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Ischemic Stroke in a 5-Year-Old Child: An Unusual Finding of Sickle Cell Disease in Bouaké (Côte D'ivoire)

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Abstract

Stroke is rare but serious in children. It causes neurological sequelae that can interfere with the child's optimal cognitive development. The causes are varied, including sickle cell disease, an autosomal recessive hemoglobinopathy linked to the mutation on chromosome 11 of the 6th codon of the gene of the β-globin chain leading to the appearance of an abnormal hemoglobin called hemoglobin S. We present the case of a 5-year-old boy, not known to be sickle cell disease, hospitalized for right hemiplegia of sudden onset without any notion of trauma or fever. Craniocerebral CT scan revealed moderate left lenticulo-capsulo-capuloid hypodensity. Hemoglobin electrophoresis revealed major sickle cell disease SFA2. Progression under treatment was favourable with complete recovery of the neurological deficit 48 hours after its onset without further reported sequelae. The objective of this clinical case was to describe the main epidemiological, clinical, therapeutic and evolutionary aspects of this unusual acute complication of sickle cell disease in children with sickle cell disease in order to improve prognosis and professional practice.

Keywords: *Child, Sickle cell disease, ischemic stroke, Côte d'Ivoire.*

Introduction

Stroke is rare but serious in children. It causes neurological sequelae that can interfere with the child's optimal cognitive development. The causes are varied, including sickle cell disease, an autosomal recessive hemoglobinopathy linked to the mutation on chromosome 11 of the 6th codon of the gene of the β-globin chain leading to the appearance of an abnormal hemoglobin called hemoglobin S [1]. Each year more than 312,000 children are born with homozygous abnormal hemoglobin S, 75% of them in sub-Saharan Africa [2], and more than 50% of children with this condition die before the age of 5 years [3]. In Côte d'Ivoire, sickle cell disease affects nearly 14% of the Ivorian population, particularly in the central and northern regions of the country, where nearly 90% of cases are concentrated [4]. Unlike in developed countries where diagnosis is made early in the neonatal period [5], in sub-Saharan Africa, which remains the area most affected by the disease, diagnosis is often made at a late stage of the disease during clinical manifestations [6]. These manifestations may be discrete or even absent until the appearance of complications revealing the disease [7,8], including vaso-occlusive painful crisis and severe acute anaemia. Stroke is a revealing complication of relatively infrequent sickle cell disease. Its incidence is estimated at 2-3 per 100,000 children per year [9]. Previous studies have shown that 11% of children with homozygous (SS) and beta-thalasso-sickle cell disease (S/Beta 0 form) will have a symptomatic cerebral infarction before the age of 20 years, while 20% will have silent ischaemic lesions with a maximum risk between the ages of 1 and 9 years [10,11]. To our knowledge, the cerebrovascular accident of sickle cell disease in children has never been described in paediatrics at the Bouaké University Hospital Centre.

We present the case of a 5-year-old boy, not known to have sickle cell disease, hospitalized for right hemiplegia of sudden onset without any notion of trauma or fever. The objective of this clinical case was to describe the main epidemiological, clinical, therapeutic and evolutionary aspects of this unusual acute complication of sickle cell disease for the improvement of prognosis and professional practice.

Clinical Case

A 5-year-old boy was referred from a rural health centre to the paediatrics department of Bouaké University Hospital for sudden right hemiplegia, 6 hours before his admission, without any notion of trauma or fever. The child was, before the neurological accident, in apparent good health with no notion of previous painful attacks, jaundice, repeated blood transfusions or clinical manifestations during childhood that could suggest congenital heart disease or sickle cell disease. There was no family history of sickle cell disease, inbreeding, repeated blood transfusions or vascular malformations. On admission, the child had a good general impression. He was conscious with a Glasgow score of 15/15. Temperature was normal at 37°4 Celsius. Weight was 20 kilograms. Heart rate was normal at 96 beats per minute. Blood pressure was normal at 110/60 mmHg. Respiratory rate was normal at 21 cycles/minute. SpO2 was 99% normal. Neurological examination noted right-sided proportional hemiplegia at 1/5 with retention of tenderness. During the examination, he presented a convulsive episode requiring slow intravenous administration of 3 mg Midazolam. The blood count showed moderate anemia at 6.1 g/dl without hyperleukytosis or thrombocytosis. Craniocerebral computed tomography revealed moderate left lenticulocapsulocapulo-caudal hypodensity without contrast compatible with ischemia of the deep territory of the sylvian artery (**Figure 1**).

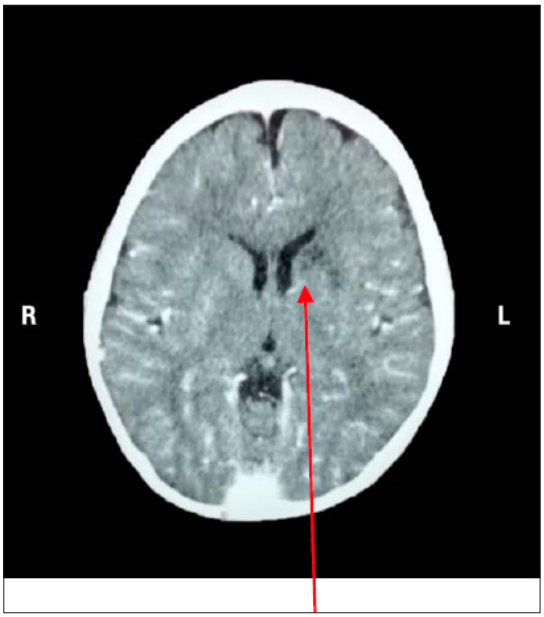

Fig1. *cranioencephalic CT scan showing moderate hypodensity left lenticulo-capsulo-caudal (red arrow).*

The electrocardiogram showed left ventricular hypertrophy. Cardiac and neck vessel Doppler ultrasonography was normal. Cytobacteriological and chemical examination of cerebrospinal fluid was normal. Lipid balance was normal (total cholesterol 3.47 mmol/l; HDL cholesterol 1.04 mmol/l; triglycerides 0.79 mmol/l). Kidney function was normal (urea 0.15 g/l; creatinine 6.1 mg/l). Liver function tests including transaminases (AST 16.51 IU/l; ALAT 13 IU/l) and blood glucose (0.86 g/l) were normal. Haemoglobin electrophoresis revealed a beta-thalasso-sickle cell disease form S/Beta 0 (S = 87.6%, F = 10.3% and A = 2.1%). The diagnosis of an ischemic stroke complicating a major form of sickle cell disease was retained. The child received an infusion of isotonic saline (90ml/kg/day), a transfusion of red blood cells (10ml/kg in 4 hours), hydroxyurea (500mg/day) by oral route, antibiotic therapy (Penicillin V, 50,000 IU/kg/day orally in two doses), functional physiotherapy and 100 mg/day of acetylsalicylic acid orally for the secondary prevention of stroke. The progression under treatment was favourable with complete recovery of the neurological deficit 48 hours after its onset with no further reported sequelae. Follow-up of the child after hospital discharge revealed no recurrence or neurosensory sequelae with a 3-month follow-up.

Discussion

The objective of this clinical case was to describe the main epidemiological, clinical, therapeutic and evolutionary aspects of stroke in children with sickle cell disease (SCD) in order to improve prognosis and professional practice. The reported case confirms once again that sickle cell disease can be complicated and late onset by cerebral infarction in children [10]. In this 5-year-old boy, not known to have sickle cell disease and without any particular history, the sudden onset, without any notion of fever or trauma of a right hemiplegia could suggest an expansive intracranial process, a hypertensive stroke, a neuromeningeal infection. But the normality of the cardiovascular and cerebrospinal fluid tests, the appearance of the lesions reported on craniocerebral CT scan and the abnormal haemoglobin electrophoresis result ((S = 87.6%, F = 10.3% and A = 2.1%) make it possible to invalidate these hypotheses and to retain only the diagnosis of an ischaemic cerebrovascular accident complicating and revealing a major form of sickle cell disease. Stroke occurs mainly in children with sickle cell disease SS or SFA2, most often between 5 and 10 years of age. It may be a late warning sign of sickle cell disease [12] as in the case of this unknown sickle cell boy. Other childhood cases have been described in the literature. Mumtombo et al [13] in Congo in 2013 described three cases of major sickle cell disease revealed late by a stroke between the ages of 5 and 10 years. Tazi [12] in 2010 in Morocco described a 10-year-old girl with a history of stroke at the age of 8 years indicating sickle cell disease. Mukuku et al [6] reported two cases of stroke in two 8- and 10-year-old girls with sickle cell disease. In the series of Yengui et al [7] in 2017 in Tunisia, out of a total of 8 children with ischemic stroke secondary to hematological disorders, the etiological diagnosis revealed sickle cell disease in 5 cases. All these different studies tend to confirm that sickle cell disease is a relatively frequent cause of stroke in children and that stroke is one of the circumstances in which the disease is discovered late. Stroke in children with sickle cell disease is either hemorrhagic or ischemic. Ischemic stroke is a much rarer event in children with sickle cell disease. Its incidence is estimated at 1.6 per 100,000 children per year [14]. The clinical signs of ischemic stroke in children compared with adults are varied and sometimes discrete. This often leads to misdiagnosis and delays in management [15]. From a pathophysiological point of view, sickle cell crises increase blood viscosity due to the presence of abnormal haemoglobin S, which induces cerebral arterial occlusions [16], the cause of cerebral ischaemia downstream of the obstruction. Most (62.5%) of sickle cell diseases revealed late in the course of a stroke recover completely on the motor level, but the cognitive sequelae are virtually constant [17]. Although most of these children do not die during the acute episode, the brain damage caused persists throughout their lives [17, 18]. Most of these children develop a range of chronic morbidities such as motor and cognitive impairments, language impairment and epilepsy [19]. The early onset of right hemiplegia within 6 hours after the onset of right hemiplegia in this case may explain the absence of cognitive sequelae after a 3-month delay.

Emergency management of stroke relies on blood transfusion in conjunction with resuscitation measures. However, blood transfusion will only be indicated if the hemoglobin level on admission is less than 10g/dl [20]. Antibiotic therapy is not routinely given. It is indicated in case of fever after administration of an antipyretic and blood culture [20]. Without treatment, the risk of recidivism is extremely high, in the order of 50% at three years [10]. Long-term transfusions would reduce this risk [21] and hydroxyurea has the advantage of preventing recurrence of subsequent strokes [22]. Primary prevention is sometimes possible when risk factors are identified. Otherwise, prevention is almost impossible, especially since stroke is often the first manifestation of sickle cell disease. Hence the importance of neonatal diagnosis of sickle cell disease, which has not yet been carried out in Côte d'Ivoire.

Conclusion

Stroke is a complication and a telltale sign of sickle cell disease in children. Because of its rarity, childhood stroke presents a diagnostic challenge that can lead to delayed treatment. The diagnosis of sickle cell disease should always be made in the case of a child's stroke even in the absence of a significant history. Since gene therapy is still inaccessible in Côte d'Ivoire, the primary prevention of this serious neurological accident involves the neonatal diagnosis of sickle cell disease and the long-term follow-up of children with sickle cell disease.

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