

Outcome Comparison of Endoscopic Third Ventriculostomy Versus Ventriculoperitoneal Shunt in Obstructive Hydrocephalus

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ABSTRACT

Objective: The aim of this study is to compare the outcomes of endoscopic third ventriculostomy versus ventriculoperitoneal shunt in Obstructive Hydrocephalus.

Study Design: Randomized/Control study

Place and Duration: Neurosurgery Department, Mardan Medical Complex, Mardan for the duration 04 years from April 2017 to April 2021.

Methods: Sixty individuals of both sexes were brought in for consultation. Involved individuals had hydrocephalus that blocked their airways. The written consent of every patient allowed the collection of comprehensive demographic data, including age, gender, and body mass index (BMI). CT and MRI scans were performed on patients. Two groups of patients were formed, and the patients were split evenly between the two. An endoscopic third ventriculostomy was performed on group I, whereas ventriculoperitoneal shunt was implanted in group II patients. Efficacy and complications of therapy were evaluated at six-month intervals. All collected data were analyzed by using the SPSS 24.0 edition.

Results: There was no any significant difference of age among both groups. Majority of the patients among both groups were males. Mean hospital stay in group I was lower 3.4 ± 6.45 days as compared to group II 8.1 ± 1.35 days. Success rate in group I was higher 25 (83.3%) as compared to group II 20 (66.7%). Complications in group II was higher among 10 (33.3%) cases as compared to group I 5 (16.7%) in which CSF leak was the most common. Recurrence rate in group I was 4 (13.3%) and in group II was 6 (20%).

Conclusion: In this research, we found that the endoscopic third ventriculostomy is an effective and safe procedure for treating patients with obstructive hydrocephalus as compared to ventriculoperitoneal shunt because of its low complication rate and decreased recurrence rate.

Keywords: Ventriculoperitoneal Shunt, Obstructive Hydrocephalus, Endoscopic Third Ventriculostomy, Complications, Recurrence

INTRODUCTION

Hydrocephalus is a frequent neurological condition in children. [1] The illness is more common in poorer nations than in industrialised ones. Congenital hydrocephalus has a prevalence of 0.5 to 1 per 1000 births in affluent nations, whereas neonatal acquired hydrocephalus has a prevalence of 3 to 5 per 1000 births. [2,3] In the United States, one out of every 1,000 babies is born with infant hydrocephalus. [4] The epidemiology of hydrocephalus in Indonesia is unknown at this time. Neurosurgery clinics and surgeries in Medan, North Sumatra, Indonesia have documented a 40–50 percent incidence of paediatric hydrocephalus among their patients, based on their records. [5] Pediatric hydrocephalus is 10 occurrences per 1000 births, according to another Indonesian research conducted on Bali[6]. Hydrocephalus at Dr. Soetomo Hospital is divided into two groups: those with communicating (41.25 percent) and those with non-communicating (40 percent) hydrocephalus. When it comes to treating children with hydrocephalus, several institutions have switched to using ETVs instead of ventriculoperitoneal shunts in the previous few decades (VPS). [7]

When it comes to treating children with hydrocephalus, several institutions have switched to using ETVs instead of ventriculoperitoneal shunts in the previous few decades (VPS). There are many unknowns about hydrocephalus' pathophysiology even if the methods seem straightforward, hence the care of patients with hydrocephalus may be difficult. Many different materials have been created since the shunt was first introduced, each with the goal that the new materials may lead to a better result. "Endoscopic third ventriculostomy," a surgical procedure that some surgeons believe was the key to successfully treating hydrocephalus, has been the subject of debate.[8] Articles on both techniques' mortality and morbidity have been published several times. Comparing third ventriculostomies and cerebrospinal shunting has never been done before, despite the fact that the two procedures are often used interchangeably. [9,10]

Communicating hydrocephalus is the standard of treatment for patients with VPS installation, but the technique has a significant failure rate—up to 40% fail within one year and 50% fail within two years. This group of patients has long been thought to be unsuitable for ETV, which is typically reserved for those with obstructive hydrocephalus. Many children with hydrocephalus who are able to communicate have found success with ETVs in tiny trials recently published in the journal *Pediatrics*. [11,12]

Research on the effects of ETV and VPS surgery on patients with obstructive hydrocephalus was the focus of this study. Determine whether therapy for people with obstructive hydrocephalus has been better over the last decade or so.

MATERIAL AND METHODS

This Randomized/Control study was conducted at Department of Neurosurgery, Mardan Medical Complex, Mardan for the duration 04 years from April 2017 to April 2021 and comprised of 60 patients. All patients who signed a consent form gave us their full demographic information, including their age, gender, and BMI. Previous surgical procedures and significant co-morbidities and infections were excluded from the research.

Baseline examinations included CT scans and MRI scans for those who could afford them, as well as a medical history, physical exam, and baseline tests. Two groups of patients were formed, and the patients were split evenly between the two. An endoscopic third ventriculostomy was performed on group I, whereas ventriculoperitoneal shunt was implanted in group II patients. Immediately after the general anaesthetic was optimized, all individuals were put on the operating room waiting list. Elective surgery was performed by a neurosurgeon in both groups with at least five years post-fellowship experience. For six months following the procedure, both groups of patients were examined for CSF leaks and other problems such as wound infections, meningitis, seizures, and haemorrhage. Using wound swabs and an MRI to diagnose these issues were the primary methods used to treat them.

All of the data was analysed using SPSS 24.0, the most recent version. We calculated the SD of age-related quantitative data to get a sense of its standard deviation. Variables such as gender, overall complications and pattern of issues (such as CSF leak, meningitis, seizures and in-hospital death) were assigned probabilities rather than absolute frequencies. If the effect modification was significant when stratified by gender and age for complications and issue patterns, we employed a chi square test with a p value of 0.05.

RESULTS

In group I 31.5±6.31 years was the mean age and in group II mean age was 32.3±5.46 years. 17 (56.7%) patients were males in group I and in group II 18 (60%) were males.(table 1)

Table 1: Age and gender distribution in both groups

Variables	Group I	Group II
Mean age (years)	31.5±6.31	32.3±5.46
Gender		
Male	17 (56.7%)	13 (43.3%)
Female	18 (60%)	12 (40%)

Aqueductal stenosis and posterior fossa tumours were the most prevalent diagnoses in the 34 and 13 patients. VP shunt blocked in 9 (15 percent), CSF ascites in 2 (3.3 percent) instances.(fig 1)

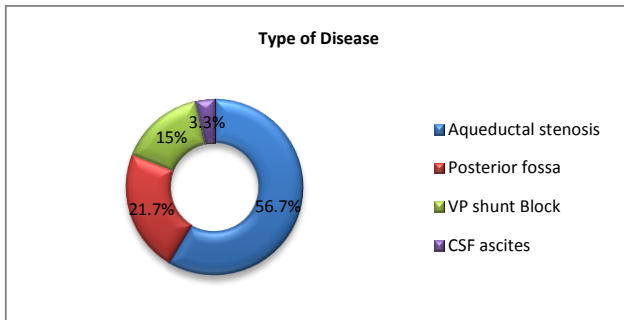


Figure 1: Association of diseases among all cases

Mean hospital stay in group I was lower 3.4± 6.45 days as compared to group II 8.1±1.35 days. Success rate in group I was higher 25 (83.3%) as compared to group II 20 (66.7%).(table 2)

Table 2: Comparison of hospital stay and success in both groups

Variables	Group I	Group II
Mean Hospital Stay (days)	3.4± 6.45	8.1±1.35
Success		
Yes	25 (83.3%)	20 (66.7%)
No	5 (16.7%)	10 (33.3%)

Complications in group II was higher among 10 (33.3%) cases as compared to group I 5 (16.7%) in which CSF leak was the most common. (table 3)

Table 3: Association of complication after endoscopic ventriculostomy

Variables	Group I	Group II
Complications		
Yes	5 (16.7%)	10 (33.3%)
No	25 (83.3%)	20 (66.7%)
Type of complications		
CSF Leak	2	5
Infection	1	2
Seizures	1	2
Bleeding	1	1
Total	5	10

Recurrence rate in group I was 4 (13.3%) and in group II was 6 (20%).(fig 1)

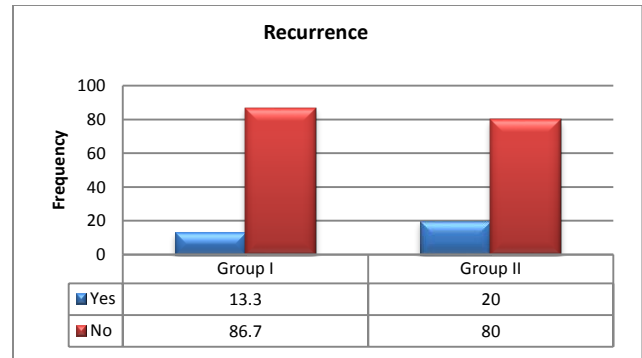


Figure 2: Comparison of recurrence rate among both groups

DISCUSSION

For decades, the treatment of Obstructive Hydrocephalus has been the subject of intense controversy. Endoscopic third ventriculostomy (E3V) or VP Shunt (a neurosurgeon's workhorse procedure) are the two options for therapy (ETV). It's important to note that, in contrast to the more traditional VP Shunt, the ETV technique has significantly reduced the likelihood of problems like obstruction or infection. These problems have been justified in this research in order to reduce mortality.

In current study total 60 patients were presented and divided equally into two groups. Group I with ETV and group II with VPS. In group I 31.5±6.31 years was the mean age and in group II mean age was 32.3±5.46 years. 17 (56.7%) patients were males in group I and in group II 18 (60%) were males. These were comparable to the previous studies.[13,14] Aqueductal stenosis and posterior fossa tumours were the most prevalent diagnoses in the 34 and 13 patients. VP shunt blocked in 9 (15 percent), CSF ascites in 2 (3.3 percent) instances.[15] People with obstructive hydrocephalus were studied by Sankey EW and his colleagues. Their symptoms improved and their failure rate was minimal after ETV. Aqueductal stenosis was the most prevalent cause for a third ventriculostomy in 70% of patients in our study. In adults with hydrocephalus, Waqar M et al explored endoscopic third ventriculostomy (ETV) [17].

Mean hospital stay in group I was lower 3.4± 6.45 days as compared to group II 8.1±1.35 days. Success rate in group I was higher 25 (83.3%) as compared to group II 20 (66.7%). Individuals with preoperative third ventricular bending had a threefold increased likelihood of ETV success compared to those without this bowing. Interventricular obstructive and communicative aspects of hydrocephalus are frequently present in the same patient, making the diagnosis problematic. Studies have shown that patients with a deformed third ventricular floor, or "bowing," are more likely to have a successful endoscopic third ventriculostomy procedure (ETV). [18] It was found that ventriculostoma reclosure, narrowing and new arachnoid membranes were all patterns of endoscopic results that had been seen. These results weren't there when the original ETV was conducted. [19] The additional CSF pathways were discovered during ETV or shunt surgery in all cases.

Complications in group II was higher among 10 (33.3%) cases as compared to group I 5 (16.7%) in which CSF leak was the most common. When treating hydrocephalus, infection of the cerebrospinal fluid (CSF) shunt is a primary cause of morbidity and mortality, as is the associated cost burden. [20] A total of 496 (3.9 percent) people were diagnosed with a shunt infection within a year after having their shunts implanted. On average, it took 4.6 [4.1–13.3] weeks to shunt infection [interquartile range].

ETV and VP shunts were compared in individuals with obstructive hydrocephalus in our research. Following surgery, both treatments were successful, although problems such as CSF leak, haemorrhage, and shunt infection were rare. Even among patients, subdural and extradural hematomas are rare. Morbidity and

mortality rates are lower because to the shorter duration of the surgery. It is one of the most successful treatments for obstructive hydrocephalus patients to have an endoscopic third ventriculostomy. When it comes to efficiency, ETV is a far superior option than VP shunt. Endoscopic third ventriculostomy had a better post-operative success rate and morbidity, infection, cost-effectiveness, and duration of hospital stay than the standard therapy of a ventriculoperitoneal shunt, according to the literature (VPS).

CONCLUSION

In this research, we found that the endoscopic third ventriculostomy is an effective and safe procedure for treating patients with obstructive hydrocephalus as compared to ventriculoperitoneal shunt because of its low complication rate and decreased recurrence rate.

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