

Outcome of Endoscopic Third Ventriculostomy (ETV)

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ABSTRACT

Objective: To know the surgical outcome of endoscopic third ventriculostomy (ETV) in non communicating hydrocephalous.

Materials and Methods: This cross sectional descriptive study was done in the department of neurosurgery PGMI / Hayatabad Medical Complex, Peshawar, from 2nd February 2011 to 1st march 2012. A total of 35 patients with non-communicating hydrocephalous, irrespective of gender discrimination were included in this study. Patients below two years of age and hydrocephalus with infected CSF or hemorrhage were excluded. Hydrocephalous was diagnosed on CT scan brain. The information regarding patient demographical details, causes of hydrocephalus and complications of procedure were documented in patient's Performa. The data was analyzed by SPSS version 17. Frequency and percentage was calculated for categorical variables. Mean \pm SD was calculated for age. Results were presented as tables.

Results: A total of 35 patients with non-communicating hydrocephalous were included in the study. Out of 35 patients, there were 22 (62.8%) males and 13 (37.21%) females. The mean age was 21 years. Etiologically tuberculous meningitis was the commonest cause of non communicating hydrocephalous. Post-operatively CSF leakage was present in 3 (8.6%) patients, pseudomeningocele in 2 (5.7%) patients, transient memory loss in 1 (2.8%) and pneumo-cephalous in 1 (2.8%).

Conclusion: The complications of endoscopic third ventriculostomy are transient. Those patients who meet the criteria, endoscopic third ventriculostomy offers the possibility of freedom from shunt dependency.

Key words: Endoscopic third ventriculostomy, complications.

Abbreviations: ETV = Endoscopic third ventriculostomy, complications. CSF = Cerebrospinal Fluid.

INTRODUCTION

The management of hydrocephalus needs diversion, either extra-cranial (shunts) or intracranial (third ventriculostomy). Extra-cranial shunts are subject to complications such as blockage, infection, and over drainage, often necessitating repeated surgical revisions. Endoscopic third ventriculostomy obviates all these complications.^{1,2}

In endoscopic third ventriculostomy, a small perforation is made in the thinned floor of the third ventricle, allowing movement of cerebrospinal fluid out of the blocked ventricular system and into the interperpendicular cistern. Cerebrospinal fluid within the ventricle is thus diverted elsewhere in an attempt to bypass an

obstruction in the aqueduct of sylvius and thereby relieve pressure.^{2,4}

The most common complications of endoscopic third ventriculostomy were fever and bleeding. The use of a cold light source and a monopolar coagulation in the confined volume of the third ventricle can increase cerebrospinal fluid temperatures to high levels, sometimes causing fever. Attempts to perforate the ventricular floor can lead to bleeding, as can damage to ventricular walls or perforation of the basilar artery. Large bleeds due to vessel injury under the third ventricle can be catastrophic, but they are rare. Short – term memory loss is another potential complication of endoscopic third ventriculostomy, since the procedure

may affect the hypothalamus and the areas of the mamillary body, which are responsible for memory. Diabetes insipidus is another transient complication.⁵⁻⁷ The purpose of this study was to know the surgical outcome of ETV in patients with non-communicating hydrocephalus.

MATERIALS AND METHODS

This cross sectional descriptive study was done in the department neurosurgery of Hayatabad Medical Complex, Peshawar, from 2nd February 2012 to 1st September 2012. A total of 35 patients with non-communicating hydrocephalous, irrespective of gender discrimination were included in this study. Patients below two years of age and hydrocephalus with infected CSF or hemorrhage were excluded.

Operative Procedure

Hydrocephalous was diagnosed on CT scan brain. Aesculap endoscope of 0 and 30 degree with 6 mm outer diameter were used. Aesculap 1 – chip video camera system (DAVID PV 140 / PV 142 Camera) was used. The system also consisted of light source, monitor and working instruments. The procedure was done under general anesthesia. The patients were placed supine with the head elevated approximately 30° to minimize excessive CSF loss and pneumocephalus. A right pre-coronal incision was made 3 cm from midline and 1 cm ahead of coronal suture. Eight mm burr hole was made. Endoscope was passed with free hand technique into the ventricle and irrigation was done with Ringer's solution. Endoscope negotiated into the 3rd ventricle and the membrane bulging in front of mamillary bodies and behind the infundibular recess selected for making a hole. Fenestration in the floor of third ventricle was usually done with Fogarty catheter 6 FR. Balloon inflated to widen fenestration (5 mm to 8 mm). Haemosatsis was preferably secured with continuous irrigation. Scalp was sutured in one layer. Clinical Outcome of ETV was evaluated by the time of discharge and on subsequent follow up visits. Base line CT brain was done to all patients post operatively. The treatment was recorded as a success or failure. **Success** of the ETV was defined as partial or complete relief of symptoms.

Failure

Any patient who subsequently needed VP shunting after the ETV procedure was described as having treatment failure.

Data Analysis

The information re-garding patient demographical details, causes of hydrocephalus and complications of procedure were documented in patient's Performa. The data was analyzed by SPSS version 17. Frequency and percentage was calculated for categorical variables. Mean \pm SD was calculated for age. Results were presented as tables.

RESULTS

We operated 35 patients during our study period. Age ranged from 2 years to 60 years with mean age 21 years.

There were 22 (62.8%) male and 13 (37.2%) female. Gender distribution is given in (Table 1).

Table 1: Gender distribution.

Gender	Number	Percentages
Male	22	62.8%
Female	13	37.2%
Total	35	100%

We operated only non-communicating hydrocephalous cases. Details of various etiological sources are highlighted in (Table 2).

Table 2: Etiology of hydrocephalous.

S. No.	Cause	No	Percentage
1.	Tuberculous Meningitis	13	37.14%
2.	4 th ventricular Tumors	10	28.5%
3.	Aequeductal stenosis	7	20%
4.	Brain stem glioma	3	8.6%
5.	Cerebellar Haemangioblastoma	2	5.7%
	Total	35	100%

The procedure was successfully performed in 32 (91.4%) patients. We converted three (8.6%) cases into ventriculo-peritoneal shunts due to altered anatomy.

The complications of third ventriculostomy were noted in seven patients (Table 3).

Table 3: *Complications of ETV.*

S. No.	Complications	No.	Percentage
1.	CSF leak	3	8.6%
2.	Pseudomeningocele	2	5.7%
3.	Pneumocephalus	1	2.8%
4.	Transient memory loss	1	2.8%
	Total	7	20%

DISCUSSION

Historically Ventriculostomy was described by Dandy in 1922, although the first successful procedure was performed by William Mixter, a urologist in Chicago in 1923. However the endoscopy could not be relied on, as the magnification and illumination of the neuro-endoscope was not so good. Hence the procedure was difficult and considered as unreliable as well. To solve this problem, the shunt was introduced in 1952. This was a simple and a reliable treatment for hydrocephalus. Shunts however are subject to complications such as blockage, infection, erosions, displacement and over drainage, often necessitating repeated surgical revisions. Both advances in endoscopic technologies and the high rate of shunt complications prompted neurosurgeons to review the oldest treatment for hydrocephalus. This led to the advent of endoscopic third ventriculostomy (ETV) procedures.^{3,5,8,9}

We operated 35 patients during our study period. Age ranged from 2 years to 60 years with mean age 21 years. Brohi SR also reported same results.¹⁰

There were 22 (62.8%) male and 13 (37.2%) female. Kulkarni AV reported male dominance in his study.¹¹ Baldauf J also reported the same result in his study.¹²

In our study the commonest cause of non-communicating hydrocephalus was tuberculous meningitis i.e. in 13 (37.14%) patients. Brohi SR has reported almost the same sequence of causes for hydrocephalus.¹⁰

Various studies suggest various ETV failure rates which range from 6% to 50%.^{13,14} In the present study, the procedure failed in three patients (8.6%). However, we believe that conversion rate can further be decreased as the surgeons get experienced and with improvement in endoscopic technology.

COMPLICATIONS

The incidence of complications with ETV has been

reported ranging from 0 – 20%.^{15,16} In our study, the overall rate of complications encountered is 20%. However there has been no permanent disability or morbidity. The commonest complication in our cases is CSF leak which occurred in 3 (8.6%) patients. Brohi SR also reported the same sequences of complications.¹⁰

CONCLUSION

The complications of endoscopic third ventriculostomy are transient. Those patients who meet the criteria, endoscopic third ventriculostomy offers the possibility of freedom from shunt dependency.

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