Signs and Symptoms of Early VP Shunt Infection in a Tertiary Hospital

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Abstract:

Background: *VP shunt infection is a major concern for the treating surgeon. Shunt infection causes shunt malfunction and is source of much morbidity for the patient.*

Introduction: *Hydrocephalus was diagnosed in patients clinically by history, symptoms and signs. This was confirmed by CT and/or MRI scans and was treated with ventriculoperitoneal shunt system. In this study we have analyzed signs and symptoms of early shunt infection. That will help in early detection of shunt infection and faster management.*

Methods: *This is an observational study. The study was done from September 2008 up to January 2010 in BSMMU. Thirty patients were operated on. They were followed up to 15 days after surgery. They were evaluated with presence of non-remitting fever in the absence of other causes, indication of infection along the shunt tract or incision site and signs of meningeal irritation or peritonitis.*

Result: *Seven patients of the thirty patients treated with ventriculoperitoneal shunt surgery had VP shunt infection. That is 23.33% of patients. This is more in the young and elderly age group. It was also more at the lower socioeconomic age group. Most patients had fever, headache and neck rigidity.*

Key Words: *Hydrocephalus, ventriculomegaly, shunt infection, headache, papilledema, meningitis, ventriculitis, ventriculoperitoneal shunt.*

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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 to 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 devices 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 Iantosca reported that the incidence of shunt infection is approximately 5%- 10%[6]. 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%[8]. 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].

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Materials and Method:

This is an observational study. This was conducted from 01-07-2008 to 17-05-2010. All patients were admitted in the BSMMU Hospital for ventriculoperitoneal shunt surgery. Patients who met the inclusion criteria from all age groups were included in the study. Number of patients were thirty (*n*=30).

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

1. Presence of non-remitting fever in the absence of other causes
2. Indication of infection along the shunt tract or incision site
3. Signs of meningeal irritation or peritonitis.

- Shunt system used: In all patients we used Chhabra medium pressure ventriculoperitoneal shunt system (Surgiwear Inc.)

- Inclusion criteria:

  All patients with ventriculomegaly in imaging and signs of hydrocephalus undergoing ventriculoperitoneal shunt surgery were selected.

- Exclusion criteria:
  - Patients with preoperative fever or any other focus of infection
  - Patients with other medical problems e.g., diabetes mellitus, valvular heart disease, renal impairment and ruptured meningocele.
  - Patients who had previous CSF diversion surgery (e.g. ETV, EVD)

Results:

After proper collection and processing of samples, the data is analyzed. The results and observations from the analysis were presented in tables and figures. Data were expressed in numbers or percentage as appropriate.

Table-I

Distribution of the patients by age

Age in years	Frequency		Total
	Shunt infection	No shunt infection	
0-2	2	6	8
2-12	1	5	6
12-30	1	3	4
30-50	1	4	5
>50	2	5	7
Total	7	23	30

From this table we can see that shut infection is more in the below 12 years and more than 50 years.

Table-II

Distribution of the patients by sex

Variables	Male	Female	Total
Shunt infection	4	3	7
No shunt infection	16	7	23
Total	20	10	30

In this table we can see that 4 male patients and 3 female patients had shunt infection.

Table-III

Distribution of the patients by post-operative morbidity

Post operative complications	Total	Percentage
Persisting Fever	07	23.33%
Surgical site infection	05	16.66%
Shunt tract infection	05	16.66%
Skin necrosis	1	3.33%
Headache	6	20%
Vomiting	6	20%
Neck rigidity	1	3.33%
Shunt block	1	3.33%
Peritonitis	2	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 skin necrosis. Headache and vomiting 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 the patients by post-operative vomiting, headacheand non-remitting fever

Age in years	Vomiting	Headache	Non-remitting fever
0-2	3	2	3
2-12	1	1	1
12-30	0	0	0
30-50	1	2	2
>50	1	1	1
Total	6	6	7

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 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 the patients by surgical site infection (n=6)

Age in years	SSI	Neck rigidity	Peritonitis
0-2	3	0	1
2-12	2	0	1
12-30	0	1	0
30-50	1	0	0
>50	0	0	0
Total	6	1	2

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.

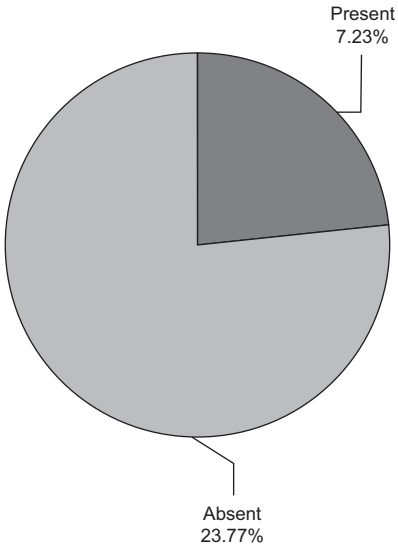

Fig.-1: *Distribution of the patients by shunt infection in all patients (n=30).*

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

Discussion:

Choux et al. in 1992 had defined post-operative shunt infection as an infection confirmed within six months of operation and was diagnosed if there was inflammation along the length of shunt, wound discharge or wound dehiscence. Signs of meningitis, ventriculitis or non-focal systemic indication of infection were also investigated for shunt infection[10]. In this study, 5 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 pain[11]. Seven patients had fever in this study following shunt insertion. Pople in 2002 had suggested the 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 shunt[12]. In our study seven patients (23.33%) had pyrexia, five patients (16.66%) had shunt malfunction and peritonitis in two patients (6.66%). The distribution of the shunt infection is congruent with the patients of the other studies.

Conclusion:

Ventriculoperitoneal shunt surgery is a common procedure. Shunt infection can reduce the success of this surgery. If we can diagnose the shunt infection early, then we can reduce morbidity as well as mortality of these patients. Therefore, we have to diagnose shunt infection very quickly and accurately and take necessary measures for benefit of the patient.

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