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A STUDY OF CLINICAL FEATURES AND OUTCOME OF PATIENTS WITH HYDROCEPHALUS FOLLOWING VENTRICULOPERITONEAL SHUNT SURGERY: A CASE SERIES STUDY

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ABSTRACT
Background: Hydrocephalus is one of the most common neurologic sequelae following insult to the central nervous system. The commonest procedure for CSF diversion being Ventriculoperitoneal (VP) shunt surgery, we conducted this study with objective of studying the clinical profile and outcome of VP shunt surgery among patients diagnosed to have hydrocephalus.Methodology: A case series study of fifty diagnosed cases with hydrocephalus were studied in setting of tertiary care hospital in the department of Neurosurgery at Vijayanagara Institute of Medical Sciences, Ballari, Karnataka during the period of June 2013 to May 2015. Among the selected patients the clinical profile with respect to age, sex, symptoms, etiology were studied. All the patients underwent VP shunt surgery. The patients were followed to observe the outcome. Appropriate descriptive statistics were used to analyse the findings and to draw the inferences. Results: The common aetiologies include congenital hydrocephalus (40%), Tubercular meningitis with hydrocephalus (18%), Traumatic hydrocephalus (18%), post meningitic hydrocephalus (14%) followed few cases of neurocysticercosis (2 cases), aqueductal stenosis (2 cases) and posterior fossa tumor (1 case). Mortality was seen in 2 cases, shunt infection in 3 cases, traumatic infection in 1 case and abdominal CSF cyst in 1 case. Conclusion: Ventriculoperitoneal shunting is effective in the management of patients with hydrocephalus and outcome depends upon the cause of hydrocephalus.

INTRODUCTION

Hydrocephalus is and excessive accumulation of cerebrospinal fluid (CSF) within the head caused by a disturbance of formation, flow or absorption [1]. The introduction of various shunting and bypassing operations has transformed the management of hydrocephalus [2]. Most shunts drain the excess cerebrospinal fluid into the peritoneal cavity (ventriculo-peritoneal shunt), but alternative sites include the right atrium (ventriculo-atrial shunt), and pleural cavi-ty (ventriculopleural shunt) [3]. Ventriculoperitoneal shunt surgery is commonest form of the CSF diversion procedures for hydrocephalus [4]. Ventriculoperitoneal (VP) shunt surgery is the predominant mode of therapy for patients with hydrocephalus. However, it has potential complications that may require multiple surgical procedures during a patient's lifetime. Outcome following VP shunt surgery depends on many factors. Aim of this study is to study the clinical profile and to determine the success rate of VP shunt for treating hydrocephalus.

METHODOLOGY

A case series study of fifty diagnosed cases with hydrocephalus were studied in setting of tertiary care hospital in the department of Neurosurgery at Vijayanagara

Institute of Medical Sciences, Ballari, Karnataka during the period of June 2013 to May 2015. Among the selected patients the clinical profile with respect to age, sex, symptoms, etiology were studied. All the patients underwent VP shunt surgery. The patients were followed to observe the outcome. All the patients were investigated systematically through various diagnostic tests; blood profile was evaluated with complete blood count. Cerebrospinal fluid examination was done each patient and other investigations depending upon provisional diagnosis of the patients. Radiological investigations like X-Ray chest, CT scan/MRI or both were done for all the patients. Neurosurgical procedure was done as per the required intervention according to the neurosurgi-cal diagnosis of the patient and the evidence based practice. After neurosurgical intervention the patients were followed and assessed for the outcome radiologically and clinically.

The collected data of different variables was entered into an excel sheet and after data cleaning it was analysed using SPSS software version 20. Appropriate descriptive statistics were used to analyse the findings and to draw the inferences.

RESULTS

A total of 50 patients were included in the study. Age of the patients ranged from 1 month to 65 years with median age of 2 years. There were 28 (56%) male and 22 (44%) female patients. On clinical assessment the common symptoms were headache (54%), drowsiness (46%) followed by nausea/vomiting (8%), visual disturbances (4%), irritability and disorientation.

Diagnostic investigations were done in all the patients where in Cranial imaging investigations included CT scan with or without con-trast and MRI of the brain with or without contrast and MR spectroscopy. The common etiologies include congenital hydrocephalus (40%), Tubercular meningitis with hydrocephalus (18%), Traumatic hydrocephalus (18%), post meningitic hydrocephalus (14%) followed few cases of neurocysticercosis (2 cases), aqueductal stenosis (2 cases) and posterior fossa tumor (1 case). Mortality was seen in 2 cases, shunt infection in 3 cases, traumatic infection in 1 case and abdominal CSF cyst in 1 case (Table no. 01).

Two patients died during follow up due to non-surgical reasons one being cardiopulmonary failure and other being severe head injury. Three of the patients had shunt infection and one of the patient developed traumatic infection. One female child developed CSF pseudocyst in the abdomen. In the remaining patients (86%) outcome was uneventful.

Table 1. Clinical Profile of the patients with Hydrocephalus (N=50)

Variable		Frequency	Percent
Age group	Infants	15	30.0
	1 - 5 yrs	15	30.0
	6 - 15 yrs	11	22.0
	16 - 25 yrs	4	8.0
	> 25 yrs	5	10.0
Sex	Male	28	56.0
	Female	22	44.0
Symptoms	Drowsiness	23	46.0
	Headache	27	54.0
	Disorientation	1	2.0
	Drowsiness	1	2.0
	Visual/gaze disturbances	2	4.0
	Irritability	1	2.0
	Nausea/vomiting	4	8.0
Etiology	Congenital HCP	20	40.0
	Tubercular Meningitis with HCP	9	18.0
	Traumatic HCP	9	18.0
	Post meningitic HCP	7	14.0
	Neurocysticercosis with HCP	2	4.0
	Aqueductal stenosis	2	4.0

	Posterior fossa tumour with HCP	1	2.0

Table 2. Outcome of the patients after VP shunt surgery

Complications	Frequency	Percent
CSF cyst in abdomen	1	2.0
Death	2	4.0
Shunt infection	3	6.0
Traumatic infection	1	2.0
Uneventful	43	86.0
Total	50	100.0

Figure 1. Hydrocephalus showing dilated frontal and occipital horns

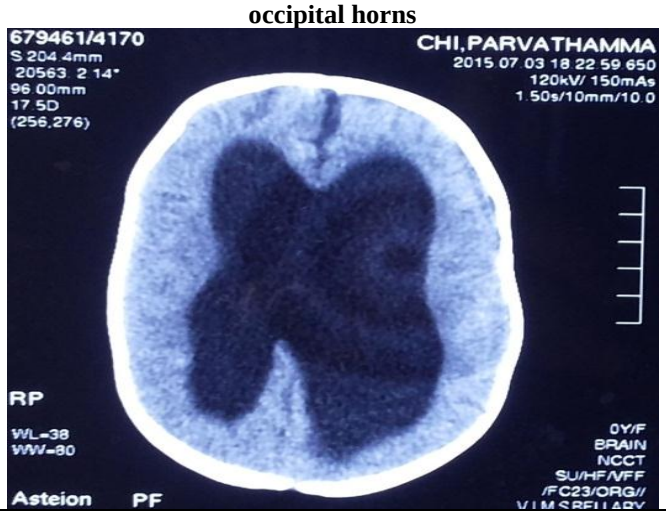


Figure 2. Hydrocephalus with Aqueductal stenosis

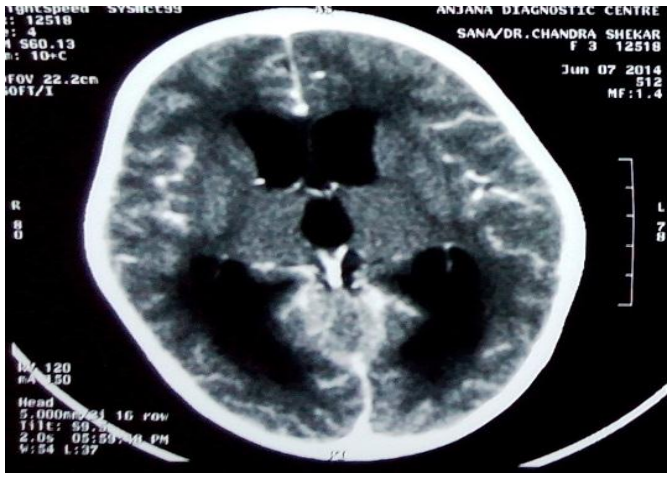
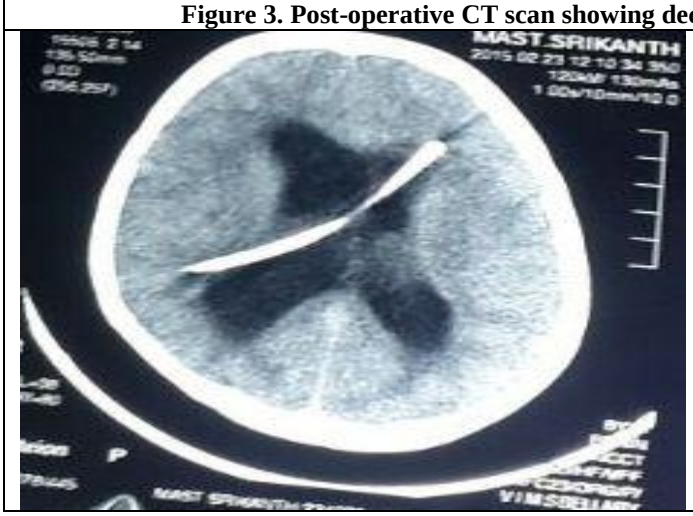
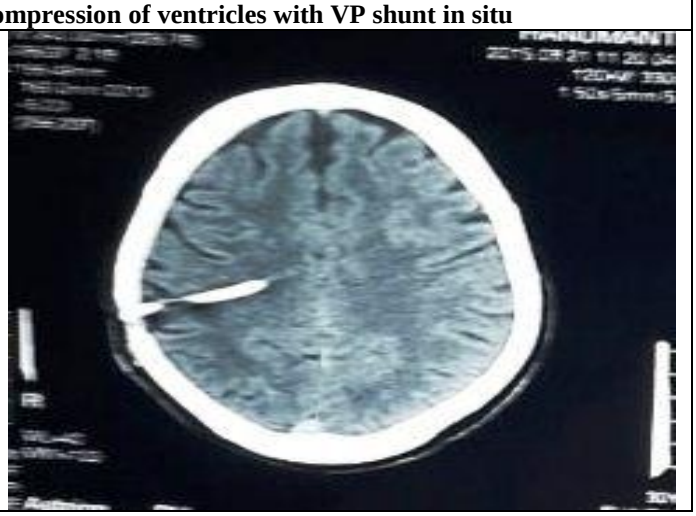


Figure 3. Post-operative CT scan showing decompression of ventricles with VP shunt in situ





DISCUSSION

The diagnosis of hydrocephalus is based on clinical features, radiologic appearances, and occasionally intracranial pressure recordings however CT scan brain and MRI brain are the preferred method in the detection of parenchymal lesions and in revealing the aetiology of the hydrocephalus [5]. The incidence of hydrocephalus exhibits bimodal presentation where in one peak occurs in infancy and is related to the various forms of congenital malformations. Another peak occurs in adulthood, mostly resulting from Normal Pressure Hydrocephalus (NPH). Adult hydrocephalus represents approximately 40% of total cases of hydrocephalus. Generally, incidence is equal

in males and females. NPH has a slight male preponderance [4]. The majority of cases in most published series are infants with spina bifida or other malformations. In the one of the series [2] reported 41% of the patients were aged under 1 year, 25.9% were aged 1 to 15 years, and 30.0% were aged over 15 years. Similar age wise distribution was observed in our series where in 30% of them were infants another 30% were in the age group of 1-5 years and 22% of them in the age group of 6-15 years.

In one of the series reported [6] post meningitic hydrocephalus was the commonest cause of hydrocephalus (48%) followed by congenital hydrocephalus (11%). But in our series congenital hydrocephalus, Tubercular Meningitis and traumatic hydrocephalus were common followed by post meningitic hydrocephalus. This difference may due the variation in the age distribution of the patients. Apart from congenital malformations as a cause of hydrocephalus there are some acquired causes like tumours, cysts, inflammatory conditions like meningitis, granulomatous conditions and absorption blockages like intracranial haemorrhages ie NPH [1].

The introduction of various shunting and bypassing operations has transformed the management of hydrocephalus [2]. Most shunts drain the excess cerebrospinal fluid into the peritoneal cavity (ventriculo-peritoneal shunt), but alternative sites include the right atrium (ventriculo-atrial shunt), and pleural cavi-ty (ventriculopleural shunt) [3]. Ventriculoperitoneal shunt surgery is commonest form of the CSF diversion procedures for hydrocephalus [4].

The development of shunt devices has greatly improved the survival and quality of life of patients with hydrocephalus [3]. In 1922, Dandy [7] described an open ventriculostomy proce-dure performed via a lateral subtemporal approach, but the mortal-ity rate was high. In 1923, Mixter [8] described the endoscopic perforation of the floor of the third ventricle, endoscopic third ventriculostomy (ETV), but it was not a success because of technical problems and complications and for many decades ETV was not used. Around 1960, the use of shunts became more common, as materials and techniques had improved. The use of modern shunts resulted in a reduction in mortality from 50% to about 10% [9].

Surgical treatment is the preferred therapeutic option. The commonly used surgical procedures are ventriculoperitoneal shunt, endoscopic third ventriculostomy and external ventricular drainage [10]. Ventriculoperitoneal (VP) shunt surgery is the predominant mode of therapy for patients with hydrocephalus. However, it has potential complications that may require multiple surgical procedures during a patient's lifetime. Outcome following VP shunt surgery depends on many factors. The common complications are malposition (Misplacement) of ventricular end, shunt obstruction (blockage), shunt infection, disconnection, shunt migration, over drainage, hemorrhage (extradural, subdural and intracerebral he-matoma), abdominal pseudocyst, and shunt extrusion.

Some of the studies suggest that age at shunt placement, etiology of hydrocephalus, type of hydrocephalus, and previous treatments before shunt surgery were independently significantly associated with the shunt survival [11] and patients with increased age, prolonged hospital stay, GCS score of less than 13, extra-ventricular drains in situ, or excision of brain tumours were more likely to experience early shunt malfunction [12]. In another study concluded that among paediatric patients with meningitis, aqueductal stenosis, postcranial surgery hydrocephalus, congenital abnormalities, and a past history of surgical excision of mass lesion may have early shunt failure [13].

CONCLUSIONS

Ventriculoperitoneal shunting is effective in the management of patients with hydrocephalus and outcome depends upon the age and cause, type of hydrocephalus.

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Conflict of interest: Nil.

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