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Research paper

Childhood arterial ischemic stroke in Senegal (West Africa)

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ABSTRACT

Etiological factors of childhood ischemic stroke depend on the epidemiological context. The purpose of this study was to determine the risk factors, the clinical and radiologic features, and the outcome of arterial ischemic stroke in a case series of Senegalese children. We carried out a retrospective registry-based study on arterial ischemic stroke in children hospitalized in the neurology department of Fann Teaching Hospital and Albert Royer Children's Hospital, from January 2005 to December 2015. We enrolled 116 cases with an age range from 2 months to 18 years. The mean age at stroke occurrence was 71.5 months. The most common manifestations were hemiparesis (84%), aphasia (19%), and partial motor seizures (10%). The middle cerebral artery was the most affected (81%). Risk factors were predominantly sickle cell disease (38%), embolic heart disease (9%), and anemia (3%). Twenty-eight percent of patients were lost to follow-up, 62% had neurological impairments, and 4% died. Secondary prevention was based on antithrombotic agents. Prevention must be prioritized and public health actions need to focus on sickle cell disease, rheumatismal disease, anemia, and related disorders. It will be necessary to set up policies that fight against consanguineous marriage, endemic infections, and argue for better nutrition.

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1. Introduction

Arterial ischemic stroke in childhood is not rare and has usually been reported in publications from developed countries. There are no data from Africa in the International Pediatric Stroke Study [1], which provides a worldwide overview on childhood ischemic stroke. Although African publications on this subject are rare, pediatric ischemic stroke is a reality on this continent and the etiologies and risk factors are numerous. Data on childhood ischemic stroke in Africa probably differ from those of other continents. The purpose of this study was to study the clinical manifestations, radiological findings, risk factors, and outcome of arterial ischemic stroke in a case series of Senegalese children.

2. Patients and methods

We conducted a retrospective and descriptive register-based study in children admitted for arterial ischemic stroke at Albert Royer Children's Hospital and at the neurology department of Fann Teaching Hospital, from January 2005 to December 2015. Arterial ischemic stroke was defined as an acute focal neurologic deficit persisting for at least 24 h, with evidence of cerebral infarction in a corresponding arterial territory on brain imaging [2,3]. We enrolled the children aged between 2 months and 18 years who were admitted with a confirmed diagnosis of arterial ischemic stroke.

We collected epidemiological data (age, sex), clinical characteristics (age at stroke onset, mode and circumstances of occurrence, neurological and associated signs), cerebral imaging results (cranial computerized tomography and/or magnetic resonance imaging), cardiovascular assessment (electrocardiogram, echocardiography, and ultrasound examination of the supra-aortic arteries), biology (full blood count, Emmel test, and hemoglobin electrophoresis, cerebrospinal fluid analysis, coagulation factors, and other relevant investigations). We also registered prescribed treatments and outcome. A full blood count was done for all patients. Other examinations were performed according to the specific context: electrocardiogram and transthoracic echocardiography, ultrasound examination of the supra-aortic arteries, Emmel (a sickle cell disease screening test), cerebrospinal fluid analysis, and coagulation tests.

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We used the Trial of Org 10172 in Acute Stroke Treatment (TOAST) Classification and Pediatric Stroke Classification [4,5] to classify the subtypes of ischemic stroke. All the patients were followed by the same physicians at the neurology department of Fann Teaching Hospital and at the Albert Royer Children's Hospital. Physicians assessed neurological deficit, epileptic seizures, speech or behavioral disorders, and academic performance of school-age children. Data were collected and analyzed using Excel software. Continuous variables were expressed as mean plus or minus standard deviation. Noncontinuous variables were expressed as percentages.

3. Results

We enrolled 116 patients with arterial ischemic stroke, 66 boys and 50 girls. Patients were aged from 2 months to 18 years and the majority of patients (81.5%) were under 5 years of age (Fig. 1). The mean age at stroke occurrence was 71.5 months (range, 2 months to 17 years). Stroke onset was abrupt or rapidly progressive in a few hours in all cases. The most common clinical signs were hemiplegia (84%), aphasia (19%), partial motor seizures (10%), psychomotor regression (10%), and altered consciousness (7%) (Table 1). The associated extraneurological signs were right ventricular heart failure with hepatomegaly and hepatojugular reflux (two patients) and renal edema (one patient).

All patients underwent cranial computerized tomography and/or magnetic resonance imaging that detected ischemic infarction in all patients. Cerebral infarcts involved predominantly the middle cerebral artery territory (87%) followed by the anterior cerebral artery territory (8%) and posterior cerebral artery territory (6%) (Table 2). Middle cerebral artery infarction was unilateral and isolated in 94 cases (81%); it involved the right side (36 patients) or left side (58 patients). Middle cerebral artery infarction was bilateral in two patients. Seven patients had anterior cerebral artery infarction, which was bilateral in one case. Double artery infarction in two different territories was noted in four patients (Table 2).

The main risk factors were sickle cell disease, cardiopathies, meningoencephalitis, and isolated anemia (Table 3).

Forty-four patients (38%) had sickle cell disease and the mean age at stroke onset in these patients was 5.95 years (range, 20 months to 15 years). All the patients had associated simple anemia (73%) or hypochromic and microcytic anemia (27%). The infarct involved the middle cerebral artery territory (82%), anterior cerebral artery territory (15%), and posterior cerebral artery territory (3%). For 26 patients (59%), ischemic stroke revealed sickle cell disease. Four patients (9%) were lost to follow-up after discharge. Two patients (4.5%) had full neurological recovery and 38 patients (86%) had neurologic and neuropsychological sequelae including motor deficit, epilepsy, and behavioral and cognitive disorders. Patients with sickle cell disease benefited from a blood transfusion program in the acute stage and during the following 3 months. After blood transfusion, 27 patients took hydroxyurea while oral folic acid was prescribed to other patients. Stroke recurred in 11 patients (25%) with sickle cell disease. Among patients with sickle cell disease, two patients had an associated risk factor: in one case, sickle cell disease was associated with interventricular communication and trisomy 21; in the second case, sickle cell disease was associated with a polyvalvular cardiopathy.

Cardiopathy was the second risk factor, present in ten patients (9%). These cardiopathies were Fallot tetralogy (four patients), interventricular communication (one patient), dilated cardiomyopathy with intraventricular thrombosis (two patients), acquired mitral valvulopathy (three patients) associated with aortic valvular insufficiency in one patient and tricuspid valvular insufficiency in two patients. The mean age at stroke occurrence was 7.3 years (range, 2–14 years). Two patients had right heart failure with hepatomegaly and hepatojugular reflux. The infarct involved the middle cerebral artery territory (eight patients), anterior cerebral artery territory (one patient), and posterior

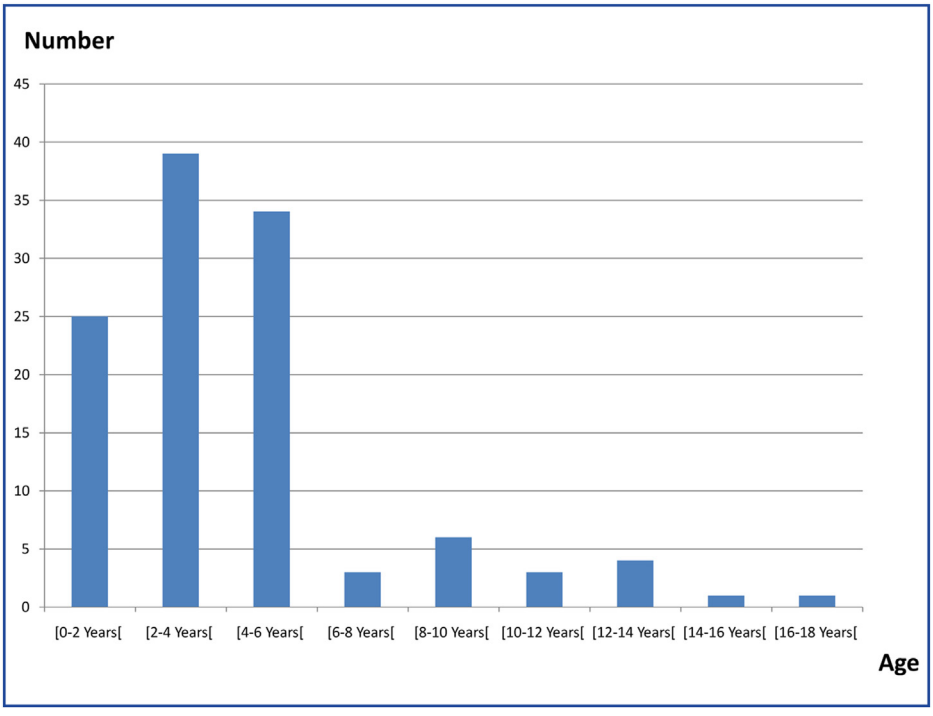

Fig. 1. Age of patients in the Senegalese case series.

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