products.

One afternoon, on the way home she suddenly collapsed. Her daughter accompanied her to Queen Elizabeth Central Hospital.

1. What is a stroke?

WHO definition:

- Rapidly developing clinical signs of focal (at times global) disturbance of cerebral function
- Clinical features last more than 24 hrs or lead to death.
- Presumed vascular origin

2. Is stroke different between blacks and whites

- In the age range 35 – 74 years blacks are nearly twice as likely to suffer a stroke as whites[1,2]
- Strokes in blacks tend to be more severe than in risk-factor-matched whites[3]
- Black patients who survive have greater residual physical and functional deficits[4]
- The proportion of strokes that are due to of intracranial hemorrhage is higher in Africa than anywhere else: 27-31% of all strokes[5-7]

3. Is stroke common here in Malawi?

- 80% of strokes occur in developing countries, where incidence is increasing
- In Malawi, stroke is the 6th biggest killer (after infectious diseases) and a significant cause of disability
- The population over 55 years is expected to increase by almost 50% by year 2020[8]
- In January – March, 2007, QECH adult medical wards we had 55 admissions due to stroke (58% female). Inpatient mortality was 23%. Of stroke patients HIV status was missing or unknown in 85% of patients. In our Sept-Oct 2007 stroke audit[9] results were very similar.

4. What are the risk factors for stroke in African populations?

- In a South African study blacks experiencing strokes more commonly had underlying ischaemic heart disease, atrial fibrillation, valvular heart disease and dilated cardiomyopathy than whites[5].
- There are no data on the impact of hyperlipidaemia, obesity or genetic factors on stroke in Central or Southern Africa.
- Hypertension is the most important risk factor because it is the most common one and it can be treated. Individuals with BP less than 120/80 mmHg have 50% lower lifetime risk of stroke than those with hypertension[10].
- Hypertension is more common in blacks than whites. Hypothetized mechanisms include low serum renin levels, altered sodium handling within electrolyte channels and cells and genetic factors.[11] Hypertension is not as angiotensin IIdependent in blacks as it is in whites.[12]
- 15% of patients with stroke have diabetes in Sub-Saharan Africa, and 5% of diabetic patients present with stroke at diagnosis.[13]
- Smoking and excessive alcohol drinking are separate global risk factors for stroke.

HIV and other infections and stroke

- AIDS is strongly associated with both ischemic stroke and intracerebral hemorrhage in young adults (<44 years)[14].
- Large-vessel cryptogenic stroke is more common in young (<50 year-old) HIV reactive patients than in HIV-nonreactive young stroke-patients.[15]
- In HIV reactive patients 80-90% of the strokes are ischemic: 10-20 % is caused by HIV related vasculopathy. The other causes are vasculitis (10-50%), coagulopathy (10-50%) and heart disease (10-40%).[16]
- ARVs can cause premature atherogenesis and thus ischemic stroke.[16]
- Neurosyphilis causes stroke, which in 35% of cases occurs 6-7 years after the original infection.17Syphilis is more common among HIV-reactive people than others.
- VDRL or RPR is positive in serum. Positive VDRL in CSF sample confirms the diagnosis of neurosyphilis, but negative result does not rule it out. RPR cannot be used for CSF samples.[17]
- Any acute infection increases the risk of having a stroke 2-3 times. Patients with acute infection tend to have a worse outcome of the stroke.[18]

AB was found out to be hypertensive. His smoking was an additional risk factor. He never took any alcohol. His cholesterol level was never measured. His mid upper arm circumference (MUAC) was 28 cm, which is normal. He did not have HIV and VDRL was also negative.

CD was normotensive and blood sugar readings were normal. She had never smoked or drank alcohol. Her MUAC was 23 cm, which is normal.CD tested reactive for HIV, the shingles being the first manifestation of her illness. Clinically she is WHO stage two, due to the shingles infection she had month ago. Stroke is not included in WHO staging of HIV infection. Her CD4 count was tested and became 263 cells/μl. Her VDRL was nonreactive.

5. How do we differentiate acute stroke from other causes of focal neurological signs

● The most significant feature of acute stroke is the abrupt onset without any preceding symptoms. There may be some progression or fluctuation of symptoms during the first hours.

●Transient ischemic attack (TIA) is defined by stroke-like symptoms which recover completely within 24 hours and often within one hour.

● Important differentials diagnoses include central nervous system infection or tumour however these tend to develop more gradually.[17]

● Lumbar puncture analysis can help to detect intracerebral infection in patients with stroke-like symptoms – especially important in HIV reactive patients.[6]

6. What are the common stroke symptoms?

● Middle cerebral artery (most common site for stroke):

Contralateral hemiparesis and facial weakness with arm weaker than leg.

Dysphasia may occur with left hemispheric strokes whereas inattention predominates in right hemispheric strokes.

● Anterior cerebral artery

Contalateral hemiparesis with leg weaker than arm

● Posterior cerebral artery

Contralateral visual field loss (homonymous hemianopia)

● Cerebellar artery

Ipsilateral cerebellar signs (e.g. ataxia, dysdiadochokinesia, dysarthria)

● Basillar artery

Unconcsiousness, tetraparesis, cranial nerve lesions

7. Can we distinguish acute ischemic stroke from acute intracerebral

hemorrhage (ICH)?

● CT scans are the gold standard in the identification of stroke type.

● Ischemic strokes are known to occur more commonly in early morning hours while ICH is more likely to start when patient is active. Headache, vomiting and loss of consciousness are significantly more likely to occur in ICH than in ischemic stroke.

● But clinical features are not enough to distinguish haemorrhage from ischaemia.

● The Siriraj Stroke Score (SSS) was used in two Nigerian prospective multicentre trials altogether comprising 140 patients with acute stroke.19,20 Here, the SSS had an overall predictive accuracy of approximately 80%, sufficient for the authors to recommend its use in resource poor settings for epidemiological purposes and to guide management.

Surairaj stroke score=

(2.5 x consciousness) + (2 x vomiting) + (2 x headache) +(0.1 x diastolic blood pressure mmHg) - (3 x atheroma) – 12
Consciousness: Alert = 0 Drowsy, stupor =1 Semi-coma, coma =2
Vomiting: No =0 Yes =1
Headache within two hours of onset: No = O Yes = 1
Atheroma markers (angina, diabetes, intermittent claudication)
None = O One or more =1
Interpretation: > +1 Haemorrhage <-1 = Infarction -1 to +1 = Indeterminate

Unfortunately, when AB and CD were admitted to QECH the CT scan was broken.

AB was drowsy on admission. The right arm was not moving at all. He was moving slightly proximal part of his right leg. He could not understand speech and only said: "ee, ee". He had right side facial weakness. The left side he was moving spontaneously. He was not vomiting, he did not have stigmata of hyperlipidaemia. His blood pressure on admission was 160/100 mmHg. His SSS = (2.5 x 1)+0+0+ (0.1 x 100 mmHg) - 0 – 12 = + 0.5.

His stroke was indeterminate, but it was treated as an ischemic stroke.

CD was alert on admission and she did not report any vomiting. She had left side weakness of her mouth and her speech was slurred. Strength in her left arm and leg was 3/5. She could not stand, but there was movement also on the distal part of her upper and lower extremity. She had visual inattention to the left. Her BP was 110/70 mmHg on admission.

Her SSS = 0+0+0 (0.1 x 70 mmHg) – 0 – 12 = - 5. Her stroke was considered ischemic and it was treated as one.

8. How could we prevent people having strokes?

● The best stroke is the prevented one.

● Teach public about healthy lifestyle. Tobacco production is important for Malawian economy but stopping smoking can prevent a stroke. Malawian basic diet is quite healthy with its vegetables and beans and minimal use of milk fats. Keeping the weight normal can also prevent a stroke.

● Evidence for non-pharmacological methods of blood pressure reduction comes from two small randomised controlled trials in blacks: A low sodium diet[21] and exercise[22] were associated with reductions in blood pressure, the latter demonstrating regression of left ventricular hypertrophy.

● Prevention of non-communicable diseases like stroke, cardiovascular diseases, diabetes and chronic respiratory diseases have many shared elements. As the population is aging in Malawi primary prevention programmes against these diseases are becoming more and more important.[23]

● Evidence for antihypertensive efficacy in blacks have overwhelmingly favoured calcium channel blockers and thiazide diuretics. The table below summarizes the data:

Table 1: Antihypersensitive efficiency in blacks

Drug	Advantages	Disadvantages
Calcium channel blocker	Potent antihypertensiveeffect[24,25] Reduction in left ventriculamass[26] Stroke risk reduction[27]	Peripheral oedema
Thiazide diuretics	Potent antihypertensive effect[25] Stroke risk reduction[27]	Less potent than CCB in some studies[25] Greater occurrence of diabetes[28]
ACEi/ARB	Potent antihypertensive in combination with thiazide or calcium channel blocker	Efficacy of ACEi as monotherpay comparable to placebo[28] Risk of angioedema[28]

Antihypertensive therapy according to the Malawi treatment guidelines (goal BP less than 140/90 mmHg:[31]

- moderate (160/100-180/110 mmHg) and severe (>180/>110 mmHg) hypertension should always be treated pharmacologically.
- Mild hypertension is only treated if general measures are ineffective.

STEP 1:

- First drug of choice is Hydrochlorthiazide 25 mg once daily or Bendrofluthiazide 2.5 mg daily.

STEP 2:

- Add in Amlodipine 5-10 mg daily or if not available, Nifedipine 10-20 mg slow release tablets twice daily if blood pressure is not controlled

STEP 3:

- If this combination is not effective enough, Enalapril 10-20 mg daily can be added to Amlodipine and Hydrochlorthiatside. Captopril 12.5-50 mg every 8 hours can be used if Enalapril is not available.

STEP 4:

- If the triple therapy does not work, Atenolol 50-100 mg daily can be added.

Propranolol is used if Atenolol is not available.

- Medical specialist input is required where troublesome side effects are encountered, the patient is pregnant or if this treatment strategy proves ineffective

9. How do we manage someone with acute stroke?

Investigations

- Fasting blood glucose (and random on admission), VDRL/RPR to look for syphilis, full blood count to look for anaemia, infections and platelet disorders.
- CT-scan of the brain, without contrast, if available.

Hypertension

- Thought to be due to cerebral autonomic regulation and generally improves over the following few days without recourse to therapy.
- Patient's own antihypertensive therapy is continued if there is no hypotension <100/60 mmHg) If hypertension is a new diagnosis for the patient 5-7 days can be waited before starting antihypertensives.
- Severe hypertension should be lowered: >220/120 mmHg in ischemic stroke, >180/100 mmHg in ICH or if not known whether stroke is ischemic or bleed.

Oxygen therapy

- Evaluated in quasi-randomised trial: it showed no statistical differences in mortality or disability scores at one year and seven months respectively in acute stroke.[33]
- But: It seems reasonable to give supplemental oxygen to maintain saturations above 95% in acute stroke.

Hyperglycemia.

- Studies from Nigeria and the Democratic Republic of Congo demonstrated an association between hyperglycaemia in ischaemic stroke and increased mortality[34,35] The association between admission hyperglycaemia and mortality in acute intracerebral haemorrhage has also been demonstrated.[36]
- While no studies have demonstrated prognostic benefit with blood glucose control, the treatment of hyperglycaemia greater than 200mg/dl (11.1 mmol/l) with insulin is considered good practice.

Fever

- Treating fever improves the prognosis of stroke.
- Acute infections should be treated. Most common of these are aspiration pneumonia and urinary tract infections in the elderly.
- Paracetamol can be given for fever of unknown cause, if patient is able to swallow.[32] Rectal paracetamol is an alternative. Intravenous paracetamol is not available in Malawi.

Rehydration

- Most patients are dehydrated when having acute stroke. Many patients are not able to swallow. Intravenous rehydration with non-glucose fluids is advisable.[32]

Swallow assessment

- Dysphagia is present in 50% of acute strokes and is associated with poorer outcomes. The majority will return to their pre-stroke diet by six months.[37]
- The bedside swallow assessment (BSA) may be performed by personnel trained in its technique. This should only be for a fully alert, half seated or seated, patient. A small volume of water is given to the patient while a judgement is made about a change of voice or respiratory pattern, coughing or pooling of fluid within the oral cavity or leakage from the mouth.
- The BSA has a positive predictive value of 62% of aspiration and a negative predictive value of 86% for aspiration.[38]

Aspirin

- In the Chinese acute stroke trial (CAST)39 (160mg/day for 4 weeks) and the International Stroke Trial (300mg/day for 2 weeks)40 aspirin demonstrated significant improvements in survival in acute ischemic stroke.
- In Malawi aspirin 75 mg/day is most commonly used.[31] For acute stroke, first dose of 300 mg of aspirin can be given to the patient to chew if swallowing is possible.[32]

● In the absence of a CT scan, the optimal treatment strategy is less certain. No study has yet assessed the risks and benefits of aspirin therapy for suspected acute ischaemic stroke based on scoring systems. In the absence of imaging, initiating low-dose aspirin for acute ischaemic strokes as determined by the SSS[19] seems reasonable.

Physiotherapy, occupational and speech therapy

● Start at day one if possible for all acute stroke patients.31 Malawi suffers with a shortage of physiotherapists, occupational and speech therapists.

Rehabilitation technicians provide a valuable service in occupational and speech therapy in the absence of specialists.

● Kachere Rehabilitation Centre (KRC) trains rehabilitation technicians. The course is 3 years long.

● KRC provides the only institutional rehabilitation in Malawi.

● At QECH we have a weekly multidisciplinary meeting with clinicians, physiotherapists, rehabilitation technicians and representatives from KRC.

These meetings are used to review patient progress as identify future rehabilitation goals.

Preventing early complications (e.g. aspiration pneumonia, deep venous thrombosis) – the guardian's role.

● Guardians need counselling and guidance in the care of stroke patients.

● Look after the patient's hygiene, comfort, nutrition and sometimes medication.

● Ensure regular patient repositioning for pressure ulcer prevention.

● Avoid the feeding of patients who are recumbent, have dysphagia or are drowsy or unconscious as this can be dangerous and lead to death through aspiration.

● Institute early physiotherapy with guidance from rehabilitation technicians.

10. How do we prevent another stroke?

● There is a 30-43% increased risk of stroke within 5 years.

● Treating the cause of the stroke with continuous assessment and medication helps preventing a new stroke.

● Optimise antihypertensive medication to a target of < 135/85 mmHg.

●Smoking cessation and treating diabetes is important

● All patients with ischemic or unknown cause of stroke should continue Aspirintherapy for life!

● There are no data on the impact of ARV-therapy on future stroke risk.

● Stroke is not a criterion in the WHO clinical staging for HIV. If possible, obtain a CD4-vount in the HIV-reactive patient recovering from stroke, to guide ARV-therapy.

AB had swallowing difficulties and so administering oral drugs was very difficult. His antihypertensives were restarted with same problem. He was put on half seated position to reduce his brain pressure. His temperature was normal. After 3 days from his stroke his temperature increased to 38.6ºC and his consciousness worsened (GCS 13/15). On auscultation there were anterior crepitations on basal area of right lung. Ceftriaxone and metronidazole were started for aspiration pneumonia. The guardians were again advised not to give anything by mouth and nasogastric tube was inserted. 2 days later AB pulled the tube out and family refused him to have another tube. Fortunately as the infection resolved, repeat swallow assessment demonstrated improvement of his dysphagia and he was able to swallow safely.

He was given daily physiotherapy at the ward. After 2 weeks he was discharged and went home. He was subsequently admitted to KRC where he stayed 6 weeks. There he was also given occupational therapy and assistance for communication. On discharge he was able to walk independently with support from onepoint stick. He was able to speak and understand few words, however still required help with washing and dressing. His blood pressure was controlled with a combination of propranolol and hydrochlordiazide, because Amlodipine or Enalapril were not available. He had stopped smoking.

CD had temperature of 38,2ºC on admission and paracetamolwas commenced. On clinical examination no cause for her fever was identified. She had 4 weeks old scar of shingles on her chest on left side. CD was discharged by day four and by three weeks had made a virtual recovery with some mild clumsiness in her left hand and she kept forgetting to use it. Her CD4-count was 312 cells on discharge and so was not started on ARVs (below the threshold for starting ARVs at the time, which has now risen to 350 cells). She was asked to come again to ARV clinic 3 months later when she was put on ARVs. Unfortunately she stopped her Aspirin after one month from discharge and is at risk for further stroke.

11. What are the missed opportunities here in Malawi?

HIV- infection and high blood pressure are the leading causes of stroke in Malawi.

The elderly population is increasing in Malawi. In our stroke audit most of the patients did not know their HIV status after admission to QECH. Blood testing for diabetes and HIV status should be routinely collected from all stroke patients.

Educating the Malawian public, stroke patients and their guardians is crucial to reducing future risk of stroke through more optimal monitoring of blood pressure and ensure treatment is continued long term. The College of Medicine is now training physiotherapists. This is very good news for all the stroke patients. The future may see more institutions like KRC offering institutional care and rehabilitation for stroke patients. Multi-disciplinary run stroke units have demonstrated effectiveness in reducing mortality in Sub Saharan Africa.[41] The future may see the development of such units in Malawi.

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