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Effectiveness of Ventriculo-Peritoneal Shunting Between Congenital and Post-Infective Childhood Hydrocephalus

Ogunleye Olabisi O., Ismail Nasiru J., Lasseini Ali, Shehu Bello B.
Regional Centre of Neurosurgery (RCN), Usmanu Danfodiyo University Teaching Hospital, Sokoto. Nigeria.
Correspondence to: Ogunleye Olabisi O.

Abstract
Background
Hydrocephalus affects people of all ages with variable effects.Globally, the burden of hydrocephalus in the paediatric population is high.Childhood hydrocephalus can be congenital or acquired.Shunts are, and will continue to be the primary treatment for hydrocephalus.
There is paucity of work on the effectiveness of ventriculo-peritoneal shunting among patients with congenital and acquired hydrocephalus and this work aimed to investigate the effectiveness of ventriculo-peritoneal shunt and compare it between patients with congenital hydrocephalus and patients with post-infective hydrocephalus.
Method
Hospital based prospective and comparative study. One hundred and forty-two children with hydrocephalus was recruited into two groups based on the aetiological factor; congenital and post-infective using systematic point sampling technique. All the patients had ventriculo-peritoneal shunt insertion. Preoperative and post-operative variables; occipitofrontal circumference(OFC), anterior fontanel, neurological symptoms were compared between the groups using multivariate analysis.
Results
The mean age of patients with congenital hydrocephalus was 3.1 ± 3.3 months and male to female ratio of 1.7:1, while the mean age of 8.0 ± 4.6 months and male to female ratio of 1:1 in patient with post-infective hydrocephalus. There was a step ladder reduction in occipitofrontal circumference (OFC) of the patients with congenital hydrocephalus during the period of follow up but there was no such pattern among the post-infective group (p = 0.005). Anterior fontanel at 3 months (0.001 vs 0.011).
Conclusion
Ventriculo-peritoneal shunt insertion is the treatment of choice for paediatric hydrocephalus, however, this treatment modality was more effective among patients with congenital hydrocephalus compared with patients with post-infective hydrocephalus.

Keywords: *effectiveness, VP shunting, hydrocephalus, congenital, post-infective.*

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I. Introduction

Hydrocephalus affects people of all ages with variable effects.[1]The earliest scientific description of hydrocephalus is ascribed to Hippocrates (466-377BC), who mentioned such symptoms as headache, vomiting, visual disturbance and diplopia, and explained the illness as a "liquefaction of the brain caused by epileptic seizures".[1]

Globally, the burden of hydrocephalus in the paediatric population is high, with a prevalence rate of 1.2/1000 children.[2] Hospital based prevalence rate in developing countries is put at 0.092%.[3]

Hydrocephalus is defined as presence of excessive cerebrospinal fluid in and around the brain.[4] It may be detected radiologically, the features of which include; the size of both temporal horns (TH) more than 2 millimetre in width, ballooning of frontal horns of lateral ventricles (''Mickey Mouse'' ventricle), ratio of frontal horn (FH) to maximal biparietal diameter (BPD) is greater than 0.3 (Evan's ratio) or transependymal absorption of cerebrospinal fluid evident as periventricular hypodensity on computerized tomography/periventricular hyperintensity signal on T2 weighted magnetic resonance image.[5, 6]

Childhood hydrocephalus can be congenital or acquired. It may arise from some disturbances in CSF secretion, flow or absorption. It can also been classified as communicating or non-communicating based on presence or absence of obstruction within the ventricular system.

Hydrocephalus in children, if untreated, causes developmental disorders, mental deficiencies and shortened life expectancy in addition to blindness and other neurological deficits as a result of cerebral injury due to distention of brain tissue.[7]

Shunts are, and will continue to be the primary treatment for hydrocephalus, yet, their use is associated with frequent complications such as shunt malfunction, infections and failure.

This study aimed to evaluate the effectiveness of ventriculo-peritoneal shunting among patients with congenital and those with post-infective hydrocephalus and this will help to identify patients or group of patients between congenital and post-infective hydrocephalus, who stand a better outcome and less complications following ventriculo-peritoneal shunt insertion.

II. Research Methodology

This was a hospital based prospective and comparative study on patients with congenital hydrocephalus and those with post-infective hydrocephalus who had ventriculo-peritoneal shunt insertion at Usmanu Danfodiyo University Teaching Hospital Sokoto, Nigeria between August 2016 and July 2017. One hundred and forty-two patients were recruited using systematic point sampling technique for each group (seventy-one patients for congenital and seventy-one patients for post-infective). The inclusion criteria includes patients admitted for initial VP shunt insertion and were aged from 0 – 2 years.

All patients had our Centre's protocol for management of childhood hydrocephalus and were treated with medium pressure VP shunt insertion (Chhabra) Pre-operative and post-operative assessment of occipitofrontal circumference (OFC), anterior fontanel and neurological findings were done and patients were followed up for 3 months.

The data were analyzedusing statistical package for social science (SPSS) version 20 (SPSS) Inc. Chicago IL, USA.Multivariate analysis was used to determine the effectiveness of ventriculo-peritoneal shunting between the two groups of patients.

Ethical clearance was obtained from the Ethics Committee of our hospital.

III. Results

Patients with congenital hydrocephalus have age range between 2 weeks and 12 months with a mean age of 3.1 ± 3.3 months, most of these patients were less than 12 months of age (93%) and male to female ratio of 1.7:1 as shown in Table 1. While patients with post-infective hydrocephalus have age range of 3 - 12 months with a mean age of 8.0 ± 4.6 months, majority of these patients were less than 12 months of age (67.6%) and male to female ratio of 1:1 as shown in Table 2.

Table 1: Socio-demographic data of patients with congenital hydrocephalus

Groups	Age groups (months)/ Frequency(%)	Age at 1st presentation (Month) (Mean ± SD)	Admission delay(Day) (Mean ± SD)	Hospital stay (Days) (Mean ± SD)	Sex Frequency/ (%)
Congenital	<12 66(93) 12 – 24 5(7)	3.03 ± 3.24	42.28 ± 42.76	14.34 ± 4.70	M 45(63.4) F 26(36.6)

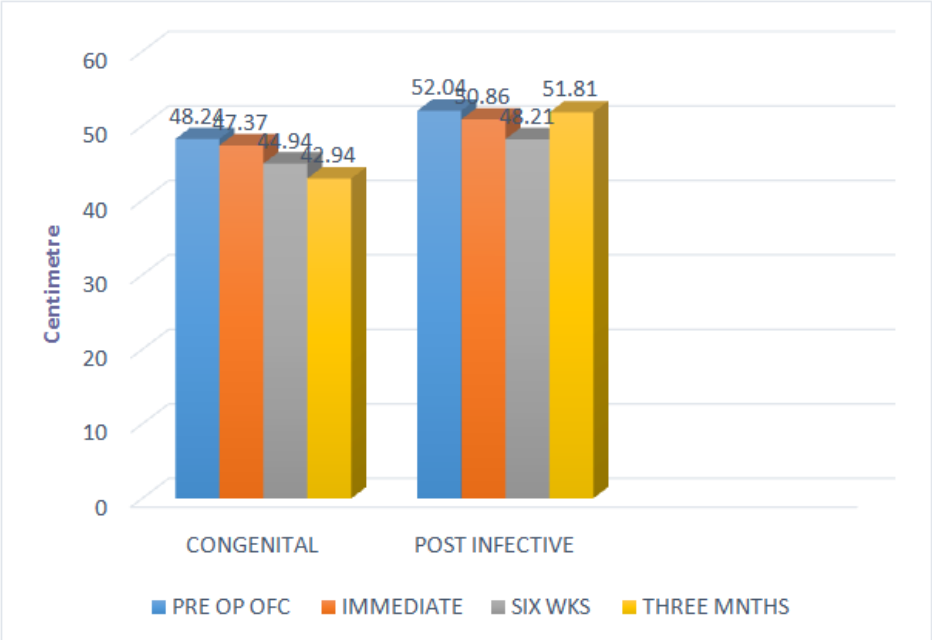
M = Male. F = Female, SD = standard deviation

Table 2: Socio-demographic data of patients with post-infective hydrocephalus

Groups	Age groups (months)/ Frequency(%)	Age at 1st presentation (Months) (Mean ± SD)	Admission delay(Day) (Mean ± SD)	Hospital stay (Days) (Mean ± SD)	Sex Frequency/ (%)
Post-infective	<12 48(67.6) 12 – 24 23(32.6)	7.99 ± 4.57	75.64 ± 98.82	11.49 ± 3.68	M 34(47.9) F 37(52.1)

M = Male. F = Female, SD = standard deviation

The mean of occipitofrontal circumference of the patients at presentation, six weeks and three month were shown in Figure 1 below.



Pre op OFC = pre-operative occipitofrontal circumference, wks = weeks, mnths =months

Figure 1: Comparative Mean of occipitofrontal circumference (OFC) between patients with congenital and post-infective hydrocephalus

Table 3 below shows the comparative inferential analysis on effectiveness of VP shunt insertion between patients with congenital and post-infective hydrocephalus.

Table 3: Comparative inferential analysis on effectiveness of ventriculo-peritoneal shunt.

Variables	**P-value**	
	CONGENITAL	**POST-INFECTIVE**
Immediate Post-operative		
Tense AF	0.035	0.041
Hypereflexia	0.042	0.004
6-week post-operative		
Tense AF	0.014	0.002
Hypereflexia	0.04	0.003
3-month post-operative		
Tense AF	0.001	0.011
Hypereflexia	0.000	0.000
Emergency admission		
Tense AF	0.004	0.000
Hypereflexia	0.001	0.000

Sample t-test at 95% confidence interval. Significance test $p \leq 0.05$

IV. Discussion

This study investigated ventriculo-peritoneal shunt (VPS) surgery in a cohort of 142 children who were followed-up for occipitofrontal circumference, anterior fontanelle status, limb reflexes, shunt infections and malfunction, over a period of three months. There wasmale preponderance among the recruited patients with congenital hydrocephalus in this study, with M: F ratio of 1.7:1; but there was no sex predilection among the patients with post-infective hydrocephalus, M: F of 1:1. The male preponderance seen among congenital hydrocephalus in this study mirrors previous studies on non-tumorous childhood hydrocephalus.[8, 9, 10] This pattern observed could be because of the importance attached to the male child in this environment and parents tend to seek health care more for the male child than the female child.

In this study, the patients with congenital hydrocephalus had shunt inserted at the mean age of 4.4 months and those with post-infective hydrocephalus had shunt inserted at the mean age of 9. 1 months. This pattern is similar to that seen in other studies, although in Puri's study the peak age for shunt insertion was a little earlier at age two to three months. [10, 11, 12]

The effectiveness of ventriculo-peritoneal shunting for hydrocephalus between patients with congenital and those with post-infective hydrocephalus in terms of resolution or worsening of presenting symptoms/signs

and the rate of complication between the two groups of patients studied. There was a step ladder reduction in occipitofrontal circumference (OFC) of the patients with congenital hydrocephalus during the period of follow up but there was no such pattern among the post-infective group (Figure 1). However, there was a statistically significant difference between the two groups ($p = 0.005$).

Tense anterior fontanelle resolution following shunting was seen in both groups but the difference between the groups was statistically significant ($p = 0.035$ vs 0.041, 0.014 vs 0.002 and 0.001 vs 0.011) at the immediate post-operative, 6-week post-operative and 3-month post-operative respectively. Visual loss was seen more among post-infective group and the difference noted between the groups was significant ($p = 0.031$ vs 0.003, 0.031 vs 0.003 and 0.031 vs 0.003) at immediate post-operative, 6-week post-operative and 3-month post-operative respectively.

V. Conclusion

The usage of ventriculo-peritoneal shunt in both group of patients was effective at the outcomes, however it is worth to note that ventriculo-peritoneal shunt is more effective among patients with congenital hydrocephalus compared with patients with post-infective hydrocephalus.

Authors contributions:
Dr Ogunleye Olabisi: conceptualization of research, research design, funding, data collection and analysis, literature search and paper write up, Dr Ismail Nasiru J: research design, literature search and paper write up, Dr Lasseini Ali: research design, literature search and paper write up, Professor Shehu Bello: research design, literature search and paper write up.

Conflict of interest: None

References

[1]. Aschoff A, Kremer P, Hashemi B, Kunze S. The scientific history of hydrocephalus and its treatment: Neurosurg Rev. 1999 Oct; 22(2-3):67-93; discussion 94-5.
[2]. Garton HJ, Piatt JH Jr. Hydrocephalus. Pediatr Clin North Am 2004; 5:305- 25.
[3]. Hana D, Ali A, Abeer AH. Prevalence of congenital hydrocephalus in the Hashemite kingdom of Jordan: A hospital-based study.Natural Science 2012; 4 (10)789-791.
[4]. Rekate HL. The definition and classification of hydrocephalus: A personal recommendation to stimulate debate. Cerebrospinal Fluid Res 2008;5:2.
[5]. LeMay M, Hochberg FH. Ventricular differences between hydrostatic hydrocephalus and hydrocephalus ex vacuo by CT. Neuroradiology 1979; 17: 191-5.
[6]. Evans WA. An encephalographic ratio for estimating ventricular and cerebral atrophy. Arch Neurol Psychiatry 1942; 47: 931-7.
[7]. Lyons MK and Meyer FB. Cerebrospinal fluid physiology and the management of increased intracranial pressure. Mayo Clin. Proc. 1990; 65: 684 - 707.
[8]. Salim Kamrudin Noorani, Aamir Wasiq Qureshi, Mubashir Mahmood Qureshi. Complications of Ventriculo-Peritoneal Shunt Insertion seen at the Kenyatta National Hospital, Kenya, East Africa. J. Hydrocephalus2010; 2(2): 15-26.
[9]. Kinasha ADA, Kahamba JF, Semali IT. Complications of Ventriculoperitoneal Shunts in Children in Dar es Salaam. East and Central African journal of SurgeryDecember 2005; 10 (2)
[10]. Mwangombe NJM, Omulo Tom M. Vetriculoperitoneal shunt infections in children with hydrocephalus at the Kenyatta National Hospital. East Afr. Med. J. 2000; 77 (7) 386-390.
[11]. Quigley MR, Reigel DH, Kortyana R. Cerebrospinal fluid shunt infections. Report of 41 cases and critical review of the literature. Paediatric Neurosci. 1989; 15: 111 - 120.
[12]. Puri P, Malone M, Guiney EJ. Primary hydrocephalus, the effect of timing of first valve insertion, valve revision and the nature of revisions on intelligence 2. Kinderchir 1977; 22: 506-510.

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