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STUDY OF EARLY VENTRICULO-PERITONEAL (VP) SHUNT INFECTION FOLLOWING SHUNT PLACEMENT FOR HYDROCEPHALOUS IN CHILDREN

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ABSTRACT

Background: Ventriculo peritoneal (VP) shunt placement is a common procedure for hydrocephalus in all age group. VP shunt infection is a major concern for treating surgeons and physicians. Malfunctioning of the shunt is a common consequences following shunt infection. Hydrocephalus is a common neurosurgical problem and treated commonly with ventriculo-peritoneal shunt. Hydrocephalus was diagnosed clinically by history, sign and symptoms and was confirmed by CT scan or MRI of brain. In this study we have diagnosed early shunt infection by analyzing the signs and symptoms following shunt placement that will help in early detection of shunt infection and faster management. **Methods:** This is a prospective interventional study. The study was done from January 2019 to December 2021 in Bangladesh Shishu Hospital & Institute (BSH&I). Sixty patients were underwent VP shunt placement for hydrocephalus (HCP). They were followed up to 30 days after surgery. They were evaluated with presence of undue continuous fever, signs of infection along the shunt on the absence of other causes, indication of infection along the shunt tract or incision site and signs of meningeal irritation or peritonitis. **Results:** Out of sixty patients underwent for VP shunt placement, fourteen (23.33%) patients had VP shunt infection. This is more in the neonatal and early infant age group (up to 2 months) and young child age group. Higher incidence of shunt infection also in the lower socioeconomic group. Most patients had fever, headache and neck rigidity. **Conclusion:** VP shunt placement is a common and popular procedure for CSF diversion for hydrocephalousin children Shunt infection reduces the success of this surgery.

KEYWORDS: Hydrocephalus, VP shunt infection, signs and symptoms of meningitis and ventriculo-meningitis.

INTRODUCTION

Hydrocephalus is defined as an abnormal enlargement of the ventricles due to an excessive accumulation of CSF from a disturbance of its flow, absorption or uncommonly, secretion.[1] Ventriculoperitoneal shunt catheter placement is a relatively common neurosurgical procedure, performed for the treatment of hydrocephalus as well as for associated conditions in which the natural flow of cerebrospinal fluid is obstructed.[2] According of McGirt et al. the signs of shunt infection are meningitis, ventriculitis, CSF leak from wound. Skin infection-anywhere along the tract, peritonitis, seizure disorder.[3]

Trojanowski had commented that between 5 and 15% of the devces become infected, of which more than a half within the rest month after surgery.[4] Ahmed et al. have studied complications on fifty patients. Of these 6 (12%) patients had shunt infection.[5] Drake and lantosca reported that the incidence of shunt infection is approximately 5% -10%. Bokhary and Kamal incidence rate is nearly 10%.[7] Kinasha et al. in their study in Tanzania reported the shunt infection rate about 24.6%. McGirt et al. had concluded from their observation that shunt infection occurred in 11% of cases (92 of 820).[3] Leach and kerr had reported that shunt infection should be within 1% and 7% of shunt insertions.[9]

METHODOLOGY

A prospective interventional study was conducted in the Faculty of Paediatric Surgery in Bangladesh Shishu Hospital and Institute (BSH&I) from January 2019 to December 2021. A total of 60 patients (n=60) who were

diagnosed as hydrocephalus by history, clinical examination imaging method (USG of brain, CT scan or MRI of brain). Figure -1 & 2. All the patients were underwent VP shunt placement under general anesthesia (GA). In all patients chabra medium pressure VP shunt system were used.

Fig-1: A baby of hydrocephalous with large head

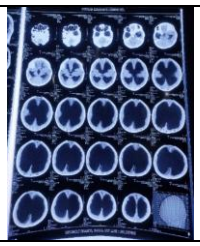

Fig-2: CT scan of brain showing severe form of ventriculomegaly

Shunt infection was defined if at least one of the following criteria was present.

1. Presence of undue continuous fever in the absence of other causes.
2. Signs of infection along the shunt tract or incision site.
3. Signs of meningeal irritation or peritonitis.

Exclusion criteria

• Patients with pre-operative undue continuous fever or any other focus of infection.

• Patients with other surgical and medical problems e.g. ruptured meningocele or myelomeningocele, valvular heart disease, renal impairment, and diabetes mellitus.

• Patients who had previous CSF diversion surgery e.g. Endoscopic third ventriculostomy (ETV), external ventricular drainage (EVD).

RESULTS

A total of sixty patients were underwent VP shunt placement and were included in the analysis for early infection after shunt placement. All the data were properly collected and evaluation were done. The results and observations from analysis of data were presented in tables and figures. Data were expressed in numbers or percentage as applicable.

Table-I: Age distribution of the patients (n=60)

Age (months)	Frequency		Total
	Shunt Infection	No Shunt Infection	
0-2	4	12	**16**
>2-6	2	10	**12**
>6-12	2	6	**8**
>12-36	2	8	**10**
>36	4	10	**14**
Total	**14**	**46**	**60**

From this table we can see that shut infection is more up to 2 months and more than 3 months.

Table-II: Sex distribution of the patients (n=60)

Variables	Male	Female	Total
Shunt infection	8	6	14
No shunt infection	32	14	46
Total	40	20	60

From the table-2 we can say that shunt infection all most equally affected in both male and female In the table we can see that 4 male patients and 3 female.

Figure-3: Early infection of VP shunt placement with bulged anterior fontanelle.

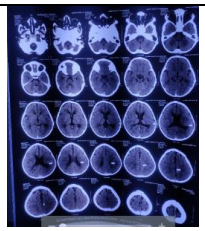

Figure-4: CT scan of a post VP shunt placement.

Table-III: Distribution of incidence of post-operative morbidity

Post operative complications	Total	Percentage
Persisting Fever	14	23.33%
Surgical site infection	10	16.66%
Shunt tract infection	10	16.66%
Skin necrosis	2	3.33%
Headache	12	20%
Vomiting	12	20%
Neck rigidity	2	3.33%
Shunt block	2	3.33%
Peritonitis	4	6.66%

From the above table it is seen that seven patients (23.33%) developed persisting fever. SSI occurred in 5 patients (16.66%). Four patients (13.33%) had shunt tract infection and only one patient had shunt tract infection and only one patient had skin necrosis. Headache and vomiting was present in 6 patients (20%), neck rigidity was present in 6 patients(20%) neck rigidity was present in one patient and shunt block occurred in one patient. Two patients (6.66) developed signs of peritonitis.

Table-IV: Distribution of incidence of sings symptoms of ventriculomeningitis

Age (months)	Vomiting	Headache	Continuous fever
0-2	6	4	**6**
>2-6	2	2	**2**
>6-12	0	0	**0**
>12-36	2	4	**4**
>36	2	2	**2**
Total	**12**	**12**	**14**

From the above table it is seen that total 6 patients had vomiting in the post operative period. 3 patients were under the age of 2 years. In this table 6 patients were under the age of 2 years. In this table 6 patients also headache. Most patients were above 12 years of age (66.67%). It also shows that total 7 patients had non-remitting fever.

Table-V: Distribution of incidence of surgical site infection (n=6)

Age in years	SSI	Neck rigidity	Peritonitis
0-2	6	0	2
>2-6	4	0	2
>6-12	0	2	0
>12-36	2	0	0
>36	0	0	0
Total	12	2	4

From the above table we can see that six patients had surgical site infection, one patient had neck rigidity and two patients had signs of peritonitis.

From this above chart it is seen that shunt infection occurred in seven patients out of thirty patients. This was about 23.33%.

DISCUSSION

A prospective interventional study was conducted in the Faculty of Paediatric Surgery in Bangladesh Shishu Hospital and Institute (BSH&I) total sixty patients were included in the study who were underwent VP shunt placement for hydrocephalous and were analyzed for early shunt infection. In our study age range was from

birth to >36 months. Majority of patients (40) were male in sex distribution. More than 25% patients got shunt infection in our study. Chous et. al.in 1992 had difined post-operative shunt infection as an infection confirmed within six months of operation and was diagnosed it there was inflammation along the length of shunt, wound discharge or wound dehiscence. Signs of meningitis, ventricultiis or non-focal systemic indication of infection were also investigated for shunt infection10. In this study, 10 patients (16.66%) had these signs. Signs of meningitis was present in one patient. Five patients had headache and vomiting. Kontny et al. had mentioned that the main sign and symptoms were fever, shunt malfunction and meningeal irritation, and with VP shunts only abdominal pain11 Fourteen patients had fever in this study following as most important clinical features of shunt infection: general malaise, pyrexia, headaches, vomiting, neck stiffness, abdominal tenderness or distension, recurrent lower end shunt obstruction, occasionally pain and erythema around the shunt12. In our study fourteen patients (23.33%) had pyrexia. Ten patients (16.66%) had shunt malfunction and peritonitis in four patients (6.66%). The distribution of the shunt infection is congruent with the patients of the other studies.

CONCLUSION

VP shunt placement is a common and popular procedure for CSF diversion for hydrocephalous in children Shunt infection reduces the success of this surgery. If we can early diagnose the shunt infection then we can take very prompt and accurate measurement for managing the early infected diagnosed VP shunt patients. Therefore we can reduce the morbidity as well as mortality of shunt surgery.

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