ORIGINAL ARTICLE

VENTRICULOPERITONEAL SHUNT BLOCKAGE

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Background: Hydrocephalus is the abnormal accumulation of cerebrospinal fluid within the ventricles and subarachnoid spaces, resulting in increased intracranial pressure. The treatment of choice is placement of ventriculoperitoneal shunt. Ventriculoperitoneal shunt blockage is not an uncommon complication. Objective of the study was to find out the frequency, causes and site of ventriculoperitoneal blockage and to compare it with other studies. **Methods:** This case series study was conducted at Department of Neurosurgery Liaquat University Hospital, Jamshoro, from April 2008 to March 2012. The records of 53 patients between 40 days to 45 years age presenting with blocked ventriculoperitoneal shunt were included. All the patients underwent thorough clinical examination and radiological investigations, and shunt revision done. The retrieved data was collected on proforma. Frequencies and percentages were calculated for categorical data. **Results:** Out of 53 patients 28 were males, 25 patients were females. Age of patients ranged from 40 days to 45 years. Time interval between the ventriculo-peritoneal shunt placement and blockage of shunt ranged from 2 weeks to 9 years. Out of 53 patients, 32 (69.37%) patients had obstruction at distal catheter, whereas 21 (39.62%) patients had ventricular catheter blockage. **Conclusion:** Ventriculo-peritoneal shunt blockage is one of the most common complications of shunt placement procedure. In this study most of the patients (69.37%) had distal catheter obstruction. Majority (35.84%) of the patients presented with shunt obstruction within one year of shunt placement. Shunt obstruction is common in children less than 3 years age.

Keywords: VP shunt, obstruction of shunt, revision

INTRODUCTION

Ventriculoperitoneal (VP) shunts are commonly used to treat hydrocephalus, the excess build up of CSF. The excess accumulation of CSF can lead to an increase in ICP that result in damage to the brain. The risks of damage to the brain are reduced by draining the CSF away from the brain.[1] The VP shunt is a connection between the ventricles and the peritoneal cavity. The location of ventricular catheter is determined by the neurosurgeon based on the type and location of the blockage causing hydrocephalus. The distal catheter is most commonly placed in the peritoneal cavity but other location includes the right atrium and pleural cavity.[2] When a shunt is first put in place, it is the dream of the neurosurgeon and patient that the shunt will last forever, unfortunately, shunts do not last forever and it is unrealistic to think they ever will. There are numerous complications related to VP shunt such as infections,[3] obstructions,[3] mechanical failures such as the valve has failed to work correctly, over drainage, slit ventricle syndrome[4,5], intra-ventricular hemorrhage.[6,7]

Obstructions are the most common shunt complications and are either in the proximal or distal catheters.[3] The proximal catheter can be obstructed by a variety of factors, including, in growth by the choroid plexus, collapsed ventricles which occludes the holes at the end of ventricular catheter, blood clots resulting from haemorrhage during placement of ventricular catheter, and build up of tissue debris.

The distal catheter becoming obstructed is less common, but it can occur.[8,9] Distal catheters can be obstructed if debris in the peritoneal cavity accumulates around the tip of the catheter, due to loss of absorptive ability by the peritoneal cavity and due to the growth of peritoneal pseudocysts.[2,10,11] Sometimes the long distal catheters may become kink in peritoneal cavity. If a shunt system fails to operate correctly, becomes obstructed, the patient's life and cognitive faculties are placed at risk. It must be revised under emergency conditions. The presentation of shunt block may be with classical symptoms such as headache, vomiting, drowsiness[12], tense fontanelle in children having open fontanelle, lethargy, loss of upward gaze or coma. The prompt diagnosis and operative treatment of blocked shunt should be very much emphasized. Death or major neurological sequelae including blindness are well described sequelae of delayed treatment.[13]

The objective of this study was to see the frequency, causes and site of ventriculoperitoneal blockage at Department of Neurosurgery, Liaquat University Hospital, Jamshoro.

PATIENTS AND METHODS

This study was conducted at the Department of Neurosurgery, Liaquat University Hospital, Jamshoro, Pakistan for a period of 5 years from April 2008 to March 2012. During the study period patients who came with clinical symptoms and radiological evidence of shunt obstruction, were included in the

study. Patients with infected shunt, exposed shunt were excluded from the study. Patients with blocked shunt were admitted through OPD. After detailed history, thorough physical examination done in the ward and records were maintained. Along with routine baseline investigations, all the patients investigated radio logically with CT scan brain, X-ray chest, X-ray abdomen, ultrasound abdomen and pelvis to assess the site and cause of shunt blockage. CT scan abdomen /pelvis in advised in patients having pseudocyst on ultrasound abdomen. Causes and site of shunt obstruction are further confirmed peroperatively i.e. during the revision procedure.

Data of every patient were recorded on a proforma and analysed using SPSS-10. Frequencies and percentages were calculated for categorical data, whereas means and standard deviations were calculated for numeric data.

RESULTS

During the study period 53 patients of shunt blockage were admitted in the ward. Out of which 28 (52.84%) patients were males, whereas 25 (47.16%) patients were females. Male to female ratio was 1.12:1. Age of patients ranged from 25 days to 44 years (Table-1). Majority of the patients were of less than 1 year age (19 patients). The time interval between the VP shunt placement and blockage of shunt ranged from 2 weeks to 9 years (Table-2). Majority of the patients had shunt blockage within a years after the placement of shunt. Majority of the patients presented with drowsiness, vomiting and headache. Patients less than 1 year age presented with drowsiness, poor feeding, vomiting, tense anterior fontanelle, and setting sun appearance of eyes. Out of 53 patients, majority of the patients (32, 60.37%) had obstruction at distal catheter, whereas 21 (39.62%) patients had ventricular catheter blockage (Table-3).

Table-1: Age and gender of patients

Age (years)	No. of patients (M, F)	%
< 1 year	19 (11, 8)	35.84
1–10	18 (11, 7)	33.96
11–20	8 (5, 3)	15.09
21–30	6 (1, 5)	11.32
31–40	1 (0, 1)	1.88
41–50	1 (0, 1)	1.88

Table-2: Time interval between VP shunt placement and revision

Time	Patients	%
<1 year	19	35.84
>1 year but <2 years	10	18.86
>2 years but <3 years	13	24.52
>3 years but <4 years	7	13.20
>4 years but <5 years	2	3.77
>5 years	2	3.77

Table-3: Site and cause of blockage

Site and cause of blockage	Patients	%
Ventricular catheter blockage	**21**	**39.62**
Shortened ventricular catheter due to decrease in ventricular size	4	7.54
Tissue debris	5	9.43
Floating and impaction of catheter to the roof of lateral ventricle	4	7.54
Shunt tip crossed the ventricle and lies in brain parenchyma	8	15.09
Distal catheter blockage	**32**	**60.37**
Kinked distal catheter	9	16.98
Debris in distal catheter	17	32.07
Abdominal Pseudocyst	6	11.32

DISCUSSION

Ventriculo-peritoneal shunts remain the mainstay of treatment for most cases of hydrocephalus with an intention to divert the excess CSF from the ventricular system to the peritoneal cavity. However, complications are common.[10,14] All are prone to malfunction, with block being the commonest reported complication in most series. In the largest reported cohort of 1,719 patients, 56% experienced at least one episode of shunt block in the 12 years following insertion.[15] Lazareff and colleagues [16] reported a 44% prevalence of shunt blockage in 244 children followed up over a period of up to 6 years post initial insertion. The peak danger period for blockage is in the first year after insertion, with rates as high as 20% recorded in some series.[17] Annual rates of shunt blockage have been estimated by Rekate to be approximately 5%.[18] In our study 35.84% patients had shunt blockage within the first year of shunt placement and 18.86% of patients had shunt blockage in the second year of shunt placement.

The incidence of distal catheter complication has been reported to from 5% to 47%.[8,9] In this study 39.62% patients had proximal catheter blockage and 60.37% patients had distal catheter blockage. The overall prevalence of distal catheter blockage due to pseudo cyst formation is varied from less than 1–4.5%.[10,11,19] In this study distal catheter blockage due to pseudo cyst formation occurred in 11.32% patients.

The time from the VP shunt placement to the development of blockage ranges from 3 weeks to 5 years.[20] There has been a reported case of pseudo cyst formation and distal catheter blockage 10 years after VP shunt placement. In this study the time interval between the VP shunt placement and revision ranged from 2 weeks to 9 years.

CONCLUSION

Majority of the patients had distal catheter obstruction. Majority of the patients presented with shunt obstruction within one year of shunt placement. Shunt obstruction is common in children less than 3 years age.

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