Original Article

Evaluation Neuropsychological of visual memory and perception organization in congenital hydrocephalus

Avaliação cognitiva da memória visual e organização perceptiva na hidrocefalia congênita

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ABSTRACT

Children with congenital hydrocephalus show deficit in learning, having losses in their schooling. Eighty-four children divided into two groups of 42–50% formed the Control Group and the other 42 in the Hydrocephalus Group – had their visual memory evaluated through the Rey complex picture test, and the perception organization in which we used the WiscIII test with subtests: picture completion, picture organizing, cubes and objects assembling. The results were co-related to age, sex and schooling. They are as follows, for visual memory Cg 28,5 ±_1,4 and Hg 11,7 ±_4,3.P<0,0001, for perception organization Cg 99,6 ± 9,1.Hg 69,7 ±_12,3.P<0,000, schooling Cg 4,3 ± 1,5, Hg 2,0 ± 1,3. P<0,0001. Cg 10,4 ± 2,4 the Hg produced the same value, in which P< 9,9964, sex Cg 2,3 ± 1,0 o Hg had the same value P <1.000. The children in the Control Group presented better results in the tests and better performance at school while the children with congenital hydrocephalus presented significant deficit in their visual memory and perception organization. We suggest that it is one of the factors that causes loss to their schooling.

Key words: visual memory, perception, cognition, neuropsychology, children, hydrocephalus.

RESUMO

As crianças portadoras de hidrocefalia congênita, apresentam déficits na aprendizagem, com prejuízos de atraso em sua escolaridade. 84 crianças, divididas em 42 no grupo controle (Gc),e 42 formando o grupo de hidrocefalia (Gh),foram avaliadas em relação a memória visual com a utilização do teste figura complexa de Rey, e a organização perceptiva onde utilizamos o teste Wisc III com os subtestes completar figuras,arranjo de figuras, cubos e armar objetos. Os resultados foram correlacionados quanto a idade, sexo e escolaridade,

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na memória visual Gc 28,5 ± 1,4 e Gh 11,7 ± 4,3.P<0,0001, na organização perceptiva Gc 99,6 ± 9,1.Gh 69,7 ±_12,3.P<0,0001, escolaridade Gc 4,3 ± 1,5, Gh 2,0 ± 1,3. P<0,0001, idade Gc 10,4 ± 2,4 o Gh apresentou o mesmo valor, onde P< 9,9964, sexo Gc2,3 ± 1,0 o Gh apresentou mesmo valor. P <1.000. As crianças do grupo controle apresentam melhores resultados nos testes e melhor desempenho na escola, enquanto que as crianças com hidrocefalia congênita apresentam déficits significativos nas esferas de memória visual e organização perceptiva, sugerimos que este seja um dos fatores que causam prejuízos em sua escolaridade.
Palavras chaves: memória visual, percepção, cognição, neuropsicologia, criança, hidrocefalia.

INTRODUCTION

It is estimated that, among one thousand children born alive, one develops congenital hydrocephalus. Some others also have other kind of neural axis malformations, such as myelomeningolece. Early treatment can diminish neurological consequences, especially relating to cognitive aspects[1].

The peritoneal ventricle shunt (PVS) makes the constant removal of excessive spinal fluid (SF) from the ventricle cavities possible, enabling the encephalus to perform its functions normally. We should assume that prior to surgical procedures, due to intracranial hypertension, there may occur brain damages, which many times can be irreversible.

Other problems also may endanger the encephalus in the development of its functions, such as, valves malfunctioning, meningitis, and the frequent replacement of PVS system.

Several studies inform that a good portion of patients with CH, who have been shunted, have a good quality of life, including good cognitive performance. One of the factors which can improve the se patients cognitive spheres performance is the early hydrocephalus correction in the first months of life[2]. This study aims at assessing patients with hydrocephalus, taking into consideration their visual memory and their perceptive organization.

The neurological damages, which these children have, can reduce their capability to interact with the environment, for they face social difficulties related to attending schools because of motor deficit and esfincterian disturbances[3].

METHODS

Eighty-four children, divided into two groups, were evaluated. Forty-two of them were healthy and formed the Control Group (C). The other forty-two children had developed CH and were shunted in the first six months of life (H). The groups were heterogeneous, having children both male and female, with ages ranging from seven to fifteen, all of them coming from the same social extract.

All subject were submitted to neuropsychological evaluation though the Rey complex picture test in order to evaluate their visual memory. Their perceptive organization was also evaluated through the Weschsler intelligence scale subtests, battery Wisc III.[4-6]

The patients and those responsible for them were previously informed about the nature of the study, according to terms of free and clear agreement approved by Federal University of Pernambuco (human ethics committees) and Maternal-Child Institute of Pernambuco.

RESULTS

The statistic data through the Mann-Whitney test, the following results were found: Visual Memory (VM) in C 28 ± DP 1,4. h 11,7 ± 4,3; and perceptive organization C 94,6 ± DP 15,7. H 65, 6 ± DP 9,4 in C; Education Level C 43,3 ±_1,5. H 2,0 ± 1,3. P<0,0001. Relating to age: (C) 10,4 ± 2,4; (H) presented the same value, where P< 9,9964, gender (C) 2,3 ± 1,0 (h) presented the same value. P <1.000.

Table 1 shows the distribution of subjects according to their age and gender in both groups. **Table 2** shows the results of the visual memory and perceptive organization neuropsychological evaluation to both groups. In **Figure 1**, the **graph A** illustrates Rey's complex figure model, and the **graph B** has samples of drawings made by children from both groups.

Figure 2 has three graphs: **graph A** corresponds to the subjects education level; **graph B** to the visual memory; and **graph C** to perceptive organization.

DISCUSSION

The peritoneal ventricle shunt is important to diminish the liquid excess in brain ventricles, and the earlier this surgery is made, the lesser the cognitive damage will be. Besides, it is important to be sure that a careful asepsis is made to avoid infections and future valve replacements, and other types of pathologies.

These children have been identified as having difficulties in the visual perception, compared to healthy ones, all this because they accomplish visual perception tasks, such as figures identification, people and geometric forms figure association and description, precariously. There are in these children ocular movement disorders, which can be a barrier to their visual perception development.[7]

Among 298 patients with CH, 61 % are strabismic, 63% have esotropy, and 37% have escotropy, these numbers can be explained because of its association to malformation in the central neural system (CNS), including hypoplasia or cranial nerve aplasia of nucleus. The percentage of CH strabismic patients is statistically higher than the average of strabismic healthy children.[8]

Comparing our results to those of the specialized literature, we found them coherent, for we observed the same cognitive deficits relating to the children with CH[4,5-8]. We should assume that the loss of about 50% in the cognitive sphere may have caused difficulties in their school life.

A noteworthy finding in our study is the fact that the children in the our control group presented a better outcome in the visual memory test (93,3%) than those results presented for the other countries in the literature. We would point out that the children were selected randomly at the nursery of the Hospital of Clinics at the Federal University of Pernambuco.

This essay is a contribution to the studies on cognitive evaluation in children with CH. As to the cognitive deficit in the visual memory and perceptive organization, we notice that in the national level the literature is precarious, but there many scholars interested about the subject internationally.

We believe that more investigations in this field are needed, in order to improve understanding, given that the cognitive evaluation in children with CH is still precarious in Brazil.

CONCLUSION

The children with CH, studied in this essay, presented cognitive deficits in the visual memory and perceptive organization spheres, being these results probably related to these patients' learning difficulties, which is a barrier in their school lives.

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Table 1 –

Ages	Control	Hydrocephalus	Control Female	Hydrocephalus Female	Control Male	Hydrocephalus Male
7	4	4	2	2	2	2
8	6	6	3	3	2	2
9	8	8	4	4	4	4
10	8	8	4	4	4	4
11	4	4	2	2	2	2
12	2	2	1	1	1	1
13	2	2	1	1	1	1
14	4	4	2	2	2	2
15	4	4	2	2	2	2
total	42	42	21	21	21	21

Note – To show that there was balance in the groups distribuition.

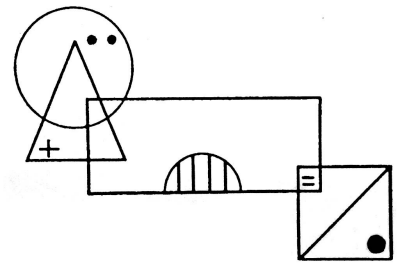
Table – 2

Data	Control	Hydrocephalus	P*
Visual Memory	28,5 ± 1,4*	11,7 ± 4,3	< 0,0001
Perceptive Organization	94,6 ± 9,1	69,7 ± 12,3	< 0,0001
School Level	4,3 ± 1,5	2,0 ± 1,5	< 0,0001
Age	10,4 ± 2,4	10,4 ± 2,4	> 0,9964
Gender	2,3 ± 1,0	2,3 ± 1,0	> 1,0000

Table 2 –* Average, ± standart deviation e P* value compared to Control Group. Results obtained by Mann-Witney test.

Figura: 1 –

Picture A –Rey's complex figure Model; Version B (for children)



Picture B – visual memory reproduction from both groups.

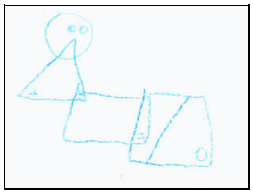
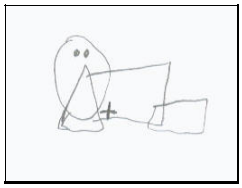
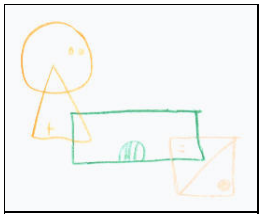
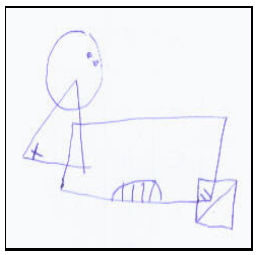
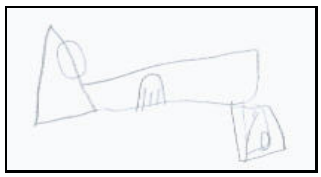
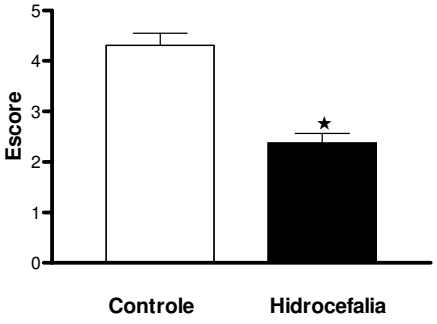
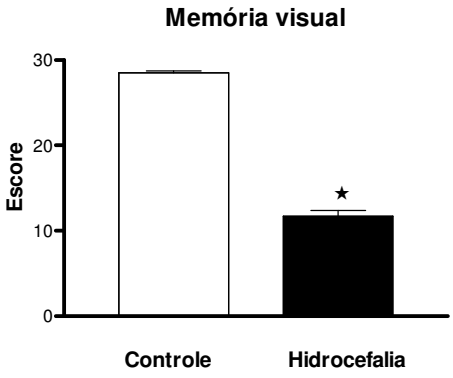
	Control	Hydrocephalus	
gender/age /score	drawings	drawings	gender/age /score
F / age: 7/ 20			F / age: 7 /14
F/ age:10 /26			F/ age: 10/19
M/ age: 11/25			M/ age: 11/10

Figure 2 – Graphs

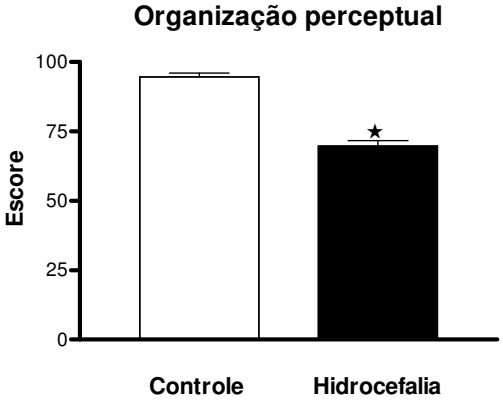
graph A



graph B



graph C



Graph A shows the difference in school level C 4,3±1,5. H 2,0 ± 1,3. **Graph B** visual memory C 28,5 ± 1,4. H 11,7 ± 4,3. **Graph C** perceptive organization C 99,6 ± 9,1.H 69,7±123,3.P<0,0001.