

## ORIGINAL ARTICLE

# A Study of Various Shunt Related Complications in a Tertiary Care Hospital

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## ABSTRACT

**Objective:** The purpose of this study is to evaluate the frequency of various complication in patients with ventriculoperitoneal shunt (VP shunt) for hydrocephalous in a tertiary care hospital.

**Material and Methods:** This descriptive study on patients for whom Ventriculoperitoneal shunt was done for hydrocephalus was carried out in neurosurgery department, Hayatabad Medical Complex, Peshawar from 1st May 2010 to 30<sup>th</sup> February 2013. Only patients of hydrocephalous with established complication from both genders without age discrimination were included in the study and patients with complications after revised shunts were excluded as complications rate is different in the two entities and will bias the study results. The patients were seen either in emergency room, ward or neurosurgical OPDs. Routine follow up schedule was examination at discharge, one month and then 6 months post operatively on outpatient bases. History, Clinical examination and full investigations which included FBC, CRP, CSF R/E (if required to rule out infection), X-Ray shunt series and CT scan brain and ultrasound abdomen pelvis were done as required in all patients. The clinical data was put into semi structured Performa and analyzed by SPSS version 10. Frequency and percentage was calculated for categorical variables. Mean  $\pm$  SD was calculated for age. Results were presented as graphs and tables.

**Results:** The total number of children operated upon was 112 of whom 71 (63.39%) males and 41 (36.61%) females. Forty one patients (36.61%) were less than one year at the time of presentation. Thirty seven (33.03%) patients were in age range of 1 – 10 years, 19 (16.96%) were in 11 – 20, 10 (8.92%) were in 21 – 30 age range, 4 (3.57%) were from 31 – 40 and one patient (0.89%) was in the age range of 41 – 50. Shunt blockage was seen in 54 (48.21%) followed by infection 38 (33.93%). Shunt erosion was seen in 11 (9.82%), extrusion in 5 (4.46%). While 4 patients died in the study period due to shunt related complications.

**Conclusion:** The commonest shunt related complication is shunt blockage followed by shunt infection. Upper end of the shunt is more prone to complications than the lower end. Shunt related complications are serious clinical conditions and may lead to death of the patient.

**Key Words:** Ventriculoperitoneal shunt, complications, frequency.

## INTRODUCTION

Hydrocephalus is defined as increase in the size of ventricles due to increased volume of cerebrospinal fluid.<sup>1</sup> There are various causes of hydrocephalus which include impaired CSF absorption and obstruction to the pathways of the cerebrospinal fluid in the ventricular system or subarachnoid spaces. The commonest modality of treatment for treatment of hydrocephalus is ventriculoperitoneal shunt.<sup>2</sup> However complications are not uncommon and include mechanical failure of the device, functional failure due to over drainage or

under drainage and infection of cerebrospinal fluid or shunt.<sup>3</sup> Multiple factors are responsible for the complications. Some of the factors are patient's age, sex, type of hydrocephalus, duration of operation, surgeons experience and use of prophylactic antibiotics.<sup>4-13</sup>

The purpose of this study is to find out the frequency of various complications associated with hydrocephalous in our institution and then accordingly the various strategies to reduce the incidence of various complications.

**MATERIAL AND METHODS**

This was a descriptive study of patients for whom Ventriculoperitoneal shunt was done for hydrocephalus. The study was carried out in neurosurgery department, Hayatabad Medical Complex, Peshawar from 1st May 2010 to 30<sup>th</sup> February 2013.

**Inclusion Criteria**

Only patients of the established hydrocephalous from both genders without age discrimination were included in the study

**Exclusion Criteria**

Patients with revised shunts were excluded as complications rate is different in the two entities and will bias the study results.

There were a total of 112 patients who had shunt procedures done during the study period. Inclusion and exclusion criteria were strictly followed. The patients were seen either in emergency room, ward or neurosurgical OPDs. Patients were advised to visit neurosurgery department as soon they develop complications. Routine follow-up schedule was examination at discharge, One month and then 6 months post operatively on outpatient bases. However all patients who came to ward at any point of time after surgery were enrolled in the study without any time restriction.

**Diagnosis** of complications were made by typical history and examination and radiological evidence of shunt obstruction. History, Clinical examination and full investigations which included FBC, CRP, CSF R/E (if required to rule out infection), X-Ray shunt series and CT scan brain and ultrasound abdomen pelvis were done as required in all patients.

**Data Analysis**

The clinical data was put into semi structured Performa and analyzed by SPSS version 10. Frequency and percentage was calculated for categorical variables. Mean ± SD was calculated for age. Results were presented as graphs and tables.

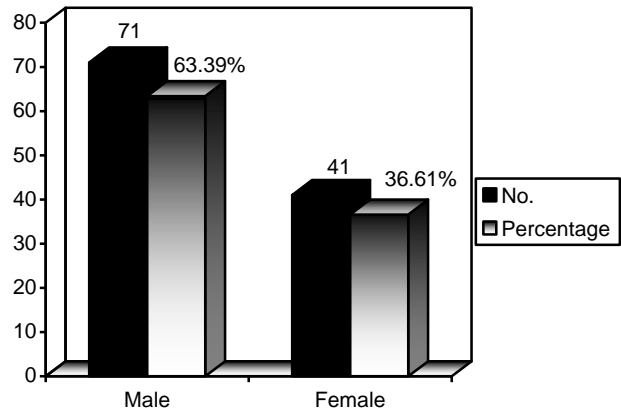
**RESULTS**

**Sex Incidence**

The total number of children operated upon was 112 of whom 71 (63.39%) males and 41 (36.61%) females. Gender distribution is given in graph 1.

**Age Incidence**

Majority of the patients presented in the first three years. Age of patients ranged from 10 days to 42 years. Age distribution is given graph 1.



**Graph 1: Gender Distribution.**

**Table 1: Age Distribution of Study Population.**

S. No	Age	No of Patients	Percentage
1.	Less than 1 year	41	36.61
2.	1 – 10	37	33.03
3.	11 – 20	19	16.96
4.	21 – 30	10	8.92
5.	31 – 40	4	3.57
6.	41 – 50	1	0.89

**Table 2: Complications of VP Shunt.**

S. No	Complications	No of Patients	Percentage
1.	Blockage	54	48.21
2.	Infection	38	33.93
3.	Shunt erosion	11	9.82
4.	Extrusion of shunt	5	4.46
5.	Death	4	3.57

**Pattern of Complications**

Twenty two patients developed shunt related complications. Shunt blockage was the commonest compli-



**Picture 1:** A child with Oral Extrusion of VP Shunt.

cation 54 (48.21%) followed by infection 38 (33.93%). The other complications are shown in table 2.

## DISCUSSION

Shunt complications have remained a major problem. Though improvement in quality of shunt material and shunting techniques have reduce the risks related to initial surgery, long term risks like repeated shunt malfunction, shunt infection, blockage, mechanical failure (breakage) and death associated with shunt failure remain the same.<sup>14-18</sup>

Shunt obstruction can occur either at ventricular or peritoneal end or reservoir of shunt can get blocked. Moreover other factors like infection, occlusion the ventricular end by choroid plexus, tumor growth or intraventricular blood, shunt disconnection, valve malfunction or kinking, pseudocyst may also results in shunt malfunctioning. In this study 54 (48.21%) patients had shunt malfunction. Ali M el all reported 50% shunt bolockage in his study in other center of the same city.<sup>19</sup>

Shunt infection is another deadly complication of this procedure. Various studies have given various infection rates but in general it ranges from 0.17 - 30%.<sup>20,21</sup> Staphylococcus epidermidis is responsible for approximately 60% of shunt infections, Staphylococcus aureus in 30% cases and coliforms, propionebacteria and streptococci are responsible for the remaining cases.<sup>6</sup>

In our study, 38 patients (33.93%) developed shunt infection. These results are parallel with the results of previous researchers i.e. (35.71%).<sup>1</sup>

Shunt extrusion can occur anywhere along the catheter pathway. It can get extruded through scalp, abdominal wall,<sup>22</sup> scrotum, anus or vagina. One patient in our study had distal end extrusion through the abdominal wall. Shunt erosion has been seen in 11 (9.82%) cases in this study. Upper end erosion was notices in 7 and lower end erosion was seen in 4 cases. Amongst lower end erosions case one patient had umbilical, one had per oral, one had per rectal and pervaginal erosion was also seen in one case. The present study results are not much different than other regional studies.<sup>19</sup>

Four patients (3.57%) died after shunt placement. Three patients had aspiration while one patient developed ventriculitis .this patient had tetralogy of fellot as well.

This study is a small descriptive study. Further large randomized controlled trials are required to know about the long term complications of such shunt procedures.

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