

Management Outcomes of Hydrocephalus among Under Five Children in a Tertiary Hospital in Gombe North Eastern Nigeria

¹S. Adamu, ²S. Yusuf, ³K J Bwala, ⁴J Iliya, ⁵A. S. Faruk, ⁵S. Olajide, ¹IM Guduf, ⁶S Wabada

¹Department of Surgery, Federal Teaching Hospital and Gombe State University Gombe, Nigeria

²Department of Surgery, University of Abuja and National Hospital Abuja, Nigeria

³Department of Surgery Abubakar Tafawa Balewa University, Bauchi

⁴Department of Paediatrics, Federal Teaching Hospital Gombe and Gombe State University

⁵Department of Surgery, Federal Teaching Hospital Gombe, Nigeria

⁶Dept of Surgery University of Maiduguri and University of Maiduguri Teaching Hospital Maiduguri, Borno State Nigeria

Corresponding Author: Dr Sani Adamu

Address: Department of Surgery,

Federal Teaching Hospital and Gombe State University Gombe, Nigeria

Abstract:-

➤ Introduction:

Hydrocephalus is an abnormal excessive accumulation of the cerebrospinal fluid (CSF) in the ventricular systems of the brain; most of the causes are due to congenital malformations. Surgery remains the mainstay of treatment.

➤ Aim:

To give an audit of management outcomes of patients with hydrocephalus (HCP) in Federal Teaching Hospital Gombe (FTHG) within a three year period.

➤ Materials and Method:

A proforma questionnaire was filled for every child who presented to the Paediatric Surgery unit of FTHG with clinical features of hydrocephalus between January 2014 and December 2016. The data was analysed using the SPSS v25 statistical software.

➤ Results:

A total of 67 patients were managed during the period, the youngest been 1 day and the oldest was 3 years. About 90% were congenital only 10% were acquired and mainly linked to meningitis. Majority (90%) had Ventriculo-peritoneal shunt (VPS), with 80% resulting in satisfactory outcome while 20% developed complications.

➤ Conclusion:

Hydrocephalus is one of the commonest congenital malformations presenting to the Paediatric Surgery clinic. Ventriculo-peritoneal shunt remains the mainstay of treatment with satisfactory outcome in majority of cases. However those presenting late have bad prognosis and result in poor outcomes. Therefore, there should be a concerted effort by all stakeholders on public enlightenment about the disease.

Keywords:- Hydrocephalus (HCP), Management Outcome, Children, Ventriculo-Peritoneal Shunt (VPS).

I. INTRODUCTION

Cerebro-spinal fluid (CSF) is mostly produced by the choroid plexus mainly in the cerebral ventricles and circulate through and get absorbed by the arachnoid granulations to the blood. However it also involves a pulsatile to-and-fro movement throughout the brain with transporters as key elements in the brain water and CSF physiology (1). Hydrocephalus (HCP) is a Greek word meaning water in the head (2), it is an abnormal excessive accumulation of the CSF due to excessive secretion or failure of its absorption. It is also defined as disturbance of formation, flow or absorption of CSF (3). While the cause in a number of patients remain idiopathic, congenital malformations such as aqueductal stenosis, neural tube defect (NTD) have been largely implicated. Intraventricular haemorrhage (IVH) in a preterm neonates and acquired conditions such as meningitis are next common causes. They can present in infants with an enlarged head or older age group with features of raised intracranial pressure (ICP). Management outcome of such condition in low and middle income countries are notably poor but steady improvement have been observed by many researchers. There are limited data in our sub region. This necessitate the review of our experience. We aim to give our three year audit of the management and outcomes of hydrocephalus (HCP) in Federal Teaching Hospital Gombe (FTHG).

II. MATERIALS AND METHODS

A proforma questionnaire was filled for every child with HCP who presented to the paediatric surgery clinic or the special care baby unit (SCBU). We extracted demographic information, management outcome and the data was entered into and analysed using SPSS V.20 Statistical software. An ethical clearance was obtained from the research and ethics committee of Federal Teaching Hospital Gombe.

III. RESULTS

A total of 67 patients with HCP were managed over this period, only 12(17.6%) were less than 4 weeks of age. Those between 1 month to 1 year were 43 (64.7%), the remaining 12 (17.6%) were over 1 year of age as shown in figure 1. Males were 39 (58.2%) and females were 28 (41.8%). Most of the patients 50 (74.6%) presented with an enlarged head and low back swelling. Ten patients (14.9%) presented with an isolated HCP from birth and the remaining 7 (10.4%) had post meningitic hydrocephalus. Twentyone (31.3%) patients were delivered at home and was unsupervised, while 14 (20.9%) were delivered by a traditional birth attendants. A total of 52 (77.6%) children were delivered spontaneously per vaginam, while 15 (22.4%) were delivered through cesarean section. The OFC at presentation ranged between 45-78cm with a median size of 60cm as seen in Fig 1. All the patients had transfontanel ultrasound scan (TFUSS), which confirmed the diagnosis. There was no intracranial mass occupying lesion, however they showed thinning of the cerebral mantle. Majority of the patients had cerebral mantle thickness ranged between 1-1.5 cm, and a few above 2cm. Those that had Computed Tomography (CT) of the brain were 15 (22%) and their reports were similar to the TFUSS.

Sixty one (91.0%) patients had VPS since it's the mainstay of surgical treatment we offer to our patients because of the limited skills and facilities for other procedures. Two (3.0%) patients could not afford the cost of the shunt and were discharge against medical advice. In one of the patient the procedure was abandoned because the CSF was purulent, hence samples were sent for microbiological studies. The remaining 3 patients died before the procedure. The procedure were carried out by the consultant in 59 (88%) of cases, only 8 (12%) cases were done by a Senior Registrar. Of the patients who had VP shunts, 50 (82.0%) were discharged within 1- 4 weeks post-operatively while the rest spent over 4 weeks on admission mainly due to post-operative complications. Among the complications, 8 (13.1%) were mainly surgical site infections and had local wound care, one patient had intestinal perforation and extrusion of the shunt through the rectum (fig 2), 1 had migration of the shunt into the cranial cavity and they declined shunt revision. In one patient there was a periventricular catheter leak of the CSF, it was however managed conservatively. Staphylococcus epidemidis accounted for over 50% of the SSI, while Staphylococcus aureus for 20 %, enterobacter species 10%. Fouty two (68.9%) had satisfactory post-operative outcome, 12 (19.7%) had neurological deficits, poor developmental milestone and malfunctioning shunts, and the remaining 7 (11.5%) patients died. Overall mortality rate was 14.9%.

IV. DISCUSSION

Hydrocephalus is an abnormal excessive accumulation of CSF in the ventricles, it can present in all age groups but appears to be common in infants, where they can present with an enlarged head, dilated scalp veins, sunset eyes etc or in the older children where they usually don't present with enlarge head because the fontanelles have already fused therefore the presentation may be features of raised ICP.

The mean age at presentation is 6 months in our study. This was also noted in a study by Santosh kumar (12), however, Patel (2) stated a slightly different mean age of 20.7 months. In developed countries they present early because of their good health seeking behavior.

The majority (80%) were congenital and were associated with NTD. In our study one of the patients was a preterm neonate and therefore the HCP could be due to IVH (intraventricular haemorrhage), 10% were due meningitis, the remaining 9% the aetiology could not be identified, this is similar in a study by Salman (9). The mortality rate in this study was 1% which is similar to that by Mathew et al (13) who recorded 0-3% depending on the duration of follow up.

The infection rate 3% in our study, but was found to be high in some series such as Mwangombe (4) as high as 24.6% at Kenyatta and the commonest microbe is staph aureus and coagulase negative streptococcus. Shunt failure is also another complication, it can be aseptic (malfunction) or can be septic shunt infection (11), the former include over drainage or under drainage, occult shunt failure, we recorded some of these malfunction in our study as was the case in other Series (11), In one of the Patients the peritoneal end of the shunt migrated through the rectum(fig 2), in yet another patient there was skin necrosis and the peritoneal extruded through the necrosed skin (fig 3), in another the ventricular end migrated proximally into the cranial cavity following fracture at the valve site as shown in the cranial-cervical X-ray(fig 4) , however these findings depend on the duration of follow up. However we continue follow up our patients for over 1yr, while some have already been enrolled into primary schools some were loss to follow up. Management of HCP in developing countries is limited by several factors ranging from ignorance of the disease, poverty, superstitions that can cause delayed in presentation and therefore poor outcome; lack of personnel and facilities also contribute to poor outcome. In developed countries however, management of HCP has reached advanced stage where minimal access surgery such as endoscopic Third ventriculostomy and VPS (5) is the practice, while some offer third ventriculostomy and endoscopic cauterization of choroid plexus (6) we still offer open VPS in our centre this is couple to the fact that we lack the skills and the facilities.

V. CONCLUSION

Hydrocephalus is one of the commonest congenital malformations seen in our setting, ventriculo-peritoneal shunt remains the mainstay of treatment with satisfactory outcome, however those presenting late have bad prognosis. Therefore there should be a concerted effort by the Government and Healthcare workers to enlighten the public on the disease and encourage parents of patients with features of hydrocephalus to bring them to the healthcare facilities for prompt and treatment.

REFERENCES

[1]. Thomas B Edward S, John M, Petra K; A New Look at Cerebrospinal Fluid Circulation: Fluids and Barriers of the CNS 2014 11:10

[2]. Moritade K, Nagai H, Nagasco N, Yamasaki M, Oi S, Hata T. (2008) Diagnosis of Hydrocephalus and Delivery of its Picture in Japan. Brain Dev. 30 764-768

[3]. Gupta D, Singla R, Dash C. (2017) Pathophysiology of Hydrocephalus in: Ammar A. (eds) Hydrocephalus Springer, Chamm.

[4]. Sirst on live : 14 July 2017

[5]. <https://doi.org/10.1007/978-3-319-61304-8-3>

[6]. Mwangombe N.J , Omulo T. (2000) V-P Shunt Surgery and Shunt Infection in Children with Non-Tumour Hydrocephalus at Kenya National Hospital ,Nairobi. East Afri Med J77:386-390

[7]. Warf B.C (2005), Hydrocephalus in Uganda: True Predominance of Infectious Origin and Primary Management with Endoscopic Third Ventriculostomy. J.Neurosurg 102 (1-sup) 1-15.

[8]. Warf B.C, Campbel J W. (2008) Combined Endoscopic Third Ventriculostomy and Choroid Plexus Cauterization and Primary Treatment of Hydrocephalus for Infants with Myelomeningocele: Long term Results of a Prospective Intent-To-Treat Study in 115 East African Infants. J Neurosurg Paediatric 2: 310-316

[9]. Adeyemo AA, Gbadegesin RA, Omotade OO; Major Congenital Malformation among Neonatal Referrals to a Nigerian University Hospital. East African Med J. 1997;74:699-701

[10]. Amos OA, Kayode GO, Central Nervous System Congenital Anomalies: A Prospective Neurosurgical Observational Study from Nigeria. (2009) Japan Teratology Society 49:258-261

[11]. Salman AJ, Habeeb KO; Management and Outcome of Infertile Hydrocephalus in a Tertiary Health Institution in Nigeria. J of Neurosciences in Rural Practice, 2017 Apr-June; 8(2) 249-253

[12]. Edward OK; Treatment of CSF Shunting Complications in Nigerian Neurosurgery Programme Case Illustrations and Review. Paediatric Neurosurgery. 2008, 44:36-42

[13]. Reddy GK, Bollam P, Caedetto G; Ventricular-Pevitoneal Shunt Surgery and Risk of Shunt Infections in Patients with Hydrocephalus: Long term Single Institutional Experience. World Neuro Surg 2012: 155-63

[14]. Santoshkumar ND, Ashishkumar TY: Clinical Study and Management of Hydrocephalus in Children. International Surg J. (2020 April)>(4) 1258-1262

[15]. Mathieu V, Harold R, Abhayan VK; Paediatric Hydrocephalus Outcomes: A Review Fluids and Barriers of the CNS 2012, 9:18

[16]. Musau CK, Nganga HN, Mbuthia NK; Management and Functional Outcome of Childhood Hydrocephalus at Kenyatta National Hospital, Nairobi, African J of Neurological Science. 2015 vol 34 No 1

[17]. John RW, Kestle MD; Paediatric Hydrocephalus: Neurol Current Management Clin N ANN 21 (2003) 883-895

[18]. Sheng C, Jingt L, Cesar R, Anatol M, Jianmiaz: Hydrocephalus after Subarachnoid Haemaorrhage: Pathophysiology, Diagnosis and Treatment Hindawi Biomed Research int Vol 2017, Article ID 8584753 8 Pages.

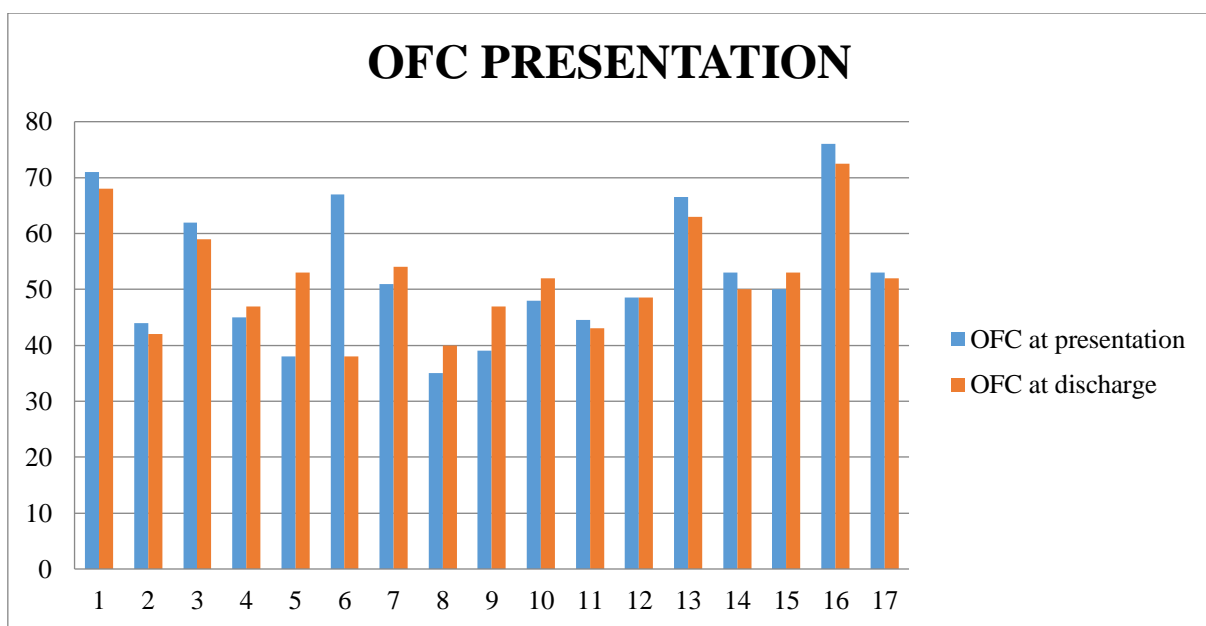


Fig. 1: Comparing Occipito Frontal Circumference (OFC) at Presentation before Ventriculo Peritoneal (VP) Shunt and at Discharge after VP Shunt



Fig. 2: Shunt Migrating through the Rectum



Fig. 3: Exposed Peritoneal Shunt through Skin Necrosis



Fig. 4: Skull X-Ray of Intracranial Shunt Migration