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Hayat Mohammad Khan
Lady Reading Hospital Peshawar.

Naeemul Haq
Lady Reading Hospital Peshawar

Muhammad Usman
Lady Reading Hospital Peshawar

Ramzan Hussain
Lady Reading Hospital Peshawar

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AUDIT OF ENDOSCOPIC THIRD VENTRICULOSTOMY IN THE TREATMENT OF OBSTRUCTIVE HYDROCEPHALUS

Hayat Mohammad Khan, Naeemul Haq, Muhammad Usman, Ramzan Hussain
 Department of Neurosurgery Lady Reading Hospital Peshawar.

Correspondence to: Dr. Hayat Mohammad Khan, Neurosurgery Department, PGMI Lady Reading Hospital Peshawar, Pakistan. Email: Dr_hayatmkhan@yahoo.com
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ABSTRACT

Objective: To analyze various aspects of endoscopic third ventriculostomy in the treatment of obstructive hydrocephalus. **Material and Methods:** This descriptive study was conducted in the Department of Neurosurgery Lady Reading Hospital Peshawar from September 2010 to April 2011. All patients who underwent endoscopic third ventriculostomy were included in the study. Data was analyzed on SPSS version sixteen. **Results:** Total of 59 patients were included in the study. Thirty two patients were male and 27 were female. Most of the patients presented with headache, vomiting and loss of consciousness. The procedure was successful in 69 percent of cases. Common operative complication was minor hemorrhage while postoperatively three patients died because of the fits. **Conclusion:** Endoscopic third ventriculostomy can be used as an alternative to other diversion procedure. It is safe, less invasive and has got an acceptable success rate.

Key words: Audit, Endoscopic third ventriculostomy, Obstructive hydrocephalus.

INTRODUCTION

Endoscopic third ventriculostomy has revolutionized the treatment of hydrocephalus. It diverts cerebrospinal fluid (CSF) from the ventricle to the prepontine cistern, bypassing the site of obstruction¹. This procedure is performed with an endoscope having proper illumination, magnification and monitor. It needs expertise in handling endoscope and orientation of endoscopic anatomy. Focusing and white balance is checked before starting the procedure. A single Bur hole is made at Kocher's point. In the frontal horn thalamostriate vein is used as pathway to foramen of Monro. Stoma is made in the floor of third ventricle making communication between third ventricle and prepontine cistern. The procedure gained attention with improvement in endoscopic technology during late seventies². It has less complication rate, and does not involve any implant. Common complications of the procedure are hemorrhage, CSF leak, infection, fits and failure of the procedure. Minor hemorrhage is dealt with continuous irrigation, focal pressure or cautery. Major hemorrhage which is the most common reason for procedure abandonment is dealt with external ventricular drainage. Clinical features of the patient improve within twenty-four hours; however radiological improvement may take months or may not improve at all. Radiological improvement is not usually the goal of surgery^{3,4,5}. Endoscopic third ventriculostomy is possible only when

third ventricle is dilated and prepontine cistern is developed. Therefore before six months of age this procedure is contraindicated by most authors, however there are people who claim success of the procedure at any age. This procedure avoids the complications associated with ventriculoperitoneal shunt which repeatedly gets blocked and is infected. Furthermore, ETV success score (Table 1) that predicts long-term outcome, has become a standard score of consideration in obstructive hydrocephalus.⁶ Ventriculoperitoneal shunt had huge amount of burden on economy, health and quality of care because of repeated explorations required for obstruction and infection. Endoscopic third ventriculostomy has greatly reduced the work load as there are very little chances of obstruction of the stoma. Different studies have been conducted over the efficacy of this procedure and all have shown good outcome of the procedure. Success rate in different studies ranges from 70 to 90 percent⁷. The aim of our study is to analyze different aspects of endoscopic third ventriculostomy to assess the improvement in level of care for patient of obstructive hydrocephalus.

MATERIALS AND METHODS

This descriptive study was conducted in Department of Neurosurgery Lady Reading Hospital Peshawar from September 2010 to April 2011. In this study all patients who underwent endoscopic third ventriculostomy of more

than six months were included. While patients with co-morbid condition and recurrent cases were excluded from the study. Total of 59 patients were included in the study. CT and/or MRI brain was performed in all the cases. An informed consent was taken pre-operatively, explaining the prognosis. The ethical approval was taken from the hospital ethical committee. All the patients received a prophylactic third generation cephalosporin intravenously, Injection Ceftriaxone sodium before the induction of anaesthesia and remained for 24 hours on this and then changed to oral antibiotics. For ETV, a more sophisticated universal GAAB Endoscopic system by Karl Storz GmbH & Co (Tuttlingen, Germany) was used which included rigid rod, lens optics 0-degree. Various aspects of endoscopic third ventriculostomy in the treatment of obstructive hydrocephalus were scrutinized. Data was analyzed on SPSS version sixteen.

RESULTS

A total of 59 patients were included in the study. Out of these 32 (54.23%) were male and 27 (45.76%) were female. More than fifty percent of patients were above ten years of age making the main bulk of the patients (Table 2). Thirty percent of the patients presented with headache, vomiting, fits and loss of consciousness while twenty seven percent presented with only headache and vomiting (Table 3). Enlargement of the head was present in only ten percent of the patients. Fifty six patients were having high pressure clear CSF on operation while only three patient making five percent of the whole were having low or medium pressure CSF (Table 4). Sixty nine percent (n=41) of the patients improved with surgery while thirty one percent (n=18) did not. The complication rate was 11.86% (n=7) including mortality (Table 5).

Table 1 : ETV Success Score

Score	Age	Etiology	Previous Shunt
0	< 1 month	Postinfectious	Yes
10	1 to < 6 months		No
20		Myelomeningocele, intraventricular hemorrhage, nontectal tumor	
30	6 months to < 1 year	Aqueductal stenosis, tectal tumor, other	
40	1 to < 10 years		
50	10 to < 19 years		

Table No. 2 : Age Range

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	less than one year	4	6.8	6.8	6.8
	1-10yrs	20	33.9	33.9	40.7
	more than 10 yrs	35	59.3	59.3	100.0
	Total	59	100.0	100.0	

Table No. 3 : Clinical Presentation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	increase head size	4	6.8	6.8	6.8
	Headach	12	20.3	20.3	27.1
	Vomiting	3	5.1	5.1	32.2
	loss of consciousness	5	8.5	8.5	40.7
	Fits	1	1.7	1.7	42.4
	headache and vomiting	16	27.1	27.1	69.5
	headach, vomiting, loss of consciousness & fits	18	30.5	30.5	100.0
	Total	59	100.0	100.0	

Table No. 4 : Operative Findings

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	High Pressure Clear CSF	56	94.9	94.9	94.9
	Medium or Low Pressure Clear CSF	3	5.1	5.1	100.0
	Total	59	100.0	100.0	

DISCUSSION

Endoscopic third ventriculostomy has now been accepted as an accepted procedure for obstructive hydrocephalus. It internally diverts cerebrospinal fluid thus bypassing the site of obstruction which should be beyond the third ventricle. Lesions in the third ventricle or at the foramen of Monro are contraindications to endoscopic third ventriculostomy. Unresolved controversies

are age less than six months and obstruction outside the ventricular system. It has made the job of neurosurgeon easy by preventing the complications of obstruction and infection very rare. It can be performed at any age above six months when the prepontine cistern is fully developed. However the success rate of the procedure increases with increase in age. In our study the success rate has not much difference among the different age groups which is against the studies of Ahmad et al and Ogiwara H et al^{8,9} but is comparable to the studies of Feng H et al¹⁰. The difference between our study and that of the Ahmad et al is probably due to the different reasons like the number of patients which is in small number in our study, patients with no history of previous shunt and all were having aqueductal stenosis as cause of hydrocephalus which is in favor of good prognosis. Prognosis of endoscopic third ventriculostomy becomes poor with previous shunt surgery. According to our study fifty eight percent of the patients with previous shunt improved with endoscopic third ventriculostomy, while this rate was eighty percent in patients without previous shunt surgery. This is in accordance with the study of Hader WJ et al¹¹. According to ETV success score the good prognosis decrease by ten percent when the patient has previous shunt as compared to no shunted patients. The exact cause behind this effect is not known; however it seems to be due to adaptation of the ventricular system and cerebrospinal fluid pathways to ventriculoperitoneal shunt. Operative hemorrhage is usually negligible and stops with irrigation, temponade or cauterization. When the hemorrhage is severe and is not controlled with these measures then procedure is abandoned and ventriculostomy tube is passed. In our study only two patients had such severe hemorrhage for which external ventricular catheter was passed but they did not survive and expired. Cerebrospinal fluid leak is a common complication of the procedure but it occurred in only one of our patients. However in study of Beems et al and Buxton et al^{12,13} cerebrospinal fluid leak is 0-20%. We used spongoston as chimney plug at the end of the procedure and closed the dura. Elevation of head end at the end of procedure and water tight closure of skin and subcutaneous tissue also decreases the chances of cerebrospinal fluid leak. Fits occurred in 3.4 percent of our patients postoperatively. Antiepileptic drugs are not needed routinely in patients with endoscopic third ventriculostomy as the percentage of patients developing fits is very low however it does occur as we pass endoscope through cortex of brain. The most feared and common complications of ventriculoperitoneal shunt is frequent obstruction and infection which are very low in case of endoscopic third ventriculostomy as no implant is involved in the case of endoscopic third ventriculostomy.

Table No. 5 : Complications Of ETV

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Nil	52	88.1	88.1	88.1
	csf leak	1	1.7	1.7	89.8
	Fits	2	3.4	3.4	93.2
	Hemorrhage	1	1.7	1.7	94.9
	Expired	3	5.1	5.1	100.0
	Total	59	100.0	100.0	

Table No. 5 : Indications for etv

		Frequency	Percent	Valid Percent
Valid	posterior fossa tumor	23	38.98	38.98
	aqueductal stenosis	22	37.28	37.28
	cp angle tumor	8	13.55	13.55
	brainstem glioma	4	6.77	6.77
	ventricular hemorrhage	2	3.38	3.38

CONCLUSION

Endoscopic third ventriculostomy is a very effective procedure for the treatment of obstructive hydrocephalus. Effectiveness varies with age of the patient and cause of hydrocephalus. The procedure can be performed safely and adopted in place of other procedure for CSF diversion.

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Author's contribution:

Dr. Hayat Mohammad Khan: Study concept and design, protocol writing, data collection, data analysis, manuscript writing, manuscript review

Dr. Naeemul Haq: Data collection, data analysis, manuscript writing, manuscript review

Dr. Muhammad Usman: Data collection, data analysis, manuscript writing, manuscript review

Dr. Ramzan Hussain: Collection, data analysis, manuscript writing, manuscript review