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HYDROCEPHALUS;
CAUSES OF HYDROCEPHALUS AMONG DIFFERENT AGE GROUPS

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ABSTRACT… Objectives: To know about the causes of hydrocephalus (HDC) among the different age groups. **Study Design:** Cross sectional study. **Setting:** Department of neurosurgery PGMI/LRH. **Period:** August 2012 to September 2013. **Materials and Methods:** The operative records and the admission records of all the patients who were admitted and operated during the study period were checked. All the patients undergoing surgery for hydrocephalus were included in the study and those patients who had undergone surgery for other reasons were excluded from the study. Patient s who had a repeated surgery for hydrocephalus were also excluded from the study as well as those who were re-admitted for shunt related or surgery related complications. The age, gender, and the radiological diagnosis of hydrocephalus was recorded on a designed proforma. All the patients were grouped into two that is above and below 12 years. Etiology wise HDC was classified as either congenital, post-infectious, tumor related, post trauma or miscelenous. The data was entered and analyzed using SPSS version 16. **Results:** A total of 634 admission for Hydrocephalus were reviewed. 387 patients fulfilled the inclusion criteria. There were 209 males and 178 females. The age range was from 1 month to 69 years and the mean age was 8±4.6 years. There were 67.67% of the patients in the group I while 33.33% of patients in the Group II. There was almost equal distribution on in the group II based on the age difference. The major causes in the group I were the congenital, post infectious, and tumor related while in the group II the main causes were the PIH, post tumor and the post hemorrhagic. **Conclusion:** The most common causes of the HDC in the pediatric age group are the congenital, PIH and tumor related. In adults the most common causes of the HDC are the PIH, post Hemorrhagic HDC and tumor related Hydrocephalus.

Key words: Hydrocephalus, Causes, Congenital, Post Infectious, Different, Age Groups.

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INTRODUCTION

Hydrocephalus has been a disease known to mankind since time immemorial. There is an excess of the cerebrospinal fluid in the brain because of an increase production or decrease absorption anywhere along its tract from the choroid plexus to the arachnoid granulations.[1] Decrease absorption results from the obstruction to the outflow of the CSF along the tract causing the neurologic sequelae because of the pressure effects on the brain.[2] The signs and symptoms of HDC are related to the underlying etiology, the rate of the progress of the disease and the age of the patient.[3] The patients with acute onset of HDC progress from headache, vomiting, loss of consciousness to death in a matter of hours.[4] On other hand it is a protracted disease and the patient only had mild symptoms of headache over months to years before progressing to a decompensated stage.[5] The children and the adult group had a different etiology and presentation of the disease.[6] Hydrocephalus with an underlying sinister diagnosis is more common in the adults rather than in the children.[7]

We revised the series of patients treated in the department since last one year in order to find an etiological clue towards the HDC in different age groups. Being a developing nation our part of the region is endowed with congenital malformations, infections and poor health status as well as the trauma resulting in an enormous burden on the healthcare system. The audit gave us an insight into the areas of concern.

MATERIALS AND METHODS

This cross sectional study was conducted in the department of neurosurgery PGMI/LRH from august 2012 to September 2013. The operative and the admission records of all patients during the study period were checked. All patients undergoing surgery for hydrocephalus were included in the study and those patients who had undergone surgery for other reasons were excluded from the study. Patient s who had a repeated surgery for hydrocephalus were also excluded from the study as well as those who were re-admitted for shunt related or surgery related complications. The age, gender, and the radiological diagnosis of hydrocephalus was recorded on a designed proforma. All the patients were grouped into two that is above and below 12 years. Etiology wise HDC was classified as either congenital, post-infectious, tumor related, post trauma, post hemorrhagic or miscellaneous. Data was entered and analyzed using SPSS version 16.

RESULTS

There were 209 males and 178 females with a male to female ratio of 1.2:1. The age range was from the 1 month to 69 years with a mean age of 7±4.5 years. There were 263(67.67%) patients in the group I while 124(32.33%) in group II i.e. above 12 years of age. Of the total patients PIH was common followed by congenital Hydrocephalus and Tumor related HDC. A little brunt in the etiological burden was from the post hemorrhagic, trauma related and miscellaneous causes of HDC (Figure-1).

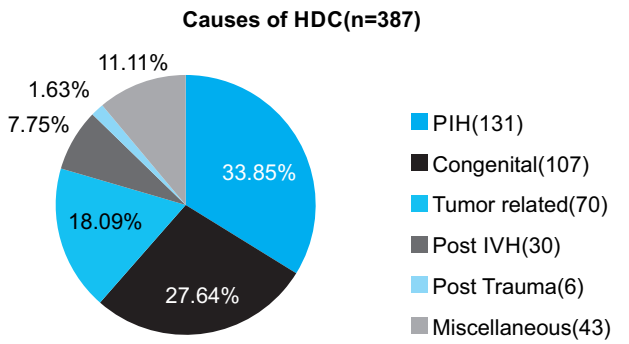

Figure-1. Showing the different etiologic causes and their relative frequencies.

Etiology wise distribution on the basis of the age of the patient showed congential etiology to be the common in pediatric age group and the infectious etiology to be responsible for the adult group. The various causes and their relative frequencies are given in the Table-I.

Surprisingly gender wise distribution revealed that only congenital hydrocephalus was more common in male gender 67.28% (72/107) as compared to female gender 32.71% (35/107); while no gross difference was found in other etiologic causes.

DISCUSSION

Hydrocephalus (HDC) is a disease who treatment still remains a challenge for the neurosurgeon.[7] Much focus is still on the prevention of the underlying condition resulting in the HDC. The etiologic entities vary from region to region. The prevalence is low in the developed countries and increase in the developing countries.[1]

This disease has no specific predilection for any gender, however many studies report a slight male predominance.[8,9,10] There was a slight male predominance of males in our series as well. No age is immune to this condition although the disease is more common in the younger age group. The mean age in our series of patients was 7±4.5 years and has been reported to be 5,8, 12 years.[8,9,15] In our study patients with less than 12 years of age were very common accounting for the 67.67% of all whereas patients in Group II comprise only 32.33%. This has been reported by Abebe M et al[21] where he found that patient less than 15 years accounted for 82% of the total burden.

The etiology of the HDC was Post infectious (PIH), congenital, tumor related and miscellaneous accounting for 33.85%, 27.65%, 18.09% and 11.11% of the HDC patients irrespective of the age. The correlation between different studies showing the etiology of hydrocephalus and the relative incidence in our study is shown in Table-II.

Etiology	Total No. of Cases (%)	Group I; n (%)	Group II; n (%)
Post infectious	131 (33.85%)	88 (33.46%)	43 (34.685)
Congenital	107 (27.65%)	102 (38.78%)	5 (4.03%)
Tumor Related	70 (18.09%)	39 (14.83%)	31 (25%)
IVH	30 (7.75%)	6 (2.28%)	24 (19.35%)
Post Trauma	6 (1.55%)	2 (0.7%)	4 (3.22%)
Miscellaneous	43 (11.11%)	26 (9.88%)	17 (13.70%)
Total	387 (100%)	263 (100%)	124 (100%)

Table-I. Showing the different causes of Hydrocephalus and their age wise distribution.

Etiology	Our Study (%)	Reported (%)
PIH	33.85	24.4 by Kamacharya BG et al[8]
Congenital HDC	27.65	13.6% by Kamacharya BG et al.[8] 36% by Braga MHV et al.[11]
Tumor related	18.09	38.3 by Kamacharya BG et al[8]
Post trauma	1.55	4% by Faarg et al.[9] 1-8% by Tribl and Oder.[12]
IVH	7.75	11.6% by kamacharya BG et al[8]
Miscellaneous	11.11	2% by Faarg AA et al[9] 11% by Kamacharya BG et al[8]

Table-II. Comparison of our study along with the other studies in the literature.

Post infectious HDC refers here to post meningitis c and post tuberculous only. It is also caused by congenital TORCH infections and cysteicosis which is not common in this part of the world. It accounted for 33.8% in our series and was responsible for 33.4% of cases in Group I and 34.6% of cases in Group II. The reported incidence is mostly in children and has been reported as low as 6%[13] in United Kingdom to as high as 60%[14] in Africa.

Congental HDC (CHC) was found in the form of primary congenital, Dandy walker syndrome, Spina bifida, Chiari II malformation and Aqueductal stenosis. CHC was the culprit in our series in 27.65% of patients. It was more common in the group I accounting for 38.8% while only 5 cases were in Group II in the form of Primary aqueductal stenosis (AS). AS can present as late as the second decade of life.[15] The reported incidence of CHC is found in literature in the range of 13[11], 38%[8] and 64%.[9]

HDC caused by tumors of the sellar, suprasellar region, third ventricle, posterior fossa and tectal plate accounted for 18.09% of patients. They accounted for 14% of the cases in Group I while they were in 25% in the Group II. HDC due to posterior fossa lesion is more common in children due to the increase incidence of the latter and about 30% presenting with HDC.[3] The low incidence in this group is due to the reason that patients with mild HDC were subjected to surgery rather than treatment for HDC. The reported incidence for HDC due to posterior fossa lesion is 38%.[8]

HDC is a common sequelae of brain trauma; and occurs in 7.1 to 72%[16] of brain injury. The differentiation between the post traumatic atrophy and HDC is very difficult. Trauma caused HDC in 1.5% of patients requiring shunt; in Group I it was 0.7% while in group II it was responsible for 3.22% of cases. The reported incidence is 4% by Faarg AA et al[8] and 1-8% by Tribl and Oder.[12] Intraventricular hemorrhage was responsible for 7.75% of the total cases and 2.28% I Group I while 19.38% in Group II. IVH is very common in patients with very low birth weight i.e. <1500gm.[18] Still the issue of survival in our country is a problem and they could not make it to adolescent or infanthood most of the times. In Group II the higher incidence was because of the hemorrhagic stroke and Subarachnoid Hemorrhage (SAH) which causes HDC. 31% of patients with SAH presenting with HDC requires shunts in the long run.[19,20] HDC

caused by hematomas and hemorrhage was responsible for 11.6%(modified) as reported by Kamacharya BG et al.[8]

Causes like Benign intracranial Hypertension (BIH) and Normal Pressure Hydrocephalus (NPH) as well as benign lesions like the arachnoid and dermoid cyst and post-surgical HDC after tumor removal were grouped as miscellaneous. They accounted for 11.11% of the total and 9.88% in Group I while 13.7% of patients in Group II. The reported incidence is from 2[9] to 11%.[8]

Conclusion; the most common causes of the HDC overall are PIH, Congenital and tumor related and the most common causes in pediatric age group are the congenital, PIH and tumor related. In adults the most common causes of the HDC are the PIH, post Hemorrhagic HDC and tumor related Hydrocephalus.

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If voting made any difference they wouldn't let us do it.

– Mark Twain –

AUTHORSHIP AND CONTRIBUTION DECLARATION

Sr. #	Author-s Full Name	Contribution to the paper	Author=s Signature
1	Muhammad Usman Khan	Conceived the idea, helped in data collection, did literature review.	
2	Bilal Khan	Did data collection, analysis and literature review.	
3	Wefaq Ullah	Did data collection and literature review.	
4	Akram Ullah	Did data collection and literature review.	
5	Mumtaz Ali	Did data analysis and literature review.	