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Research Article

DESCRIPTIVE RESEARCH ANALYSIS OF THE SHUNT BLOCKAGE IN VENTRICULO-PERITONEAL (VP) SHUNTS FOR HYDROCEPHALOUS WITH REFERENCE TO AGE, SEX AND INTERVAL OF REPLACEMENT OF VP SHUNT TO REVISION AT MAYO HOSPITAL, LAHORE

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Abstract:

Background: In the established hydrocephalous a common modality of the treatment is ventriculoperitoneal shunt. Our research was aimed at the determination of the age and sex distribution, cause and site and post-operative year of shunt obstruction of the ventriculoperitoneal obstruction blocked VP shunts patients.

Material & Methods: Research design was descriptive and it was carried out at Mayo Hospital, Lahore in the period of Jan, 2016 to Jan, 2017. We included every blocked VP shunt patient in our research study. Age and sex were the demographic; whereas, time from the VP shunt insertion was counted in years, post-operative shunt obstruction year and cause and site of the shunt obstruction were taken as the variables of the research study. To calculate the continuous data, we calculated the values of Mean & SD; whereas, percentage and frequency were also calculated for categorical data.

Results: Research sample consisted of 104 patients, 56 males (53.85%) and 48 females (46.15%). The patient's median age factor was observed as four years (0.58 – 11.75 (IQR)). Below one-year age was involved repeatedly and it was observed in 39 patients (37.5%). Shunt obstruction occurrence was observed in 1st year of the post shunt insertion in 38 patients (36.54%). The occurrence of the Shunt obstruction was observed at the end of ventricular in 57 patients (54.80%); whereas, 47 patients (45.20%) had the blockage of distal catheter. The repeated cause of the blockage of the shunt was observed as lying in brain parenchyma and shunt tip crossing ventricle observed in 20 patients (19.23%).

Conclusion: In the early years of the life the occurrence of the shunt obstruction in VP shunts is common and repeated. Its predominance is observed at the end of proximal. In the first insertion years its occurrence is observed.

Key Words: Hydrocephalous; Cerebrospinal Fluid; Ventriculoperitoneal Shunt; Pleural Cavity; Peritoneal Cavity; Choroid Plexus and Slit Ventricle Syndrome.

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INTRODUCTION:

VP is the repeated modality in the established cases of the hydrocephalus [1]. During this process, the communication of the ventricles is made with the peritoneal cavity through a specific tube for the drainage of the CSF from ventricles to the cavity of peritoneal. For shunt distal part, other cavities such as right heart atrium, gall bladder and pleural cavity can also be used [2].

However, complication is still there in these shunts. Mostly we observed the complications are the infections linked with the VP shunt are obstruction, infection, mechanical failure like failure of the valve, excessive drainage, intra-ventricular hemorrhage and slit ventricle syndrome [3 – 7]. Most common complication is the shunt obstruction. Obstructions can be seen in both distal and proximal catheters [3]. The responsible causes of the VP shunt proximal part obstruction include in choroid plexus growth into the pores of the shunt, collapsed ventricles after the drainage of CSF which causes the channel blockage at ventricular catheter end, brain tissue debris and blood clots. There is a relative less obstruction in the distal catheter [8, 9]. Peritoneal cavity debris, peritoneal cavity absorptive loss ability, tube kinking and peritoneal pseudocysts are reasons behind the obstruction of the distal end [2, 10 – 12]. Shunt blockage is considered as the neurosurgical emergency which requires a prompt treatment and remedial action. There is a serious threat to the life of the patients if the emergency is not handled timely and expertly.

In the established hydrocephalus a common modality of the treatment is ventriculoperitoneal shunt. Our research was aimed at the determination of the age and sex distribution, cause and site and post-operative year of shunt obstruction of the

ventriculoperitoneal obstruction blocked VP shunts patients.

MATERIAL AND METHODS:

Research design was descriptive and it was carried out at Mayo Hospital, Lahore. We included every blocked VP shunt patient in our research study. Age and sex were the demographic; whereas, time from the VP shunt insertion was counted in years, post-operative shunt obstruction year and cause and site of the shunt obstruction were taken as the variables of the research study. To calculate the continuous data, we calculated the values of Mean & SD; whereas, percentage and frequency were also calculated for categorical data. Research sample consisted of 104 patients, 56 males (53.85%) and 48 females (46.15%). Consecutive sampling was used for the collection of the research sample. The patients with broken and infected shunts were not included in the research. Blocked shunt diagnosis was made through history, radiological evidence and examination of obstruction of shunt. History, relevant investigations and clinical examination included FBC, CSF routine assessment, C-reactive protein, brain CT scan and X-Ray shunt series were carried out on all the patients. Emergency operations were carried out in majority of the cases. Clinical shunt reservoir assessment was the initial diagnosis method. Clinical and biochemical analysis of CSF was also carried out. Analysis of the outcomes was carried through SPSS – 19.

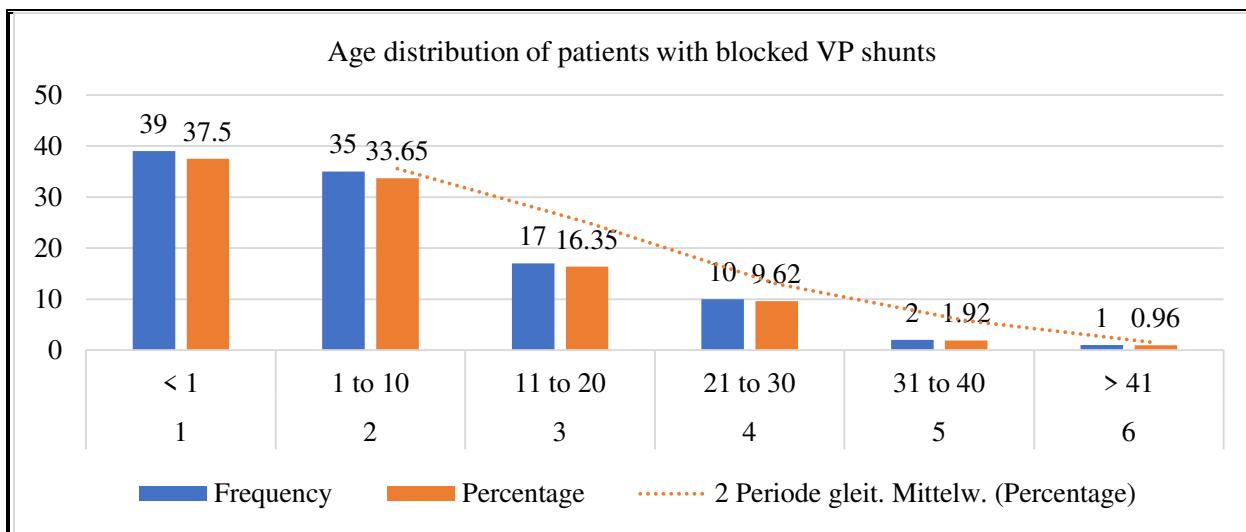
RESULTS

In the research sample male to female ratio was observed as 1.16 to 1 with slight dominance of males over females. Asymmetrical distribution of the age was made, skewness was taken as 1.46, K.S Z as 2.04 and kurtosis as 1.63 with a significant p-value (0.00). Data of the VP shunt duration of insertion was distributed asymmetrically, with skewness, kurtosis, K.S Z and p-value respectively as 5.94, 41.27, 3.17 and 0.00.

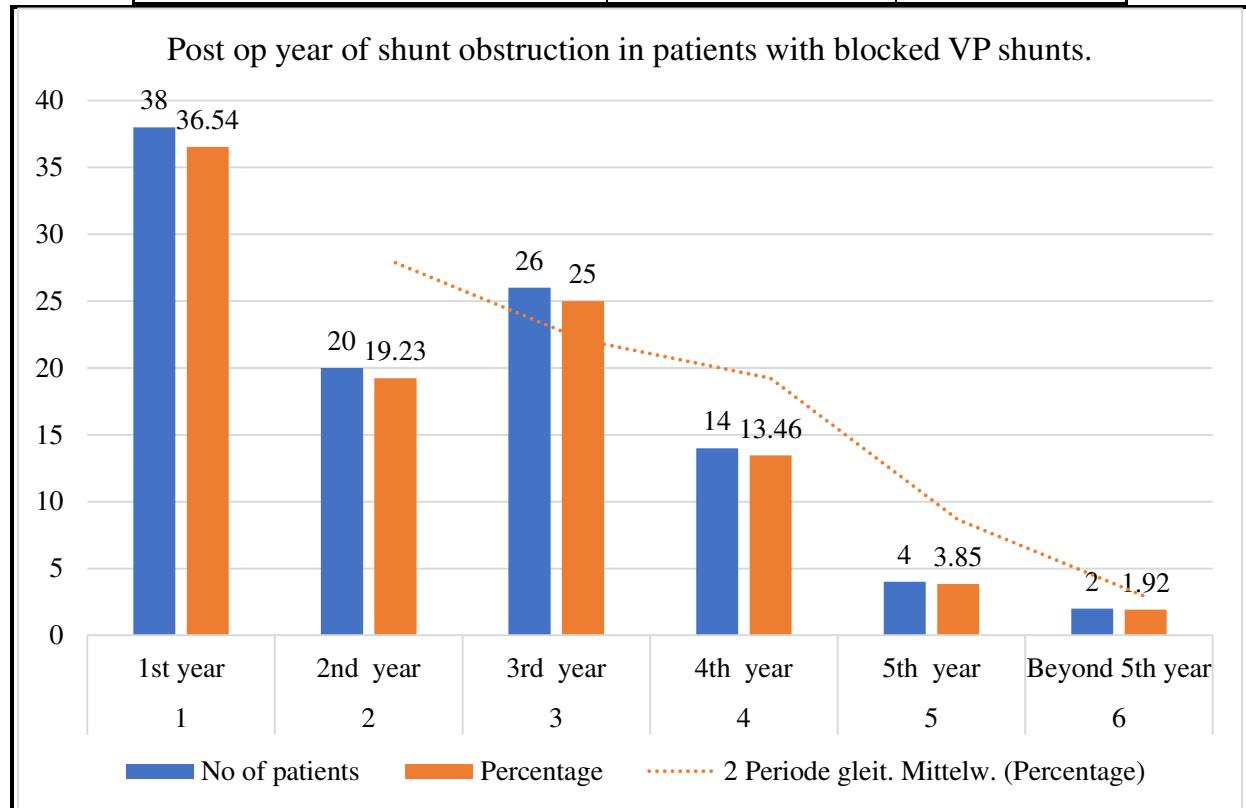
Sample mean age was observed four-years (0.58 – 11.75 (IQR)) with a common age group of below one-year as shown in Table - I.

Table – I: Age distribution of patients with blocked VP shunts.

S. No	Age in years	Frequency	Percentage
1	< 1	39	37.5
2	1 to 10	35	33.65
3	11 to 20	17	16.35
4	21 to 30	10	9.62
5	31 to 40	2	1.92
6	> 41	1	0.96
Total		104	100%

**Table – II:** Post op year of shunt obstruction in patients with blocked VP shunts.

S. No	Post op year	No of patients	Percentage
1	1 st year	38	36.54
2	2 nd year	20	19.23
3	3 rd year	26	25
4	4 th year	14	13.46
5	5 th year	4	3.85
6	Beyond 5 th year	2	1.92
Total		104	100%



VP shunt insertion duration in years in the research sample was observed as (1.37 (0.58 – 2.87 (IQR)) years. It was also seen that majority of the cases of obstruction were seen in the first post shunt insertion year that is 38 patients (36.54%), which has been shown in Table – II.

In the 57 cases the obstruction of the shunt occurred at the end of ventricular (54.80%); whereas, 47 patients (45.20%) had blockage of distal catheter.

The percentage and frequency of various shunt obstruction causes at on both ends has been shown in Table – III.

DISCUSSION:

Most performed hydrocephalous treatment process was ventricular-peritoneal (VP) shunts, which diverts the flow of CSF to the cavity of peritoneal from ventricles. However, there are few complications associated with the VP shunt including the common most complexity of blockage or obstruction of shunt at the proximal end or at the distal end [10, 14].

Table – III: Site & Cause of shunt blockage in patients with blocked VP shunts.

Site of blocked shunt	Cause of shunt blockage	Frequency	Percentage
Ventricular end	Shunt tip crossed the ventricle and lies in brain parenchyma	20	19.23
	Shortened ventricular catheter due to decrease in ventricular size	12	11.54
	Floating and impaction of catheter to the roof of lateral ventricle	11	10.58
	Tissue debris	14	13.46
Abdominal end	Debris in distal catheter	23	22.11
	Kinked distal catheter	18	17.31
	Abdominal Pseudocyst	6	5.77
Total		104	100%

In the previous large-scale research studies, it has been stated that 56% VP shunts cases experienced a minimum of one shunt obstruction episode in twelve years' time span which was followed by insertion of the shunt [15]. Lazareff is of the view that 44% shunt blockage prevalence in a total of 244 patients which followed a six years post shunt insertion [16]. Shunt blockage occurs commonly in 1st insertion year and according to few other authors this incidence has been reported up to twenty percent [17]. Rekate has observed five percent shunt blockage annually [18]. We observed in our research that 38 patients (36.54%) showed the obstruction of the shunt in the very first insertion year; whereas, 20 patients (19.23%) blockage of the shunt was observed in the 2nd year of the replacement of the shunt. Our outcomes are same as observed by the national level research studies [12].

There is a report of the five percent distal catheter complication frequency to a range of forty-seven percent in the internationally available literature [8, 9]. Hussain in his locally held research shares that the

obstruction site is peritoneal end [12]. We observed that 57 patients (54.80%) have the obstruction of the proximal and 47 patients (45.20%) suffered the blockage of the distal catheter, these outcomes are also same as observed previously [17, 18]. The reason behind the distal end shunt obstruction is Pseudocyst which was observed in 1 – 4.5% of the patients [10, 11, 19]. We observed the same incidence of formation of pseudocyst formation in six cases which results in the shape of blockage of the shunt (5.77%).

The duration from replacement of VP shunt to blockage development varies in numerous research studies as few of the studies have reported this time from three weeks to a maximum of five years [20]. We observed this interval between replacement of VP shunt and revision in the range of ten days to a maximum of fifteen years.

CONCLUSION:

In the early years of the life the occurrence of the shunt obstruction in VP shunts is common and

repeated. Its predominance is observed at the end of proximal. In the first insertion years its occurrence is observed.

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