STROKE IN CHILDREN IN YAOUNDE, CAMEROON

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ABSTRACT

Thirty five children aged 5 months to 15 years suffering from stroke were studied from August 1984 to July 1990 from two hospitals in order to determine the incidence, the etiological factors and the short term outcome of the stroke. The average annual incidence was 1.85 per 1000 pediatric hospitalizations. There was a progressive rise in the number of cases from 1985, with a peak in 1990.

Motor impairment of one half of the body was the commonest clinical feature seen in 97.1% of the cases. Other clinical signs were: facial paralysis (62.9%) and aphasia (28.6%). The main etiological factors were: homozygous sickle cell disease (31.4%), heart disease (17.1%), cerebral malaria (14.3%) and meningitis (14.3%). No causative factor was identified in 7 patients (20%). The mortality rate was low (2.9%) and all the children had neurological deficit after a mean hospital stay of 15 days.

Laboratory investigations including lipid analysis, platelet count, and skull X-rays proved to be of no diagnostic value. However, computed tomography (CT) scan confirmed the diagnosis of ischemic stroke whenever it could be done.

Key words: *Stroke, Sickle cell anemid, Cerebral malaria.*

Cerebrovascular disease is a frequent cause of morbidity and mortality worldwide. Stroke, the most debilitating cerebrovascular disease has been considered **a** disease of senescene where diabetes mellitus, hypertension, atherosclerosis and use of oral contraceptives have been identified as predisposing factors. If in young adults, the above mentioned factors have been incriminated in the etiopathogenesis of stroke; in children, however, it is very unlikely that the same factors would be responsible for its occurrence. In recent years, it has been shown that this disease does not spare children, and even fetuses and neonates are known to suffer from stroke(l-3).

In Cameroon, where little is known about stroke in children, we undertook a 6 year retrospective and prospective study in two hospitals of the capital city, Yaounde, to determine the causative factors involved, the clinical features and the short-term outcome of the patients.

Material and Methods

The Study was undertaken in two hospitals in Yaounde namely: University Teaching Hospital (UTH), and Central Hospital (CH) in 2 parts; a retrospective one from August 1984 to July 1989 and a prospective one from August 1989 to July 1990.

All children aged 5 months to 15 years of age were included. Neonates and infants less than 5 months of age were excluded. All the patients were seen by the neurologist

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and those with cardiac disorders by the cardiologist.

In the retrospective study, files of patients with neurological deficits such as hemiplegia, hemiparesis, aphasia, syncope, loss of consciousness or muscle weakness were studied. Besides the history, the following investigations where available were recorded: hemoglobin electrophoresis, full blood count with platelet count, thick blood smear for malaria parasites, cerebrospinal fluid culture, skull X-rays, lipid analysis, electroencephalogram and echocardiography.

In the prospective study, any patient hospitalized with any of the above mentioned neurological disorders was included and the same laboratory investigations were undertaken with the addition of CT scan of the head and doppler echocardiography.

Results

After a drop in 1986, the number of cases of stroke remained stable in 1987 and 1988, then progressively increased from 1989 with a peak in 1990, giving a mean annual incidence of 1.85 per 1000 hospitalized children. The majority of cases were in the first five years of life with a total of 22 patients, 13 of whom were between 1 and 3 years of age. Past medical history revealed homozygous sickle cell disease in 10 cases (28.6%), 1 case of hemophilia (2.9%), heart disease in 6 cases (17.1%), cerebral malaria and meningitis in 4 cases each (11.4%). A wide range of neurological signs were reported or identified. The commonest were weakness or paralysis of one half of the body seen in 24 cases (68.5%), and convulsions and speech abnormalities in 6 cases each (17.1%). Ten cases (28.57%) had no neurological signs. The main clinical signs were hemiplegia/hemiparesis in 33 cases (97.1%), facial paralysis in 22 cases (62.9%) and aphasia in 10 cases (28.6%).

Hemoglobin electrophoresis done in 22 patients revealed 11 cases of homozygous sickle cell disease (10 confirmations and 1 new diagnosis), 7 had normal electro-phoretic patterns and 4 shared heterozygous sickle cell trait. Determination of the hema-tocrit showed 11 patients with a level below 20%, 8 between 20% and 30% and the rest had level above 30%. The lipid profile was normal in all patients, as was the platlet count and skull X-rays. One blood culture was positive for *Salmonella typhi,* while cerebrospinal fluid culture was positive for *Streptococcus pneumoniae* in 3 cases. Thick blood smear for malaria parasite was positive in 10 out of 30 cases. Ophthalmoscopy done in 10 patients showed papilledema in one. Electroencephalography done in 3 patients showed cortical hyperactivity on contralateral side in all 3 patients.

Echocardiography done in 15 patients showed mitral stenosis in 4 patients, mitral valve prolapse in one and pericardial effusion in 1 case. The rest of them had no heart lesions. CT scan performed in 5 cases, confinned the diagnosis of ischemic stroke. The probable causes of stroke were grouped into: hematological disorders (34.3%), infections (28.6%), heart disease (17.1%) and unknown causes in 20% *(Table I).* All the patients with the exception of the one with hemophilia received presumptive antibiotic therapy for meningitis including ampicillin and chloramphenicol. Infective endocarditis was treated with a combination of Penicillin G and streptomycin. Patients with cerebral malaria received intravenous quinine. Patients with hemoglobin level below 10 g/dl received blood transfusion. Of the 35 patients, one died. On day 15 of hospitalization, all patients showed neurological

TABLE I–*Underlying Cause of Stroke*

Condition	Number (n=35)	Percentage
Hematological disease	12	34.3
Homozygous sickle cell anemia	11	31.4
Hemophilia	1	2.9
Infection	10	28.6
Meningitis/meningo-encephalitis	5	14.3
Cerebral malaria	5	14.3
Heart diseases	6	17.1
Mitral valve prolapse	2	5.7
Mitral stenosis	2	5.7
Infective endocarditis	2	5.7
Unknown	7	20.0

deficit. Due to failure to return for follow up in most of the cases, no figure could be given for a long term outcome.

Discussion

The annual incidence of stroke in our population was 1.85 per 1000 children hospitalized. Pavlakis *et al.* reported the annual incidence of cerebrovascular disease in children to be 2.5 cases per 100,000 population every year(2). This figure cannot be compared to ours because it was derived from wide community surveys, while ours was a hospital based report.

The rising frequency of stroke in our sample was attributed to an increasing awareness of the problem on the part of the physicians coupled with advent of better diagnostic tools in one of our hospitals. The General Hospital of Yaounde acquired a CT scanner in 1990. Inspite of the cost, five patients underwent the examination and the diagnosis of ischemic stroke was confirmed. A similar observation was made by others(4,5) in North America where the use of CT scan increased the detection rate of stroke.

The sex distribution of our patients showed a sex ratio of 1.5 in favor of males. Other authors have reported similar findings(6). It is difficult to ascertain whether this is due to a predilection of stroke in males or just reflects the sex ratio in our pediatric wards.

Twenty two patients were 5 years of age or less and 13 between the ages of 1 and 3 years. The commonest symptom was paralysis of the limbs in 97.1%. In India, Chopra and Prabhakar(7) noted motor impairment in 100% of their patients. In our study, the other clinical features included facial paralysis in 62.9% and aphasia in 28.6% patients. Cardiovascular abnormalities included heart murmurs and arrhythmia. The speech, sensory and visual abnormalities were, however, difficult to determine in young children. Similar difficulties were reported by Lanska *et al.*(3) in the evaluation of language, visual field and sensory deficits in the young and acutely ill children.

Risk factors identified included homozygous sickle cell disease in 31.4% cases with a predilection for 1-3 years age group. Cerebrovascular accidents are well known in sickle cell patients. Balkaran, *et al.* in West Indies(8) followed a cohort of 310 children with homozygous sickle cell from birth to age 17 years. Seventeen of these children (7.8%) developed stroke phenomena by the age of 14 years. Frempong(9) reported, from the United States, an incidence of 7.9% strokes in patients of sickle cell anemia (34 out of 430 children). The high proportion of the 1-3 years age group

in our study reflects the high population of sickle cell patients in this country.

The occurrence of stroke in a patient with hemophilia is not surprising since it is a primary deficiency of factor VIII, with abnormal clotting and subsequent predisposition to hemorrhagic stroke(2).

Heart disease was incriminated in (17.1%) patients including mitral valve prolapse, mitral stenosis and infective endocarditis. This is thought to be related to cardiogenic embolism known to account for about 15% of all ischemic strokes in clinical studies(10). We registered no case of congenital heart disease probably because many die soon after birth, while the survivors undergo successful corrective surgery overseas.

Meningitis and malaria were probable etiological factors each in 11.43% of cases each. According to Farrel(ll), bacterial meningitis is associated with intracranial arteritis and may lead to stroke. In malaria, microthrombi of cerebral capillaries have been described and demonstrated histologically after cerebral malaria(12).

The low hematocrit level in most of our patients might have led to anoxia and ischemic brain injury. In their study, Balkaran *et al*.(8) found that a low hemoglobin and high white blood cell count were risk factors in the group of homozygous sickle cell patients. The normal lipid profile in our patients is similar to a report by Raisonnier *et al*.(13) who showed that the Cameroonian lipid profile was protective against atherogenic diseases. This is, however, in contradiction to the known high lipid diet of Cameroonians made up of oil and starch.

Our results suggest that stroke is common in Cameroonian children especially those with homozygous sickle cell disease, leart disease and infections of the central lervous system. The diagnosis can be made by careful clinical examination. The CT scan, when available, is a satisfactory invesigation for diagnosis and follow up.

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