

Research Article

Frequency of complications associated VP shunt placement at tertiary care hospital, Bahawalpur

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ABSTRACT

Objective: To determine the frequency of complications associated VP shunt placement at tertiary care hospital, Bahawalpur.

Material and methods: This cross sectional study was conducted at Department of Neurosurgery Bahawal Victoria Hospital, Bahawalpur from June 2017 to June 2018. The patients were aged one year or less of either gender who were suspected to have HCP on presence of any of clinical sign and symptoms of irritability, vomiting on feeding, convex and full anterior fontanelle, distended scalp veins, cranial suture splaying, poor head control, and "setting sun" sign in which eyes were inferiorly deviated. The suspects were confirmed on the basis of computed tomography (CT) scan report which indicated dilated brain plain and fluid-filled ventricles. VP shunt placement was done in all selected and VP shunt complications were assessed.

Results: Out of 100 patients selected for VP shunt insertion. Post insertion of VP shunt, complication was noted in 20 (20%) patients and 80 (80%) patients found without any complication. VP shunt complications were noted in 12 (22.22%) patients, 6 (20%) patients and 2 (12.5%) patients respectively in age group <2 years, age group 2-15 years and age group >15 years. Out of 70 (70%) male patients, complications were seen in 11 (15.71%) patients. Among the 30 (30%) female patients, complications were seen in 9 (30%) patients.

Conclusion: Results of present study showed slightly higher rate of VP shunt complications in cases of hydrocephalus. Most of the patients were under 2 years but VP shunt complications were not significantly associated with age group. Male patients were found with higher number but complication difference was not statistically significant.

Key words: PV Shunt, complication, hydrocephalus, infection

INTRODUCTION

Hydrocephalus is defined as the pathological increase in intracranial cerebrospinal fluid (CSF) volume and can be either congenital or acquired following brain injury, tumor or infection.¹ Normal production of CSF occurs in the ventricles; however, it can accumulate due to

overproduction or decreased circulation to other brain compartments.² The accumulation leads to swelling of the ventricular system and ultimately to brain damage due to decreased blood flow and altered metabolism in the compressed tissues.¹³ The primary neurosurgical treatment of

hydrocephalus involves the surgical insertion of a shunt system which drains the excessive fluid into other body cavities where it can be reabsorbed.⁴⁰ Since its introduction in the 1950's, placement of ventriculoperitoneal (VP) shunts has provided a highly efficacious treatment for thousands of hydrocephalus patients annually. Nevertheless, its effectiveness has been overshadowed by complications such as infection and mechanical malfunction.⁵

Shunt infection is generally defined as the identification of a bacterial pathogen from the CSF both by gram stain and culture, in conjunction with CSF pleocytosis, fever, neurologic symptoms, and signs of shunt malfunction.⁶⁻⁷ The clinical symptoms associated with SI can vary due to the organism involved and can be initially blunted in biofilm infections, leading to delayed diagnosis and treatment in some cases. Shunt infections are associated with higher rates of revision, recurrence of infection, ventriculitis, meningitis, and encephalitis, and often with greater mortality rates.⁸

Shunt infection rates per patient range from 10% to 22% and around 6.0% per procedure, with 90% of infections occurring within 30 days of surgery.⁹ Risk factors for infection include young age, frequent revisions and causes of hydrocephalus such as post-infectious hydrocephalus, posthemorrhagic hydrocephalus or hydrocephalus due to spina bifida or other neurologic defects resulting in communication of the CSF with skin.¹⁰

The aim of this study was to assess effectiveness of procedure against proven standards of care, to study complications of VP shunt and to study factors influencing shunt malfunction.

MATERIAL AND METHODS

This cross sectional study was conducted at Department of Neurosurgery Bahawal Victoria Hospital, Bahawalpur from June 2017 to June 2018. The patients were aged one year or less of either gender who were suspected to have HCP on presence of any of clinical sign and symptoms of

irritability, vomiting on feeding, convex and full anterior fontanelle, distended scalp veins, cranial suture splaying, poor head control, and "setting sun" sign in which eyes were inferiorly deviated. The suspects were confirmed on the basis of computed tomography (CT) scan report which indicated dilated brain plain and fluid-filled ventricles. However, patients who had preoperative fever $>38.5^{\circ}\text{C}$, pre-existing conditions like abdominal tuberculosis (TB) and ascitis, those who had undergone laprotomy previously and who had Infected HCP confirmed by increased white cell count ($>25\%$ polymorph nuclear leucocytes) and decreased glucose (<15 g/dl) in CSF were excluded.

VP shunts were inserted by using standard procedure. Patients were followed up for six months and those presenting with any one of the following were labelled as VPS infection: pus discharge from surgical wound, excursion of skin with exposure of the shunt, signs of inflammation including redness, warmth and tenderness along shunt track and fever ($>38^{\circ}\text{C}$) with increased white cell count ($>25\%$ polymorph nuclear leucocytes) and decreased glucose (<15 g/dl) in CSF. During surgery, CSF sample was taken of all patients for chemistry and culture.

All the collected was entered in SPSS version 20 and analyzed. Mean and SD was calculated for numerical data and frequencies and percentages were calculated for categorical data.

RESULTS

Out of 100 patients selected for VP shunt insertion. Post insertion of VP shunt, complication was noted in 20 (20%) patients and 80 (80%) patients found without any complication. (Fig.1)

Of which infection was noted in 6 (10%) patients followed by blocked shunt in 4 (6.6%) patients, Disconnection of Ventricular Catheter with Distal Part in 2 (3.33%) patients, malposition in 2 (3.3%) patients, Extrusion of shunt through anus in 2 (3.3%) patients, Shunt ascites 2 (3.3%) patients and Seizures in 2 (3.3%) patients. (Table 1)

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Selected patients were divided into three groups i.e. age group <2 years, age group 2-15 years and age group >15 years. In age group <2 years, there were 54 (54%) patients, 30 (30%) patients belonged to age group 2-15 years and 16 (16%) patients belonged to age group >15 years. VP shunt complications were noted in 12 (22.22%) patients, 6 (20%) patients and 2 (12.5%) patients respectively in age group <2 years, age group 2-15

years and age group >15 years. Statistically insignificant association of development of complications with age groups was noted with p value 0.6942. (Table 2) Out of 70 (70%) male patients, complications were seen in 11 (15.71%) patients. Among the 30 (30%) female patients, complications were seen in 9 (30%) patients. Complications were insignificantly associated with gender with p value 0.1726. (Table 3)

Fig. 1 : Frequency of complications

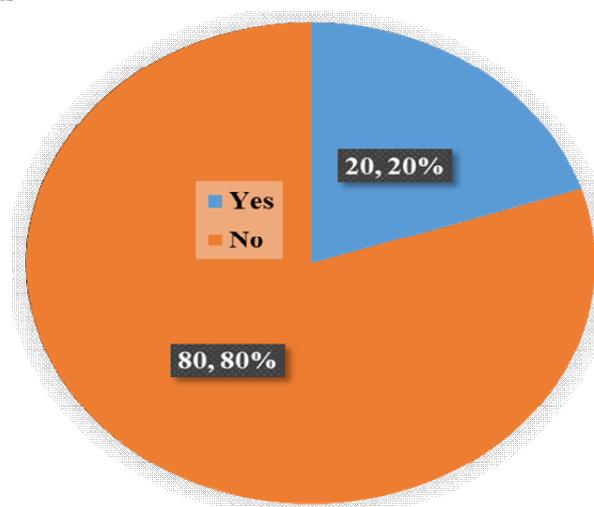


Table 1: Complications details

Particulars	No. of cases	Percentage
Infection	6	10%
Blocked shunt	4	6.6%
Disconnection of Ventricular Catheter with Distal Part	2	3.33%
Malposition	2	3.3%
Extrusion of shunt through anus	2	3.3%
Shunt ascites	2	3.3%
Seizures	2	3.3%
Total	20	33.3%

Table 2: Association of complications with age groups

Age (years)	Complications		Total	P-value
	Yes	No		
<2 years	12 (22.22%)	42 (77.78%)	54 (54%)	0.6942
2-15 years	06 (20%)	24 (80%)	30 (30%)	
Above 15 years	02 (12.5%)	14 (87.5%)	16 (16%)	
Total	20 (20%)	80 (80%)	100	

Table 3: Association of complications with gender

Gender	Complications		Total	P-value
	Yes	No		
Male	11 (15.71%)	59 (84.29%)	70 (70%)	0.1726
Female	9 (30%)	21 (70%)	30 (30%)	
Total	20 (20%)	80 (80%)	100	

DISCUSSION

VPS procedures are the most common ones performed by paediatric neurosurgeons, making up nearly half of all cases in this specialty. It has been estimated that more than 30,000 shunt procedures are performed in the United States annually.³ Infections are the second most common complication, being a major source of morbidity and cost. The incidence of shunt infections in modern prospective studies has ranged from 8.2% to 12% of shunt procedures.¹¹

Out of 100 patients selected for VP shunt insertion. Post insertion of VP shunt, complication was noted in 20 (20%) patients and 80 (80%) patients found without any complication. Of which infection was noted in 6 (10%) patients followed by blocked shunt in 4 (6.6%) patients, Disconnection of Ventricular Catheter with Distal Part in 2 (3.33%) patients, malposition in 2 (3.3%) patients, Extrusion of shunt through anus in 2 (3.3%) patients, Shunt ascites 2 (3.3%) patients and Seizures in 2 (3.3%) patients. In one study by Pal et al,¹² total 198 patients were managed with PV shunt. Post operative VP shunt complication was noted in 28.8% patients. Findings of this study are comparable with our findings. In present study, out of 70 (70%) male patients, complications were seen in 11 (15.71%) patients. Among the 30 (30%) female patients, complications were seen in 9 (30%) patients. Complications were insignificantly associated with gender with p value 0.1726. Though the incidence of hydrocephalus in infancy is showing high values than any other paediatric age, changing trends of shift to higher age group is seen. Male predominance is observed in this series.

In Kumar et al¹³ study, 55.7% were males and 44.3% were females which is not in agreement

with our study. In this study VP shunt infection was noted in 18.1% patient which also in agreement with complication rate of our study. In another study by Theophilus et al,¹⁴ Of the 90 patients studied, 13 (14.4%) patients developed post-operative VP shunt infection. This study has also not shown any influence of gender on VPS infection which is similar with our study. Khan et al¹⁵ managed 113 patients of hydrocephalus with PV shunt and found VP shunt complications in 23% patients. A prospective¹⁶ study of 100 cases of infantile hydrocephalus was conducted at Pakistan Institute of Medical Sciences, Islamabad, Pakistan. All selected patients suffering from congenital and post-meningitic hydrocephalus were operated on for ventriculoperitoneal shunt and on follow up found infection rate as 14%. In one study by Jeelani et al,¹⁷ out of 205 patients, shunt infections developed in 17 patients (8.3%).

CONCLUSION

Results of present study showed slightly higher rate of VP shunt complications in cases of hydrocephalus. Most of the patients were under 2 years but VP shunt complications were not significantly associated with age group. Male patients were found with higher number but complication difference was not statistically significant.

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