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Case Report

Psychomotor Performance in Children Operated for Hydrocephalus: About 79 Cases

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Abstract

Introduction: Ventricle enlargement is characteristic of hydrocephalus and responsible of brain compression including ischemic disorders and alterations of the myelinisation. Delayed management of children hydrocephalus could induce definitive psychomotor impairment. Our aim was to assess children that have been operated for hydrocephalus in psychomotor field before and after operation.

Patients and Methods: It was a retrospective, cross sectional and analytical survey. The study was conducted on children operated from 2003 through 2009. These children were reevaluated in 2013. Sometimes, clinical data were obtained from their parents or relatives. The Denver test was used for final neurological evaluation.

Results: From 2003 through 2009, 357 children were managed for hydrocephalus. Seventy nine cases were included for this study. In 35 cases (44.33%) families' monthly incomes were below the minimum salary fixed by the government. Prior to surgical procedure, 57.2% of these children had macrocrania (>3 SD). Only three children (3.79%) underwent surgery within one month after admission. With a medium follow up of 7.8 years, 41 of operated children (51.9%) are still alive and 19 (24.05%) were symptomatic psychomotor delay were identified in 18 cases, whereas major functions impairments were present in 14 cases. Twenty three (56.1%) were attending schools.

Conclusion: In this report, difficulties in management of children with hydrocephalus could be responsible of psychomotor impairments. More effort must be done regarding the initial evaluation, surgical management and social integration.

Keywords: Hydrocephalus; Psychomotor impairment; School

Introduction

Hydrocephalus is a disorder of production and absorption of cerebrospinal fluid. It causes enlargement of ventricular system which lead to direct compression of cerebral parenchyma. According to the causes, the anatomic level or obstruction, and the duration of the disease, impairments may occur such as ischemia, basal ganglia destruction or parenchyma necrosis [1-3].

In neonates or young patients, morphologic and functional impairments of cerebral structures could compromise mental functions, pathways organization and good psychomotor development [4]. In developing countries especially in African sub Saharan countries, most children with hydrocephalus suffered from meningitis in neonatal period [5-8]. In Benin republic, this pathology counted for about 15% of patients attending neurosurgical consultations. So far, children with hydrocephalus represented more than 60% of the pediatric neurosurgical disorders [9]. To this reason, in this present study, we aims to determine the clinical patterns and neuro-imaging aspects of children with hydrocephalus in Cotonou, Benin in order to have a better understanding of their quality of life after neurosurgical procedure.

Patients and Methods

The study was done in Department of Neurosurgery in the Military Teaching Hospital and Department of Pediatrics in the National Teaching Hospital of Cotonou, both committed in surgical care for children with hydrocephalus.

It was a retrospective, descriptive and analytic study regarding children that underwent surgical management of hydrocephalus from September 2003 through August 2009. These children were aged from one day to ten years old, and had been included according to selected variables upon epidemiology, clinical, therapeutic and follow up data. A minimum of one year follow-up was requested after neurosurgical procedure before inclusion. Data had been collected from patient's files and were completed with psychomotor pattern based on Denver test during final neurological assessment [10-12]. More questions were asked for better description of cultural and social profile, various disabilities, including challenges in social insertion. In some other cases, missing data were obtained through phone call. Neuro-imaging data of ventricular system were obtained by cerebral ultrasounds (n=75) and CT scan (n=35). MRI was done in only one case. These help determining EVANS ratio which is the distance between outer

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margins of frontal horns divided by distance between inner table of calvarium on the same slice. Normal value ranged from 0.3 through 0.4 [2]. By reference to the normal developmental age, a six month extra time period was considered before looking on neurological development delayed. All data were analyzed with SPSS 21software. Chi-square test was used for proportion comparison and a p-value of 0.05 was considered as significant. Parents gave written consent and data were managed according to good practice in clinical research.

Results

During the period of the study, 357 patients had ventricular-peritoneal shunt, and 79 parents had given their consent in participating in the study. The sex-ratio was 1.2. The mean age at first admission was nine months (min = 27 days and max = nine years) and 61cases (78.2%) were in infants. Children at school age and neonate were respectively 1.26% and 19.2%. In 60 cases (76%) first neurosurgical consultation was obtained at least one month after the beginning of the disorders. In eight cases (10.3%) this delay was ≤ one year. Regarding economic conditions, 45 parents (56.96%) were self-employed workers, enrolled in private companies or without job. Twenty one (26.58%) were civil servants and are eligible for the national health system assurance. In most cases (n = 63; 80%) the highest parents' income varied from 40 000 to 120 000 CFA franc (240 US Dollars). Six families (10%) had income higher than 120 000 CFA franc, and six others had income lower than 40000 FCFA or no income at all. Medical histories revealed fetal infections (n=62; 78.51%), preterm birth (12.65%) and birth asphyxia (8.86%). Main etiologies are documented in (Table 1). Meningitis (74.7%) and cerebral malformations (16.5%) represented the leading causes of hydrocephalus. All the children came with macrocrania. Variation of cranial circumpherence was higher than 3 standard deviations in 45 cases (57.2%) and was situated between 2 and 3 SD in 34cases (42.8%). Neurological disorders were axial hypotonia (n=40; 50.6%), poor control of vesical sphincter (n = 14; 17.7%). On anatomic based, hydrocephalus was tetra ventricular in 49 cases (62.02%) and tri or bi ventricular respectively in 30.37 % and 7.59 % of the cases. Calculated EVANS ratio ranged from 0.71 to 1 in 65 cases (82.85%) and 0.51 to 0.70 in 9 cases (11.42%). In five children, the ratio was in the subnormal range. The global average value was 0.81 (min = 0.48 - max = 1). Regarding management following their admission, only three cases (3.79%) underwent surgery before one month following admission. Sixty children (76%) were operated between one month and one year, while 16 children (20.25%) had surgeries one year after operative decision. At the completion of this study, medium post-operative follow up was 7.8 years (min = 1 year; max = 10 years). Sixty two children (78%) had single neurosurgical procedure and kept their first shunt device. Twenty five children (31.64%) disclosed complications such as meningitis (n=11; 26.8%), infection either cutaneous necrosis at the operating site (n=8; 19.5%) and malnutrition (14.7%).

Seventeen children (21.51%) had benefited from a shunt revision. Thirty eight children out of 79 (48.10%) died from shunt dysfunctions (n=18), infections at operating site (n=14) or under nutrition (n=6). Final neurological evaluation was based on 41 clinical controls in the department with 38 reports collected from parents. Nineteen children (24.05%) were free of neurological disorder. Sixty other children had shown various psychomotor impairments. Out of 41 that were alive children, 23 (56.1%) were able to attend normal schools. Twelve children (52%) were doing well at school and 11 (47.82%) had bad school performances. Delayed in neurological abilities were identified in 18 cases, while major functions impairments were present in 14 cases such as lack of walking after three years (n=7); blindness (n=3), dysarthria and inability in scholar duty (n=4).

Table 1: Etiologies of children hydrocephalus.

Pathologies	Patients	%
Meningitis	59	74.7
Cerebral malformation	13	16.5
Hemorrage	5	6.3
Tumor	2	2.5
Total	79	100,0

Discussion

Hydrocephalus counted for 63.4% of pediatric consultations and represents a major challenge for Benin health system [1]. Over the period of study, 357 children were operated for hydrocephalus and 79 (22.12%) received neurological evaluation in our facilities. In this study, infants represented 78.2% of the cases, as usually reported [5, 6]. Early onset of hydrocephalus is responsible of massive neuronal destructions. Through a routine neuro pediatrics evaluation in 18 children ranged from 1 to 8 years old with previous history of isolated fetal mild ventriculomegaly. Gomez-Ariga reported five cases of neurological disorders: three had language impairment and two had either left hemiparesis or intellectual retardation [13]. In this study, circumstances were dominated by infectious contexts (n=60; 75.9%) and meningitis (n=59; 74.7%) was the main cause, followed by congenital malformation as found in 13 cases (16.5%). This predominance of infection was previously reported especially in low income countries [7, 14-16]. The occurrence time of hydrocephalus in children comes from the importance of ventricular enlargement that is responsible of reduction of cerebral mantle. This increases immediately EVANS ratio (0.81 instead of 0.3). This is pathognomonic of major cerebral anatomical changes and characteristic in infant that had suffered from meningitis, leading to poor outcome [8,17,18]. On a therapeutic aspect, delay in surgery is at the origin of major complications such as chronic infectious, under nutrition and cutaneous necrosis near shunt device. All these increase revision rate with negative impact on quality of surgery. Qura-Tul-Ain and al. had reported the rates of 11.2% and 16% respectively regarding shunt infection and dysfunction [15]. In term of psychomotor development, 23 out of 41 alive children (56.09%) had combined disorders or sequela, such as motor disability, cognitive and psycho affective impairments. Three children (7.31%) had no psychomotor impairment and had good result at school. The major fear in this condition is psychomotor delay as reported in literature [19,20]. Complications are fewer in high income resources countries compared to developing world [20-22]. In our study, long term outcome gave 56.1% of survivors and most of them (n = 20; 86.95 %) are still going to normal schools with no specific help. Our results were consistent with what have been reported in the past [20-25].

Conclusion

Hydrocephalus is at risk whenever new born or infant experience

acute infection of nervous system. Long term follow up in Benin republic is characterized by a low rate of survival (51.9%) and various impairments on survivors such as motor deficit (68.29%), cognitive (31.7%) and psycho affective (12.19) disorders. There is a low rate of schooling (56.1%) in survivor children.

References

1. Peudenier S, Dufour T. Hydrocéphalies de l'enfant. Flammarion Médecine Sciences 1999.
2. Grunberg MS. Handbook of Neurosurgery. Fifth edition. Thieme. New York, 2001; 74: 362-363.
3. Wada M. Congenital Hydrocephalus in HTX-rats: Incidence, Pathophysiology, and Developmental Impairment. Neurol Med Chir 1988; 28, 955-964.
4. Stevens JP, Eames M, Kent A, Halket S, Holt D, Harvey D. Long term outcome of neonatal meningitis. Arch Dis Child Fetal Neonatal Ed 2003; 88: 179–184.
5. Barkat A, Chkirate B, Benjelloune DBS. Hydrocephalies post-meningitiques, a propos de 75 cas. Med du Maghreb. 2004; 120: 11–14.
6. Onifade E, Lesi FEA, Ezeaka VC, Grange AO. Séquelles neurologiques chez des enfants atteints d'une méningite purulente dans un centre tertiaire à Lagos. AJNS. 2003; 22: 31-38.
7. Warf BC. Hydrocephalus in Uganda: the predominance of infectious origin and primary management with endoscopic third ventriculostomy. J Neurosurg 2005; 102: 1-15.
8. Johnson WBR, Adedoyin OT, Abdulkarim AA, Olanrewaju WI. Bacterial Pathogens and outcome determinants of childhood pyogenic meningitis in Ilorin, Nigeria. Afr J Med Sci 2001; 30: 295-303.
9. Bognon GMA. Evaluation des problèmes posés par la prise en charge des hydrocéphalies (à propos de 71 cas reçus à l'Hôpital d'Instruction des Armées de Cotonou). Th Med UAC FSS. 2005.
10. Albright AL, Pollack IF, Adelson PD. Principles and Practice of Pediatric Neurosurgery. 3rd edition. Thieme. 2015.
11. Ya I, Sun I, Dreux F, Fernandes M. Communication difficulties perceived by parents of children with developmental disorders. CoDAS 2014; 26: 270-275.
12. Sabanathan S, Wills B, Gladstone M. Child development assessment tools in low-income and middle-income countries: how can we use them more appropriately? Arch Dis Child 2015; 100: 482–488.
13. Gómez-Arriaga P, Herraiz IP, Jose M, Zamora-Crespo B, Núñez-Enamorado N, Galindo A. Mid-Term Neurodevelopmental Outcome in Isolated Mild Ventriculomegaly Diagnosed in Fetal Life Fetal. Diagn Ther 2012; 31: 12-18.
14. Warf BC. Hydrocephalus associated with neural tube defects: characteristics, management, and outcome in sub-Saharan Africa. Childs Nerv Syst 2011; 27: 1589–1594.
15. Qura-Tul-Ain R, Muhammad SS, Kishwar E et al., Time trends and age-related etiologies of pediatric hydrocephalus: results of a GroupWise analysis in a clinical cohort Childs Nerv Syst 2012; 28: 221–227.
16. Akpede GO, Ighogboja SI. The contribution of delayed Diagnosis to the Outcome in Pyogenic Meningitis. Nig J Paediatr 1996; 23: 4-10.
17. Koivisto AM, Alafuzoff I, Savolainen S et al., Poor cognitive outcome in shunt-responsive Idiopathic normal pressure hydrocephalus neurosurgery. 2013; 72: 1-8.
18. Palm WM, Saczynski JS, Van Der Grond J, et al.,Ventricular dilation association with gait and cognition. Ann Neurol 2009; 66: 485-493.
19. Vinchon M, Baroncini M, Delestret I. Adult outcome of pediatric hydrocephalus. Childs Nerv Syst 2012; 28: 847-854.
20. Yekpe Ahouansou HP, Gandaho H, Alao J, Anato Y, Biaou O, Boco V. Complications post méningitiques et leurs suivis par échographie trans-fontanellaire chez le nouveau-né et le nourrisson à Cotonou. Le Bénin Médical 2012; 51: 11-16.
21. Lindquist B, Persson E, Fernell E, Uvebrant P. Very long-term follow-up of cognitive function in adults treated in infancy for hydrocephalus Childs Nerv Syst 2011; 27: 597–601.
22. Paulsen AH, Tryggve Lunda R, Lindegaa KF. Twenty-year outcome in young adults with childhood hydrocephalus: assessment of surgical outcome, work participation, and health-related quality of life. J Neurosurg Pediatr 2010; 6: 527-535.
23. Topczewska-Lach, Lenkiewicz T, Olański W, Zaborska A. Quality of life and psychomotor development after surgical treatment of hydrocephalus. Eur J Pediatr Surg 2005; 15: 2-5.
24. Gupta N, Park J, Solomon C, Kranz DA, Wrensch M, Wu YW. Long-term outcomes in patients with treated childhood hydrocephalus. J Neurosurg 2007; 106: 334-339.
25. Platenkamp M, Hanlo PW, Fischer K, Goosken RHJM. Outcome in pediatric hydrocephalus: a comparison between previously used outcome measures and the Hydrocephalus Outcome Questionnaire. J Neurosurg 2007; 107: 26-31.

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