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ORIGINAL ARTICLE

Prevalence and Pattern of Initial Complications Following Endoscopic Third Ventriculostomy for Hydrocephalus Obstructor

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ABSTRACT

Objective: The purpose of this study is to analyse the complication rate of endoscopic third ventriculostomy for obstructive hydrocephalus.

Study Design: Descriptive study

Place and Duration: This descriptive study was conducted at Dow International Medical College and Hospital OJHA Campus, Karachi in the period from May, 2022 to October, 2022.

Methods: Total 97 male and female patients aged 1-30 presented. Patients had obstructive hydrocephalus were included. With consent, all patients provided age, sex, and BMI. CT and brain MRI were performed. In all reported instances, a third ventriculostomy was done under general anaesthesia after symptoms had become apparent. Two-week follow-up examined post-treatment efficacy and complications. SPSS 26.0 analyzed all data.

Results: 66 (68.04%) of the 97 patients were male, while 31(31.96%) were female. The most frequent illness was aqueductal stenosis, which was seen in 64 (65.97%), followed by posterior fossa tumours in 15 (15.5%), blocked VP shunts in 13 (13.4%), and CSF ascites in 5 (5.2%) instances. Frequency of complication was found in 22 (22.7%) cases, most prevalent was CSF leak, followed by meningitis, seizures and bleeding. There were 3 deaths (3.1%) among all cases.

Conclusion: In this research, we found that endoscopic third ventriculostomy reduced the risk of complications and death for patients with obstructive hydrocephalus.

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

INTRODUCTION

Hydrocephalus is treated most effectively with a surgical procedure called cerebrospinal fluid (CSF) diversions, which may be accomplished either the insertion of a ventricle shunt or the creation of a ventriculocisternostomy. Hydrocephalus is most often treated by inserting a ventriculoperitoneal (VP) shunt, despite the fact that as many as half of these devices fail within the first two years[2]. 3 Hydrocephalus treatment has advanced significantly in the past 20 years, with endoscopic third ventriculostomy (ETV) being considered the gold standard. Now that there is a large body of literature on the effects of ETV on children over the long term, several case series have published integrated paediatric and adult data. Few studies have looked at the effects of ETV on adults with hydrocephalus, and the ones that do typically only reflect on short-term results. Because it permits the diversion of cerebrospinal fluid (CSF) through the floor of the third ventricle, endoscopic third ventriculostomy (ETV) is a preferred alternative for CSF shunting for children with hydrocephalus. The cerebral spinal fluid (CSF) may be reabsorbed into the subarachnoid space without being blocked by any anatomical structures if a hole is drilled in the bottom of the third ventricle. For the first time in more than half a century, a significant advancement has been made in the management of hydrocephalus, and it's the creation of the CSF shunt. When effective, ETV is a straightforward procedure that lasts longer than CSF shunting and has fewer long-term consequences. In less developed nations, where the CSF shunt procedure itself may be too expensive for some families and where problems like shunt infection are less likely to be treated promptly, this is an especially appealing alternative. [6,7] On the other hand, more than 30% of kids won't improve with ETV and will need a CSF shunt nonetheless. [8]

In patients with noncommunicating hydrocephalus, a prior meta-analysis found that extra-truncal ventriculostomy (ETV) and ventriculoperitoneal shunt (VS) both had similar therapeutic effects; however, the latter was linked to a lower incidence of major complications, reoperation, and surgical duration.

[9] There has been no elucidation, however, of the treatment's effects among individuals who share certain traits. Even though many other indicators, such as adverse events and surgical variability, were not analysed in another key meta-analysis, it was discovered that both ETV and VS were related with greater failure rates, with no significant difference between the two procedures. This study aimed to evaluate the efficacy of ETV surgery in the treatment of obstructive hydrocephalus and the risks associated with doing so in a specific patient population [10]. Examine whether or if the standard of care for patients with obstructive hydrocephalus has increased.

MATERIAL AND METHODS

This descriptive study was conducted at Dow International Medical College and Hospital OJHA Campus, Karachi in the period from May, 2022 to October, 2022 and comprised of 97 patients. Patients' consented-to, in-depth demographic information was collected, including their ages, sexes, and body mass indexes. Patients with third ventricular floor lesions or those whose third ventricles measured less than seven millimetres in diameter on computed tomography were not included in the study.

Patients were between the ages of 1 to 30 with obstructive hydrocephalus. All patients underwent CT scans of their bodies and MRIs of their brains if they could afford it as part of a comprehensive medical evaluation that also included a detailed history and physical. All study participants were then added to the waiting list for the next available operating room once they had been optimised for general anaesthesia. On the next available elective list, an individual neurosurgeon with at least five years of experience post-fellowship performed the procedure. After surgery, patients were observed for 14 days for signs of CSF leak, wound infection, meningitis, seizures, haemorrhage, or in-hospital death. Both wound swabs and a computed tomography (CT) scan of the brain were used in the treatment of these conditions.

All data was analysed using SPSS version 26.0. For numerical variables, such age, the mean and standard deviation (SD) were calculated. However, frequencies and percentages were approximated for categorical factors such gender, overall complications, and pattern of issues (CSF leak, wound infection, meningitis, seizures, haemorrhage, and in-hospital death). When

analysing complications and issue patterns, we stratified patients by gender and age and utilised a chi square test with a significance level of 0.05 to evaluate whether the effect modification was statistically significant.

RESULTS

Sixty six (68.04%) of the 97 patients were male, while 31(31.96%) were female.(figure-1)

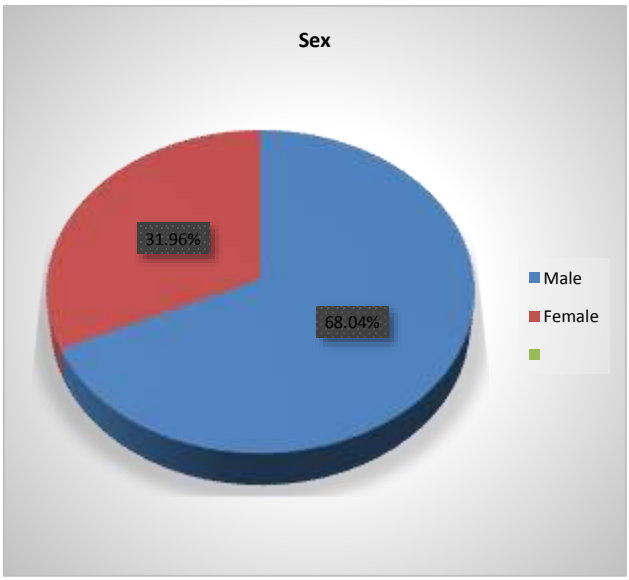

Figure-1: Sex of the included cases

The most frequent illness was aqueductal stenosis, which was seen in 64 (65.97%), followed by posterior fossa tumours in 15 (15.5%), blocked VP shunts in 13 (13.4%), and CSF ascites in 5 (5.2%) instances. (figure 2)

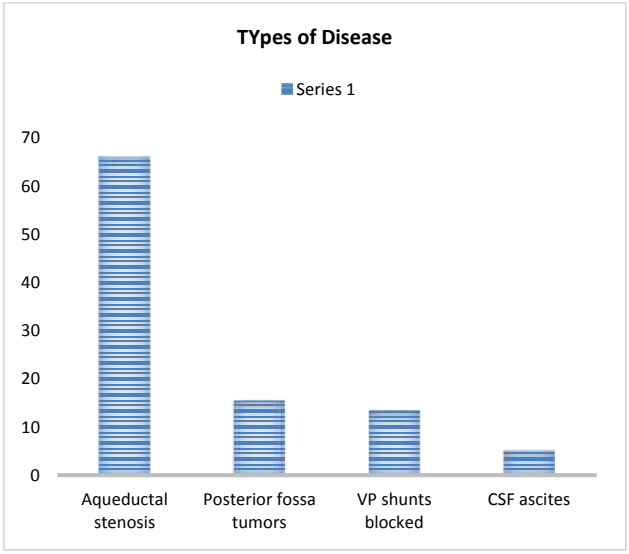

Figure-2: Ventriculostomy Association with Disease

Frequency of complication was found in 22 (22.7%) cases, most prevalent was CSF leak, followed by meningitis, seizures and bleeding.

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%).(table 1)

Table 1: Association of complication after endoscopic ventriculostomy

Variables	Frequency	Percentage
Adverse events		
Yes	22	22.7
No	75	77.3
Types		
CSF Leak	11	11.3
Meningitis	5	5.2
Seizures	4	4.1
Bleeding	2	2.1

There were 3 deaths (3.1%) among all cases.(table 2)

Table-2: Association of deaths among all cases

Variables	Frequency	Percentage
Deaths		
Yes	3	3.1
No	94	96.9

DISCUSSION

Hydrocephalus affects 1%–2% of the population. Diversion was common therapy. [11] Shunt technology has improved, but treating hydrocephalus is still tough, thus neurosurgeons are exploring alternate options. Hydrocephalus is commonly treated using CSF shunting. CSF shunt patients experience drainage (obstruction, disconnection), drainage (overflow), and infection concerns. [12] Hydrocephalus therapy is moving away from shunts to endoscopic methods. [13] Small burr holes offer rapid access without brain retraction. Hydrocephalus cannot be cured. [14] Guide wires, forceps with closed jaws, laser fibres, dormia baskets, and bugbee wires are used to construct the ventriculostomy using endoscopes and other blunt tools. Bleeding and fever are the most common adverse effects. Short-term memory loss is likely since the medication may affect the hypothalamus and mamillary body.

Ninety seven cases aged 1-40years were included in this descriptive research. 31 (31.96%) of the 97 cases were female, while 66 (68.04%) were male. The results of these trials were similar. [16,17] The most frequent illness was aqueductal stenosis, which was seen in 64 (65.97%), followed by posterior fossa tumours in 15 (15.5%), blocked VP shunts in 13 (13.4%), and CSF ascites in 5 (5.2%) instances. In previous study [18] patients with aqueductal stenosis-induced obstructive hydrocephalus. They demonstrated symptomatic improvement and a reduced failure rate after ETV. The most prevalent cause for a third ventriculostomy in our study was aqueductal stenosis, which affected 70% of patients. Another study investigated people with hydrocephalus with endoscopic third ventriculostomy (ETV) [19]. This research assessed ETV's long-term impacts.

Frequency of complication was found in 22 (22.7%) cases, most prevalent was CSF leak, followed by meningitis, seizures and bleeding.[20] The complication rate for ETV in the literature is between 2 and 15%, however some studies have reported rates as high as 30%. The incidence of complications in our study is consistent with previous research. [21] Three different percentages of CSF leakage after ETV for obstructive hydrocephalus have been reported: 1.8%, 5.16 %, and 10.2%. [22]. There were 3 deaths (3.1%) among all cases. Studies show that the mortality rate after ETV might range from 0.22 percent to 10.3 percent. [23,24]

Individuals with preoperative third ventricular bowing had a threefold higher chance of a successful ETV compared to patients without preoperative third ventricular bowing. Even though bending the knee is a reliable indicator of recovery, ETV benefited 33 percent of non-bending patients. Hydrocephalus patients sometimes show both intraventricular obstructive and communicative symptoms, making it difficult to determine which is more prevalent. Previous studies have demonstrated that when the third ventricular floor deforms, or "bows," the success rate of endoscopic third ventriculostomy rises in patients with intraventricular obstructive hydrocephalus (ETV). [25] Endoscopic examination revealed a wide variety of ventriculostoma patterns, such as reclosure, narrowing, and patent ventriculostomas with

new arachnoid membranes under the floor of the third ventricle. For the first ETV showing, these findings were unavailable. [26] After ETV or shunt surgery, it was determined that all patients had hidden barriers to CSF drainage.

In certain cases, an endoscopic third ventriculostomy is the treatment of choice for obstructive hydrocephalus. Because it is gentler on the body, patients like it. Additionally, ETV sidesteps the problems associated with shunt insertion. ETV has the potential to be a useful and secure treatment in a number of settings.

CONCLUSION

In this research, we found that endoscopic third ventriculostomy reduced the risk of complications and death for patients with obstructive hydrocephalus.

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