

Frequency and Pattern of Early Complications after Endoscopic Third Ventriculostomy in Obstructive Hydrocephalus

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ABSTRACT

Objective: The aim of this study is to determine the frequency of complication among patients after endoscopic third ventriculostomy in obstructive hydrocephalus.

Study Design: Descriptive study

Place and Duration: Conducted at the department of Neurosurgery, Bacha Khan Medical College Mardan/ Medical Complex Mardan and Frontier Medical and Dental College, Abbottabad for duration of 06 months from April 2021 to September 2021.

Methods: There were one hundred and fifteen patients of both genders with ages 1-40 years were presented. Included patients had obstructive hydrocephalus. Detailed demographics, including age, sex, and BMI, were obtained from all patients with signed permission. Patients underwent CT scan and brain MRI. Endoscopic third ventriculostomy was performed among all the cases after indication of symptoms. Post-treatment effectiveness and complication were assessed after follow up within duration of 2-weeks. SPSS 25.0 version was used to analyze all data.

Results: Mean age of the patients was 6.2 ±3.25 years. Among 115 cases, 70 (60.9%) were males and 45 (29.1%) were female patients. Aqueductal stenosis was the most common disease found in 77 (67%) cases followed by posterior fossa tumours 20 (17.4%), VP shunt blocked in 17 (14.8%) and CSF ascites in 3 (2.6%) cases. We found complications in 24 (20.9%) cases CSF leak was the most common found in 12 (10.4%) cases, meningitis in 4 (3.5%), seizures and bleeding in 3 (2.6%). Mortality found in 2 (1.7%) cases.

Conclusion: We concluded in this study that the endoscopic third ventriculostomy is an effective and safe method for the patients of obstructive hydrocephalus in terms of minimum complication with lower rate of mortality.

Keywords: Endoscopic Third Ventriculostomy, Obstructive Hydrocephalus, Mortality, Complications

INTRODUCTION

Hydrocephalus is a condition in which excess cerebrospinal fluid (CSF) accumulates in the brain's ventricular system. It's possible that the causes are obstructive or non-obstructive. Obstructions may be caused by space-consuming lesions, congenital lesions, and other conditions.. As an example of non-obstructive reasons, we may think of infections and bleeding (from trauma or not). VP shunts, which are the conventional therapy, are subject to infection and obstruction, which are both regular occurrences. Endocrinal third ventriculostomy is an alternative to the use of a ventricular perfusion shunt (ETV). For patients with hydrocephalus, long-term extra cranial shunting may lead to infections. A third ventriculostomy, or cerebral cerebrospinal fluid diversion, may be used to treat patients without causing severe morbidity. [1] The endoscope is inserted via a burr hole immediately anterior to the coronal suture in this procedure. Creating a tiny hole in the 3rd ventricle's floor accomplishes this goal. [2] In favour of extra cranial treatments, Dandy's ventriculostomy was abandoned. In certain circumstances, ventriculostomy is now regarded a feasible alternative to open surgery. [3,4] 10 Hydrocephalus that has been transformed from non-communicating to communicative in patients who have had a third ventriculostomy and shunts

is predicted to be less reliant on shunts in the future.... This usually doesn't have a fast onset or very high intracranial pressure levels. [5-8]

Third ventri-culostomy endoscopy is a possible alternative therapy (ETV).[9] In 1923, Mixter et al. successfully accomplished ETV.[10] When the blockage is located at or beyond the posterior half of the 3rd ventricle, it is most often used to treat individuals with obstructive hydrocephalus (OH). Pineal tumours are the most prevalent sign of ETV. It is also possible to have ETV in the absence of any of these three conditions. [11] Hydrocephalus after an infection may benefit from ETV, according to certain research. 6 [12] In terms of hydrocephalus therapy, ETV is a simple and straightforward option. Rather of attempting to clear a blockage at its source, ETV works around it by directing CSF to the inter-peduncular and pre-pontine cisterns.

The ETV has a complication rate of 2–15 percent in the literature, with just a few cases of persistent debilitation. There have been reports of eye palsy, fever, altered awareness, diabetes insipidus, early puberty, hemiparesis, memory problems, weight gain, and bleeding as side effects.[13] Some other researchers in this field have noted complications such as intraventricular, intracerebral, or subdural haemorrhage, hypothalamic injury, CSF

leakage, basilar artery injury, central nervous system infections (CNS infections), subdural hygroma or hematoma, headache caused by subdural accumulation of air in frontal cortex, and epilepsy, with an 8.5% complication rate. [14,15]

Patients with obstructive hydrocephalus were the focus of this research in order to see how the ETV surgery went and what issues could arise as a result. To determine whether the quality of treatment provided to patients with obstructive hydrocephalus has improved.

MATERIAL AND METHODS

This descriptive study was conducted at the department of Neurosurgery, Bacha Khan Medical College Mardan/ Medical Complex Mardan and Frontier Medical and Dental College, Abbottabad for duration of 06 months from April 2021 to September 2021 and comprised of 115 patients. Detailed demographics, including age, sex and BMI were obtained from all patients with signed permission. Excluded from the research were individuals with lesions in the third ventricular floor, as well as those who had less than seven millimetres of third ventricular size detected by computed tomography scans.

Included patients had obstructive hydrocephalus with ages 1-40 years. The patients had a thorough medical history, physical examination, and baseline tests such as CT scans in all cases and MRI brain scans in the case of individuals who could afford it. Following optimization for general anaesthetic, all research subjects were placed on the next available operating room list. An individual neurosurgeon with a minimum of five years of post-fellowship experience conducted surgery on the next available elective list. The patients were subsequently monitored for CSF leak, wound infection, meningitis, seizures, haemorrhage, and in-hospital mortality for a total of 14 days after the operation to ensure that none of these complications occurred. Treatment for these problems included the use of wound swabs and a CT scan of the brain.

SPSS 25.0 version was used to analyze all data. The mean standard deviation (SD) was determined for quantitative data like age. While for categorical variables like gender, total complications, and pattern of problems (CSF leak, wound infection, meningitis, seizures, bleeding, and in hospital mortality), frequencies and percentages were estimated. We used a chi square test with a p value of 0.05 to determine if the impact modification was significant when stratifying by gender and age for complications and pattern of problem.

RESULTS

Mean age of the patients was 6.2 ±3.25 years. Among 115 cases, 70 (60.9%) were males and 45 (29.1%) were female patients.(table 1)

Table 1: Characteristics of enrolled cases

Variables	Frequency	%age
Mean age (years)	6.2 ±3.25	
Sex		
Male	70	60.9
Female	45	29.1

Aqueductal stenosis was the most common disease found in 77 (67%) cases followed by posterior fossa tumors 20 (17.4%), VP shunt blocked in 17 (14.8%) and CSF ascites in 3 (2.6%) cases.(table 2)

Table 2: Indication of ventriculostomy by disease association

Variables	Frequency	%age
Diseases		
Aqueductal stenosis	77	67
Posterior fossa tumors	20	17.4
VP shunt blocked	17	14.8
CSF ascites	3	2.6

We found complications in 24 (20.9%) cases CSF leak was the most common found in 12 (10.4%) cases, meningitis in 4 (3.5%), seizures and bleeding in 3 (2.6%). Mortality found in 2 (1.7%) cases.(table 3)

Table 3: Association of complication after endoscopic ventriculostomy

Variables	Frequency	%age
Complications		
Yes	24	20.9
No	91	79.1
Type of complications		
CSF Leak	12	10.4
Meningitis	4	3.5
Seizures	3	2.6
Bleeding	3	2.6
Mortality	2	1.7

DISCUSSION

One to two percent of the population suffers from hydrocephalus. Intracranial or extracranial diversion was part of the standard treatment regimen. [16] A lot has happened in shunt technology recently, yet treating hydrocephalus is still difficult, leading neurosurgeons to look for other possibilities. Hydrocephalus is often treated by CSF shunting. It has been shown that patients with CSF shunting have issues with drainage (obstruction, disconnection), drainage (overflow), and infection. [17] In the treatment of hydrocephalus, the focus is shifting from shunts to endoscopic approaches. [18] Small burr holes provide quick access without the requirement for brain retraction. A cure for hydrocephalus is impossible. [19] Endoscopes and other blunt instruments are often used to create the ventriculostomy, such as guide wires, forceps with closed jaws, laser fibres, dormia baskets, and bugbee wires. Fever and bleeding are two of the most frequent side effects. [20] Because the treatment may influence the hypothalamus and memory-related parts of the mamillary body, short-term memory loss is possible.

This descriptive study was comprised of 115 patients with ages 1-40 years. Mean age of the patients was 6.2 ±3.25 years. Among 115 cases, 70 (60.9%) were males and 45 (29.1%) were female patients. These data showed comparable findings to the studies conducted in past.[21,22] Aqueductal stenosis was the most common disease found in 77 (67%) cases followed by posterior fossa tumors 20 (17.4%), VP shunt blocked in 17 (14.8%) and CSF ascites in 3 (2.6%) cases.[22] Sankey EW et al [20] examined individuals who had aqueductal stenosis-induced obstructive hydrocephalus. After ETV, they

showed symptomatic improvement and a low failure rate. 70% of patients in our research had aqueductal stenosis, and this was the most common reason for a third ventriculostomy. Endoscopic third ventriculostomy (ETV) in adults with hydrocephalus was studied by Waqar M et al [23]. The long-term effects of ETV were evaluated in this study.

We found complications in 24 (20.9%) cases CSF leak was the most common found in 12 (10.4%) cases.[21] Some studies have reported a 30 percent complication rate with ETV, which is higher than the literature's 2–15 percent complication rate. According to the literature, our study's complication rate is in line. [24] There have been reports of 1.8 percent, 5.16 percent, and 10.2 percent CSF leaks after ETV for obstructive hydrocephalus. [25] In current study meningitis found in 4 (3.5%), seizures and bleeding in 3 (2.6%) cases. Mortality found in 2 (1.7%) cases. According to the research, the death rate after ETV varies from 0.22 percent to 10.3 percent. [26,27]

A threefold increase in the chance of ETV success is shown in individuals who have preoperative third ventricular bowing as compared to those who do not have this bowing. ETV was effective in treating 33% of patients who did not bow, despite the fact that bowing is a predictor. Hydrocephalus patients often have both intraventricular obstructive and communicative components, making it difficult to determine which is more prevalent. Endoscopic third ventriculostomy has a better success rate when a patient's third ventricular floor deforms, or "bows," indicating intraventricular obstructive hydrocephalus, according to previous studies (ETV). [28] Ventriculostoma reclosure, ventriculostoma narrowing and patent ventriculostoma with new arachnoid membranes under the floor of the third ventricle were all patterns of endoscopic findings seen. These findings were not present at the time of the initial ETV. [29] During ETV or shunt surgery in all patients, new CSF routes were found to be obstructed.

First-line therapy for obstructive hydrocephalus may include an endoscopic third ventriculostomy. Patients prefer it over other treatments because of how little damage it does to their bodies. ETV also avoids the disadvantages of shunt implantation. There are several circumstances where we believe that ETV can be a safe and effective therapy.

CONCLUSION

We concluded in this study that the endoscopic third ventriculostomy is an effective and safe method for the patients of obstructive hydrocephalus in terms of minimum complication with lower rate of mortality.

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