ORIGINAL RESEARCH PAPER

Paediatrics

THE ETIOLOGICAL, DEMOGRAPHIC PROFILE AND OUTCOME OF CASES OF PEDIATRIC HYDROCEPHALUS IN A TERTIARY CARE HOSPITAL

KEY WORDS:
Hydrocephalus, Chiari malformations, intracranial bleed

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ABSTRACT

Objectives: Hydrocephalus is the symptomatic accumulation of cerebrospinal fluid inside the cerebral ventricles. It has complex pathogenesis and different causes. There are not many studies which have comprehensively evaluated the etiology and demographic profile of hydrocephalus cases in pediatric population. This study aims at describing the etiology and demographic profile of such cases in the pediatric population and their outcomes by analyzing the cases admitted to a tertiary care Centre, Vani Vilas Hospital, BMCRI. **Methods:** The cases of hydrocephalus admitted under the pediatrics department between October 2022 to 2023 were enrolled into the study. Their clinico-demographic details, etiologies were collected. The cases were followed up and their outcomes in the form of mortality were collected. **Results:** A total of 36 cases of hydrocephalus were admitted between October 2022 to October 2023. Out of that 21 (58.3%) were males, 15 (41.6%) were females. 11(30.5%) were cases of congenital hydrocephalus whereas 25 (69.4%) were of acquired causes. There were 2 cases of congenital toxoplasmosis, 2 cases of Chiari malformations, 4 cases of congenital aqueductal stenosis, 2 cases were associated with Meningomyelocele and 1 case with intracranial malformations. Among the acquired causes 9 cases were of post meningitis, 7 cases were associated with intracranial bleed, 1 case was associated with medulloblastoma and 9 cases were a part of HIE sequalae. Out of the 36 cases majority were below the age of 1 year (58.3%). Out of the 36 cases 9(25%) succumbed and 27(75%) are alive. **Conclusion:** Majority of cases are acquired in nature. A thorough evaluation and early detection and adequate treatment of conditions leading to hydrocephalus can help in reducing morbidity and mortality.

INTRODUCTION

Pediatric hydrocephalus (PH) is defined as "an active dilatation of the ventricles from an imbalance between the production of cerebrospinal fluid (CSF) in the ventricles and its absorption to the systemic circulation."(1)

The morbidity and mortality rates associated with hydrocephalus in the pediatric population are quite high. In the pediatric population, the prevalence of hydrocephalus ranges from 30 to 423 per 100,000 pediatric population, according to a number of studies that have been reported [2,3,4,5]. The incidence of hydrocephalus has been found to be higher in developing nations in comparison to the industrialized world.

There are a variety of causes that can lead to congenital hydrocephalus. These causes include primary aqueductal stenosis (PAS), Dandy–Walker malformation (DWM), germinal matrix hemorrhage (GMH), and intrauterine infections that can lead to gliosis, intraventricular space-occupying lesions, X-linked hydrocephalus and Chiari malformations, neural tube defects, and a great number of other syndromic and genetic disorders.[6–7] * In the pediatric population, acquired hydrocephalus is typically attributable to cerebral infections, intracranial hemorrhage (particularly intraventricular hemorrhage [IVH] and subarachnoid bleed), benign and malignant lesions, and other similar conditions.(6)

In order to evaluate and diagnose PH, the most common radiological modalities that are utilized are computed tomography (CT) and magnetic resonance imaging (MRI) that are performed on the brain. In situations where there is a diagnostic conundrum, measuring the size of the ventricle with MRI or CT is highly helpful.[8]. Measurement of the size of the ventricle, etiological diagnosis, endoscopic third ventriculostomy (ETV) patency, and parenchymal alterations are all areas in which magnetic resonance imaging (MRI) excels. In comparison to magnetic resonance imaging (MRI), computed tomography (CT) scans with neuronavigation as an adjunct have a higher sensitivity for localizing the tip of the catheter [9].

This study aims at describing the etiology and demographic profile of such cases in the pediatric population and their outcomes by analyzing the cases admitted to a tertiary care Centre.

METHODS AND MATERIALS

This is a prospective observational study on the cases of hydrocephalus admitted under the pediatrics department between October 2022 to 2023. Those cases with other cranial anomalies, congenital heart disease, seizure disorders not related to the hydrocephalus or those with cranial vault anomalies were excluded from the study.

After institutional ethical clearance and informed consent from the parents, their clinico- demographic details, etiologies were collected. The cases were followed up and their outcomes in the form of mortality were collected.

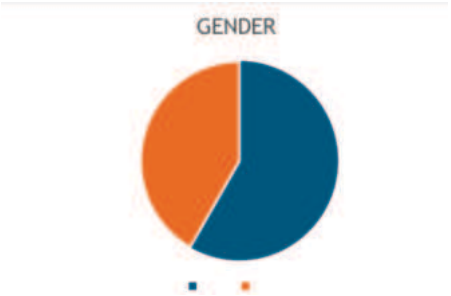
The data was entered into an MS excel spreadsheet and analyzed using SPSS v 22. Categorical variables were represented as frequencies and proportions, while continuous data was represented as mean and standard deviation. The appropriate statistical tests were utilized, such as Chi square test, students T-test, ANOVA and Mann Whitney U test. A p value <0.05 was considered statistically significant.

RESULTS

A total of 36 cases of hydrocephalus were admitted between October 2022 to October 2023. Out of that 21 (58.3%) were males, 15 (41.6%) were females.

The 11(30.5%) were cases of congenital hydrocephalus whereas 25 (69.4%) were of acquired causes. There were 2 cases of congenital toxoplasmosis, 2 cases of Chiari malformations, 4 cases of congenital aqueductal stenosis, 2 cases were associated with Meningomyelocele and 1 case with intracranial malformations. Among the acquired causes 9

cases were of post meningitis, 7 cases were associated with intracranial bleed, 1 case was associated with medulloblastoma and cases were a part of HIE sequalae.



Graph 1: Sex distribution

Table 1: Distribution based on Aetiology

AETIOLOGY		FREQUENCY
CONGENITAL N=11	AQUEDUCTAL STENOSIS	4
	CONGENITAL TOXOPLASMOSIS	2
	CHIARI MALFORMATION	2
	MENINGOMYELOCOELE	2
	INTRACRANIAL MALFORMATION	1
ACQUIRED N=25	POST-MENINGITIS	9
	HIE SEQUELAE	9
	INTRACRANIAL BLEED	7
	MEDULLOBLASTOMA	1

Out of the 36 cases majority were below the age of 1 year I.e. 21 (58.3%). 6 (16.6%) cases between 1 to 3 yrs. 3(8.3%) cases between 3 to y yrs. 5 (13.8%) cases between 6 to 10 yrs. 1(2.1%) case was over 10 years. Out of the 36 cases 9(25%) succumbed and 27(75%) are alive.

Case Images

Fig 1.

Fig. 2

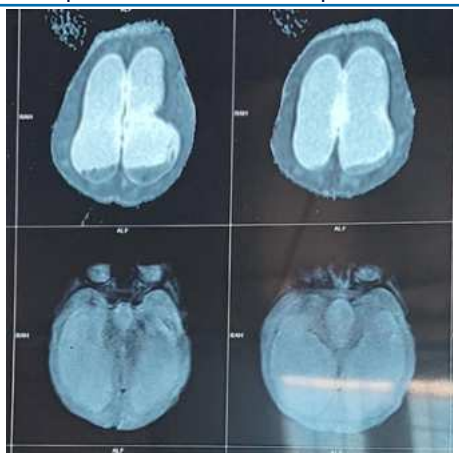


Fig. 3

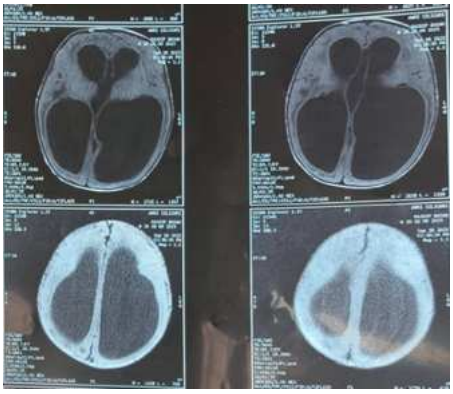


Fig. 4

DISCUSSION

A normal brain development may be affected by PH in a manner that is proportional to the period and duration of this condition. Damage to the ependymal layer, changes in the ultrastructure of the white matter, alterations in cerebral circulation and metabolic processes, gliotic abnormalities in the cortex, and harm to axons are all outcomes of HCP.10 and 11; According to the findings of this study, male children were more likely to be impacted than female children, and the ratio of males to girls was 1.22 to 1.

An overwhelming majority of cases of hydrocephalus in the pediatric population have been observed to be male, according to a number of studies. (12, 13, 14, and 15) In the course of our research, we found that the most common causes of PH were 11(30.5%) were cases of congenital hydrocephalus whereas 25 (69.4%) were of acquired causes. There were 2 cases of congenital toxoplasmosis, 2 cases of Chiari malformations, 4 cases of congenital aqueductal stenosis, 2 cases were associated with Meningomyelocele and 1 case with intracranial malformations. Among the acquired causes 9 cases were of post meningitis, 7 cases were associated with intracranial bleed, 1 case was associated with medulloblastoma and cases were a part of HIE sequalae. In a study by Rahul Singh et al (16), post-infectious cases were 35%, followed by neoplasms, unlike the findings in the present study. The most common cause of neonatal and PH globally is postinfectious HCP, which is also the most common case.[17] On the other hand, posthemorrhagic HCP is the most common cause of newborn HCP in highly industrialized countries.[18] [18] The death rate due to primary pathology was 10.5% in a study conducted by Rahul Singh, which was lower than the findings of the current study.

CONCLUSION

Majority of cases are acquired in nature and can be preventable. Hence a thorough evaluation and early detection

and adequate treatment of conditions leading to hydrocephalus can help in reducing morbidity and mortality.

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