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Original Article

Children hydrocephalus in Togo: etiologies, treatment, and outcomes

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ABSTRACT

Background: Hydrocephalus is frequent in sub-Saharan African countries. The postinfectious hydrocephalus tends to decrease. The objective of this study was to identify the etiologies and outcomes of hydrocephalus.

Methods: This was a retrospective study of hydrocephalus cases (0–15 years old) treated in the neurosurgery unit of the Sylvanus Olympio Hospital in Lomé over 10 years (2012–2021). At 1 year, the evolution distinguished in two categories: (1) Good psychomotor development: no delay in the acquisition of walking, language, and school. (2) Psychomotor delay: delay in the acquisition of walking, language, and school.

Results: We reported 305 children treated for hydrocephalus representing 1.8% of all neurosurgery unit patients and 34.2% of pediatric pathologies. There was a male predominance (60.6%). We noted second degree consanguinity in 8.5%. The positive maternal serologies were HIV (12.4%), syphilis (8.2%), and toxoplasmosis (2.6%). A malaria episode had been treated during the first trimester in 36.7% of the mothers. The main clinical sign of hydrocephalus was 91.5% of Macrocephalus. Congenital Malformafions were the most common etiologies of hydrocephalus (68.5%). Ventriculoperitoneal shunt was the main surgical method used and 16 deaths were recorded. The medium-term evolution (1 year) was evaluated in 36.1% and noted 61.8% of psychomotor retardation.

Conclusion: This study confirms the trend of the predominance of congenital causes of hydrocephalus in Africa, even if maternal infections can be involved in the development of some of them. The morbimortality of this pathology remains important, especially concerning neurocognitive outcomes.

Keywords: Etiologies, Hydrocephalus in children, Togo

INTRODUCTION

Hydrocephalus is active dilation of ventricles.[9] It is an important health problem in most sub-Saharan African countries.[1,3,4,8,16,24] If in developed countries, the malformative causes are leading, postinfectious hydrocephalus was predominant in underdeveloped countries. This predominance nevertheless tends to decrease in our current practice due to a large campaign of vaccination making most vaccines accessible to populations. In Togo, management was for a long time exclusively shunt but with acquiring of endoscope, we have an additional method. The objective of this study was to identify the etiologies of hydrocephalus in our country for

possible preventive action and also to report the results of their management.

MATERIALS AND METHODS

This was a retrospective study of hydrocephalus cases (0–15 years old) treated in the neurosurgery unit of the Sylvanus Olympio Hospital in Lomé over 10 years (2012–2021). The results were assessed at discharge and 1 year later. The postoperative parameters evaluated were complicated, the neurological disabilities and the psychomotor development were distinguished in two categories: (1) Good psychomotor development: no delay in the acquisition of walking, language, and school. (2) Psychomotor delay: delay in the acquisition of walking, language, and school.

RESULTS

A total of 305 children were treated for hydrocephalus representing 1.8% of all neurosurgery unit patients and 34.2% of pediatric pathologies. Infants were the most age range represented (88.2%). Antenatal diagnosis was made in 11 cases (3.6%). There was a male predominance of 60.6%.

The parents of children affected were mainly poor (87.2%) according to the UN definition. The average age of the mothers was 23.7 years. Their main antecedents were occasional alcoholism (52.4%), high blood tension (3.9%), diabetes (2%), and 29.2% were in single mothers. We noted second degree consanguinity in 8.5%. Pregnancy was well monitored with malaria and anemic prophylaxis in 90.8%. The positive maternal serologies were HIV (12.4%), syphilis (8.2%), and toxoplasmosis (2.6%). A malaria episode had been treated during the 1st trimester in 36.7% of the mothers. The antenatal diagnosis of hydrocephalus was made during the 3rd trimester ultrasound in 33 cases (10.8%) and 4.9% were premature.

The main clinical sign of hydrocephalus was macrocephalus (91.5%). The macrocephalus was present in 34.4% at birth (head circumference >35 cm). The average of head circumference was 56.9 cm. The average consultation time after birth was 4.7 months, with psychomotor retardation in 23.6% [Table 1]. Cerebral CT was honored in 96.1% with a predominance of tetra ventricular hydrocephalus (63.3%). There were 2.6% in hydranencephaly. Spina bifida (myelomeningocele) was associated to hydrocephalus in 17.4%. Malformative etiologies of hydrocephalus predominant are shown in [Table 2]. Ventriculoperitoneal shunt was the main surgical method used [Table 3]. The average age at the intervention was 5.2 months.

The immediate postoperative outcomes were simple in 75.4%. The main complications recorded were hyperthermia (4.3%), pressure sores (2.3%), and over drainage (3.3%). We recorded 16 deaths (staphylococcal meningitis, ventriculitis, and sepsis). During the period of study, we had 11 valve malfunctions with shunt revision (5.6% of 267 shunts)

Table 1: Clinical signs of children at admission.

	Number (*n*)	Percentage (%)
Macrocephalus	279	91.5
Cephalic vein dilation	78	42.3
Brittle hair	135	44.3
Disjunction of sutures	175	90.2
Eyes avulsion	123	40.3
Nystagmus	21	6.9
Psychomotor retardation	72	23.6
HIC signs (headache and vomiting)	25	8.2
Cephalic bedsores	37	12.1

Table 2: Etiologies of hydrocephalus.

	Number (*n*)	Percentage (%)
Malformative[a]	**209**	**68.5**
Maternal infectious suspected as responsible (87)		
Unknown (122)		
Confirmed postméningitis	**50**	**16.4**
Tumor[b]	**38**	**12.5**
Brainstem glioma (4)		
Thalamic glioma (2)		
Medulloblastoma (5)		
Colloid cyst (1)		
Choroid plexus Papilloma (3)		
Pilocytic Astrocytoma (5)		
Ependymoma (4)		
Craniopharyngioma (13)		
Pineal Tumor (1)		
Hemorrhagic	**8**	**2.6**
Total	**305**	**100**

[a]Dandy Walker syndrom (23 patients), Midbrain aqueduct stenosis (13 patients), [b]Histological diagnosis (11), radiological diagnosis (27). Bold text: Main etiological entities. Number of each etiology is mentioned in bracket

Table 3: Therapeutic modalities.

	Number (*n*)	Percentage (%)
Shunt	267	87.5
VCS	11	3.6
Tumor resection without shunt or VCS	5	1.6
Tumor resection completed by shunt or VCS*	10	3.3
Surgical abstinence**	23	7.5

*Patients benefited of shunt or VCS before tumor resection,**Parent refusal, anesthetic abstinence, lack of income, volunteer discharge, VCS: Ventriculocisternostomy

Table 4: Outcomes at 1 year concerning 110 patients (36.1%).

	Number (*n*)	Percentage (%)
Psychomotor retardation	68	61.8
Normal neurocognition	18	16.4
Valve malfunction	11	10
Epilepsy	8	7.3
Neurological deficit	5	4.5
Total	110	100

The medium-term evolution (1 year) was evaluated in 36.1%. The results at this term are summarized in Table 4.

The retardation, especially walking, affected mostly congenital hydrocephalus (malformative). Among eight hydranencephaly, only two were shown up at control. The normal neurocognition evolution concerned secondary hydrocephalus and three malformative hydrocephalus. Cranium sizes according age were normal in 21 after 1 year.

DISCUSSION

Hydrocephalus is the main pathology in pediatric neurosurgery. Our frequency does not reflect the reality because it is not all patients who are consulting. Indeed because of farness and poverty, a lot of rural population do not have access to medical facilities as reported also in another countries.[16,24] Furthermore, we noted a diagnosis delay illustrated, for example, by prenatal diagnosis which is relatively low regarding the number of obstetrical ultrasounds performed during pregnancies. Some authors even reported no antenatal diagnosis.[15] According to the etiologies, it is classic to distinguish two types of hydrocephalus: congenital and secondary even there is a pathway between them. Hydrocephalus without an obvious extrinsic cause is usually referred to as congenital hydrocephalus, since it is often present at birth. When hydrocephalus occurs as a complication of another condition such as hemorrhage, infection, or neoplasm, it is usually called acquired or secondary hydrocephalus. However, forces such as hemorrhage and infection can act prenatally and also cause "congenital" hydrocephalus.[21]

In fact, maternal factors have a major role in development of hydrocephalus, such as stress, diabetes, alcohol, first-trimester infection, drug, and malnutrition.[20] We suspected without formal proof of malaria, diabetes, syphilis, and toxoplasmosis as being potentially responsible of some congenital hydrocephalus without neglecting genetic factors through as inbreeding we found in our series.[17,18,22] We clinically evoked a Bicker-Adam syndrome in two cases without confirmation. The most syndrome frequently seen in practice is Dandy Walker, which is common cause of congenital hydrocephalus.[12,19] Previously, in Africa, the postinfectious etiology was predominant.[14,25] However, this predominance tends to decrease, as like in developed countries.[1,15,26] This trend is confirmed in our study with only 16.4% of postinfectious etiology against 68.5% for congenital causes.

Then, the prevention of hydrocephalus for modifiable causes involves early treatment of infections in pregnant women, perinatal supplementation with folic acid, and the fight against poverty.

Although postoperative mortality is low (5.2%), the main problem is morbidity especially the cognitive deficiency. Neurocognitive deficits are well reported in children with hydrocephalous. Numerous factors such as etiology, age at onset, raised intracranial pressure, the rate of ventricular enlargement, ventricular size, the duration of hydrocephalus, coexisting pathological changes, and shunt complications have been shown to influence cognitive function.[11,23,27]

Neurocognitive outcome was better in secondary hydrocephalus when the cause was treated, opposite to congenital hydrocephalus with a high rate of psychomotor retardation. This fact can be explained by the early onset in congenital hydrocephalus and especially by the associated brain lesions.[7] Aside these endogenous factors, we can notice also the diagnostic delay common in Africa. Indeed, time is crucial for psychomotor development: early diagnosis and treatment may reduce residual neuronal degeneration. Despite the small patients seen in control after one year, the high percentage of psychomotor retardation (61.8%) gave an idea about significant morbidity of infantile hydrocephalus. This rate would probably be higher if all patients had been seen; as well as long-term mortality. This high rate of outpatient control of no attendance is explained first by medical facilities farness for patients, who are mainly rural but by the minimization of those appointment by parents either for economic reasons or discouragement due to absence of substantial psychomotor improvement expected. A feeling of fatality or reorientation toward traditional medicine then sets in. The management of hydranencephaly raised ethical problems. There is debate between abstinence and surgical treatment; therefore, indications are mainly individual.[2,5,6,10,13] In our practice, we are doing shunt firstly to treat the macrocephalus.

CONCLUSION

This study confirms the trend of the predominance of congenital causes of hydrocephalus in Africa, even if maternal infections can be involved in the development of some of them. The diagnosis remains late. Most patients are treated by shunt despite the availability of endoscopic ventriculocisternostomy. The morbimortality of this pathology remains important, especially concerning neurocognitive outcomes.

Declaration of patient consent

Patients' consent not required as patients' identities were not disclosed or compromised.

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Conflicts of interest

There are no conflicts of interest.

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