# TO DETERMINE THE ETIOLOGY AND OUTCOME OF INFANTILE HYDROCEPHALUS

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## ABSTRACT

The aim of this study was to determine etiology and surgical outcome of infantile hydrocephalus.

**Materials and Methods:** This prospective descriptive study was carried out from February 2012 to January 2012, in Neurosurgery Department of Hayatabad Medical Complex Peshawar Pakistan. The 75 infants included in this study were from 0 to 12 months who presented in outpatient department with concern of large head. We excluded all those children who already under went surgical correction and have hydrocephalus due to brain tumors. Etiology was studied after the diagnosis of hydrocephalus. Surgery done in these patients and postsurgical short term outcome was determined in these infants on follow up.

**Results:** Total 75 infants were included in the study. The children were divided in two age groups one from 0 to 6 months, accounting 55(73%), and 6 to 12 months accounting for 20(26%). 25(33%) were having stenosis of aqueduct of sylvius, 20(26%) were post meningitic hydrocephalus, 15(20%) were with post hemorrhagic, 7(9.3%) were having spina bifida, 5(6.6%) were of Dandy walker cyst and in 3(4%) no cause could be find out. 19(25.3%) developed complication after surgery, out of which 15(20%) had infection while 4(5.3%) had mechanical fault of VP shunt.

**Conclusion:** Infantile hydrocephalus is a common disorder and etiology can be find out in most of the cases. For early diagnosis the head circumference of neonates should be routinely measured. To avert complications asepsis and appropriate methods and materials for shunting should be used.

**Key Words:** Infantile Hydrocephalus, VP Shunt.

## INTRODUCTION

Hydrocephalus, also known as “water in brain”, is a condition where in excess of cerebrospinal fluid (CSF) accumulates within the ventricular system and cistern of the brain, the condition may result from an overproduction of the CSF from choroid plexus papillomas, from a congenital malformation blocking normal drainage of the fluid, or from complications of head injury, tumor or infections leading to increased intracranial pressure and related consequences. Hydrocephalous can be classified as communicating hydrocephalus occurs when cerebrospinal fluid (CSF) can still flow among the ventricles. Non communicating hydrocephalus, also called “obstructive” hydrocephalus, occurs when the flow of CSF is blocked[1,2].

The Hydrocephalous can apparently result from various causes that can affect a fetus, infant, child or adult. Large heads were ignored in the past generally. The introduction of CT scan in 1980s has rapidly advanced the early detection of etiology and treatment of hydrocephalus.[1,2,3]

Infantile hydrocephalus is not uncommon, the prevalence is 0.82 per 1000 live births[1], has a totally different presentation as compare to older children. Compression of the brain by the accumulating fluid eventually may cause neurological symptoms. These signs occur sooner in adults, whose skulls are no longer able to expand to accommodate the increasing fluid volume within. Fetuses, infants, and young children with hydrocephalus typically have an abnormally large head, excluding the face, because the pressure of the fluid causes the individual skull bones which have yet to fuse to bulge outward at their juncture points. Another medical signs, in infants, is a characteristic fixed downward gaze with whites of the eyes showing above the iris, as though the infant were trying to examine its own lower eyelids, bulging fontanelle, hyperactive reflexes, irritability and apneic spells. The natural evaluation of this pathology may result in serious consequences like visual impairment, deterioration of intellectual capacity, motor deficit so early treatment is necessary and fruitful.[4,5,6]

The aim of this study was to determine etiology and surgical outcome of infantile hydrocephalus.

## MATERIALS AND METHODS

This prospective descriptive study was carried out from February 2012 to January 2013, in Neurosurgery Department of Hayatabad Medical Complex Peshawar, Pakistan. The 75 children included in this study were from 0 to 12 months of age who presented in outpatient department with concern of large head. We excluded those children who already under went

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surgical correction and have hydrocephalus due to brain tumors. For each child, the diagnosis of hydrocephalus was based on an increase in the head circumference above 2SD, the sun setting sign and bulging fontanelle. Radiological imaging using CT scan and MRI was done for the confirmation of hydrocephalus and to find out the etiology. Ventriculo peritoneal shunt was done in all patients as primary surgical procedure. These children were followed up for the period of 3 months after Ventriculo peritoneal shunt. In the surgical outcome shunt infection and mechanical failure was assessed. In fallow up infants weight and head circumference were measured on each visit for comparison with initial measurements. CT scan was done after 3 months of surgery to see the cortical thickness as compared to pre surgical scan. The data was entered and analyzed on Microsoft excel 2007.

## RESULTS

Total 75 infants were included in the study, out of which 45(60%) were male and 30(40%) were female. The children were divided in two age groups one from 0 to 6 months, accounting 55(73%), and 6 to 12 months accounting for 20(26%). CT scan was done in all the cases while MRI was done in those (n=9) patients where structural lesion was expected. Regarding etiology 25(33%) were having stenosis of aqueduct of sylvius, 20(26%) were post meningitic hydrocephalus, 15(20%) were with post hemorrhagic, 7(9.3%) were having spina bifida, 5(6.6%) were of Dandy walker cyst and in 3(4%) no cause could be find out. 19(25.3%) developed complication after surgery, out of which 15(20%) had infection while 4(5.3%) had mechanical fault of VP shunt.

**Table 1. ETIOLGY OF INFENTIAL HYDROCEPHALUS**

| Etiology | No. Patients (Percentage) |
|---|---|
| Aqueductal Stenosis | 25(33%) |
| Post Meningitic | 20(26%) |
| Post Hemorrhagic | 15(20%) |
| Spina Bifida | 7(9.3%) |
| Dandy Walker Cyst | 5(6.6%) |
| Idiopathic | 3(4%) |

## DISCUSSION

Our experience indicates that infantile hydrocephalus is not uncommon disorder as the vast majority of the cases can be accurately classified regarding etiology. Increasing access to rapidly developing neuroimaging techniques has given and will continue to provide the greater potential for revealing the timing of brain damaging events, which in turns provide clues to underlying etiology. In our study we find out that most of the infants (73%) presented in the first six months of life with increasing in the size of head more than normal as was noticed by parents or by some relatives. In other studies they found that the most of the infants presented in the same age group[8,12,13]. It's good that in our country where literacy rate is low, still parents seek advice at an early stage when complications are less and surgical outcome is much better. Among the infants male ratio was higher than female[7,8].

In our study Congenital malformations including aqueductal stenosis and spina bifida(48.9%) were the commonest etiological factors for infantile hydrocephalus. Stenosis of aqueduct of sylvius was found to be the 33% in our study. In a study conducted in Cameron, in whom they shared experience of 36 infantile hydrocephalus patients, they determined aqueductal stenosis as commonest etiological factor[9,10,13]. Studies conducted in Saudi Arabia and Japan they found congenital malformation as the primary etiology[12,14]. In contrast Keita *et al*., in Bamako and Warf *et al*., in Uganda had found infections as the leading cause of infantile hydrocephalus[7]. In our study post meningitic hydrocephalus accounted for 26% of cases. The number of cases of post meningitic hydrocephalus has reduced due to early diagnosis and prompt treatment of meningitis. Post hemorrhagic hydrocephalus accounts for 20% of the patients, among them most were premature infants having intraventricular bleed. In a recent study of premature infants they found that about 25-80% with intraventricular hemorrhage developed hydrocephalus[2]. Increase in incidence of post hemorrhagic hydrocephalus might be due to improved neonatal care leading to improve outcome of premature infants. No cause could be identified only in 4% of the patients; this decrease is due to improved neuroimaging.

Ventriculoperitoneal shunting is effective and time proven management of infantile hydrocephalus. In our study we have done this procedure in all the cases as most authors agree on for Ventriculoperitoneal shunting managing infantile hydrocephalus[1]. 25.3% of the cases got complications after the surgery. Studying the evolution of the patients showed that infectious complications were the most frequent, affecting 20% of our cases. This result is similar to that of study by Braga *et al*., in Brazil, who found 69% of complications caused by infections for children who benefited from a Ventriculoperitoneal shunting[4,8]. Infections were mostly in those cases which had postmeningitic hydrocephalus. Mechanical failure was the next among the complication accounting for 5.3% of the cases which is lower than the 31% observed in the group studied by Braga *et al* and 10% in Baksh A[3, 8]. These complications could be further reduced with use of good quality shunt and better surgical techniques. In our study most of the patients (74.7%), followed for 3 months were having good out-

come due to in time management, proper selection of surgical procedure and techniques. The head circumference did not increased further as was noticed on the follow up measurements of head circumference. General health of these infants improved a lot with good intake and gaining of weight on follow up visits. CT scan done on the follow up visit shows increased in the cortical thickness as compared to previous CT scan.

## CONCLUSION

Infantile hydrocephalus is not an uncommon disorder and etiology can be find out in most of the cases by doing neuroimaging which is now easily assessable most of the places. Most of the infants presented early in first six months of life. For early diagnosis to be made, the head circumference of neonates should be routinely measured in the labour room and followed-up in all medical visits. To avert complications following surgery, rigorous surgical procedures with effective asepsis and appropriate methods and materials for shunting should be used.

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