

# Management of hydrocephalus using the Chabbra shunt

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Abstract

Over a two-year period, 223 patients with hydrocephalus were admitted to the wards of Queen Elizabeth Central Hospital, Blantyre. Of these 223 patients, 111 were male and 112 were female. All children of less than 18 months underwent ultrasonography to confirm the diagnosis of hydrocephalus, and 22 older patients had a CT scan. The commonest causes of hydrocephalus were meningitis and congenital hydrocephalus. 201 had ventricular aspiration to assess suitability for shunting and in 157 patients, the cerebrospinal fluid (CSF) was clear and these patients were con-

sidered suitable for insertion of a ventriculo-peritoneal (VP) shunt. The outcome was satisfactory in 73% of the patients with 10 patients lost to follow-up. There were 12 (7.6%) patients with shunt infections, 6 (3.8%) patients had peritoneal shunt blockage and 2 (1.3%) had over-drainage. There were 2 cases of shunt prolapsing through the anus. Twenty patients died (12.7%); one had inflammation along the shunt tract, one had valve malfunction and one had the valve exposed on the scalp.

## Introduction

Hydrocephalus occurs when CSF circulation is altered in some way. For instance, the flow of cerebrospinal fluid may be obstructed from tumours, infections such as meningitis and from haemorrhage. CSF may not be adequately reabsorbed into bloodstream or less often, too much CSF is produced usually caused by a rare brain tumour choroids plexus papilloma.

In the past, hydrocephalus was managed using an improvised Malawian VP shunt. This shunt was home-made of Silastic tubing with a curved metal tube, the shoulder of the system, between the upper ventricular and lower abdominal sections. Near the catheter tip there are two fine holes. The lower end of the distal catheter is ligated. The longitudinal slits are made above the occluded lower ends. Follow-up studies treated with the Malawian shunt showed that the commonest sequelae are: over-drainage, shunt blockage and collapse of the cranium<sup>1</sup>. From these follow-up studies, we switched to Chabbra shunt from March 2001. The Chabbra shunt is made up of ventricular catheter, which has fine twenty-eight holes, and it is proximally attached with a valve in continuation with the peritoneal catheter unlike the Malawian shunt. At the distal end of the catheter, there are two slit-holes. This paper reports our experience with the regular use of the Chabbra shunt in the management of hydrocephalus.

## Methods and Results

The patients were 223 patients (111 males and 112 females) with a clinical diagnosis of hydrocephalus. The ages ranged from 2 weeks to 53 years. The mean age was 3 months. All 201 children with an open fontanelle underwent cranial ultrasound (US) to confirm the diagnosis of hydrocephalus and evaluate the cerebral cortex. The other 22 older patients underwent CT scanning, because the anterior fontanelle was closed and results are in Table 1. The likely cause of hydrocephalus was known in 157 cases (figure 1) with meningitis and congenital hydrocephalus being the commonest causes.

Figure 2 shows the range of head circumferences: range of 36.5 to 67 cm with a mean of 53 cm and mode of 60 cm.

Imaging does not differentiate clear from infected CSF, which could be a contra-indication to the operation. To overcome this problem a pre-operative ventricular tap as described previously<sup>2</sup> was performed in 201 children with open fontanelle. Blood-stained CSF must not be diverted to the peritoneal cavity, as the shunt will rapidly become blocked through the development of adhesions at the abdominal end. In 157 patients, CSF was clear and these were considered ready for insertion of a V-P shunt.

Outcome for these 157 patients are in figure 3: uncomplicated in 115 (73%); infections in 12 (7.6%); blocked shunt in 6 (3.8%) and two patients had over-drainage. Two had shunt prolapsed through the anus – presenting 5 and 8 months post-operatively. <sup>4</sup>Ten were lost to follow-up.

Twenty (12.7%) patients died and the commonest cause was sepsis – figure 4. Bacteria were isolated from blood culture and/or CSF in 8 of the 12 patients who died with sepsis: *Staphylococcus aureus* (n=4), *Staphylococcus epidermidis* (2), *Klebsiella pneumoniae* (1) and *Streptococcus pyogenes* (1). One patient died of cryptococcal meningitis. This patient was presented with oral sores, neck stiffness and continuous headaches after six months of shunt insertion, and was found to be HIV-infected. The patient was treated with Amphotericin-B, but died three days while on treatment.

## Discussion

In our patient group, “sequelae of meningitis” was the commonest cause of hydrocephalus. This is similar to the experience reported from Uganda<sup>3</sup>. The next commonest cause was congenital. In a previous study done at Queen Elizabeth Central Hospital, it was found that congenital hydrocephalus associated with the neural tube defects of encephaloceles and meningomyeloceles and with aqueduct stenosis was more common than meningitis. This might be partly explained by childhood meningitis-related research at QECH over recent years which has included long-term follow-up. Among older patients who had CT scan, posterior fossa tumour was common – this is the commonest site for paediatric CNS malignancy.

Outcome in our group was very satisfactory overall. There were 12 patients who had infections, which represents 7.6%, and only six patients had peritoneal shunt blockage. Management of these patients should include well-informed counselling and teaching for parents and patient. It is important to realise that a successful and well conducted insertion of the most sophisticated shunt device will still result in a very bad outcome, unless information for the mother is part of the “surgical” routine<sup>6</sup>.

Counselling should include advice about the use of folic acid in future early pregnancies to reduce the risk of neural tube defects. VP shunt can be safely and effectively performed for hydrocephalus at QECH. The Chabbra shunts are so far superior to the “Malawi” shunt used previously, as they do not lead to over-drainage, and the risk of shunt blockage or infection is relatively low.

References

1. Adeloye A. Management of hydrocephalus in central Africa. Trop Doc 2001: 67-70
2. Adeloye A. Ultrasonographic study of children suspected of hydrocephalus at the Queen Elizabeth Central Hospital in Blantyre, Malawi. E Afr Med J 1997: 267-270
3. Warf BC, MacGowen L. Post infectious hydrocephalus: the most common cause of hydrocephalus in Uganda. In: Proceedings of the 13th Conference of IF Project in Dar es Salaam, Tanzania, 2001.
4. Adeloye A. protrusion of Ventriculo-Peritoneal Shunt through the anus. E Afr Med J 1997: 337-339
5. Kalangu KN. Parents' contribution to the survival of children with hydrocephalus. In: Proceedings of the 13th Conference of IF Project in Dar es Salaam, Tanzania, 2001.
6. Hahn, Y.S. 1994. Use of the distal double – slit valve system in children with hydrocephalus. Child Nerv Syst 1994; 10: 99-103

Figure 3: Outcome of the V-P shunting

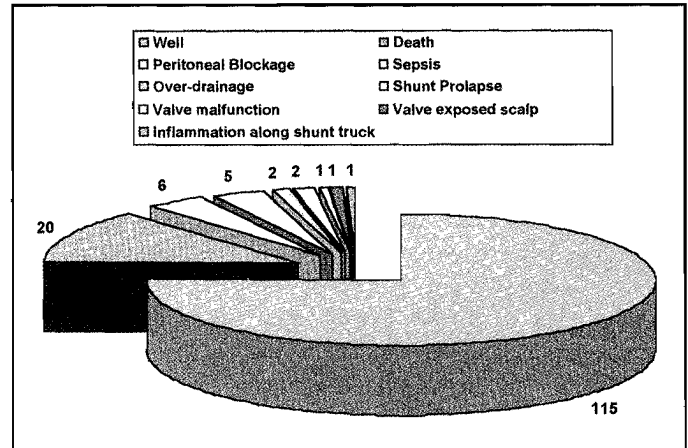


Table 1: Findings on CT scan

Posterior fossa tumour	11
Aqueduct Stenosis	4
Communicating Hydrocephalus	3
Head Injury	2
Porecephalic cyst	1
Frontal arachnoid cyst	1

Figure 4: Causes of death

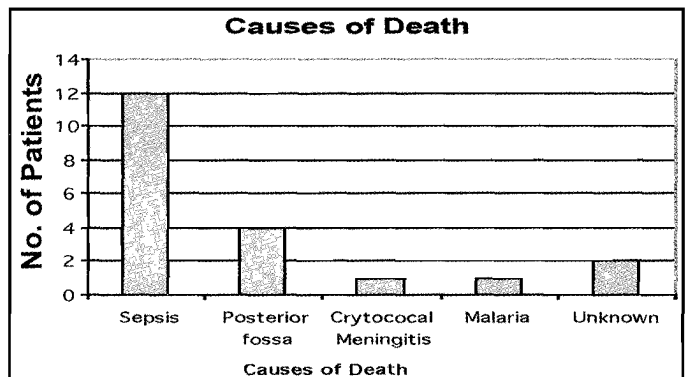


Figure 1: Causes of Hydrocephalus

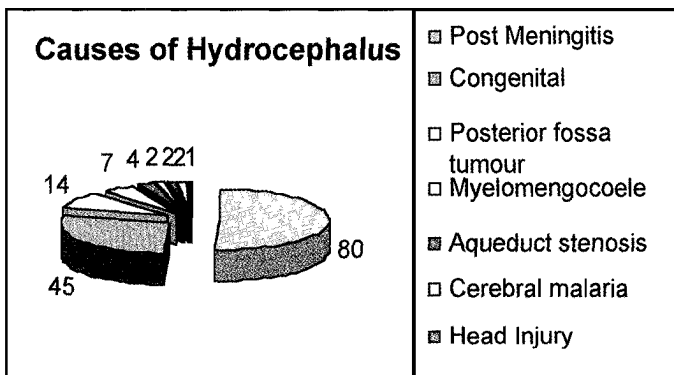


Figure 2: Head Circumference range of the patients

