



# ENDOSCOPIC THIRD VENTRICULOSTOMY (ETV); OUTCOME

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## INTRODUCTION

Historically Ventriculostomy was described by Dandy in 1922, although the first successful procedure was performed by William Mixer, a urologist in Chicago in 1923. However the endoscopy could not be relied on, as the magnification and illumination of the neuroendoscope 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

**ABSTRACT... Objective:** To know the surgical outcome of endoscopic third ventriculostomy (ETV) in non communicating hydrocephalous. **Materials and methods:** This study was conducted in Abaseen Hospital, Peshawar, from 13th December 2010 to 12th October 2011. Patients with non-communicating hydrocephalous, irrespective of gender discrimination were included in this study. Patients with communicating hydrocephalous, patients below two years of age and hydrocephalus with infected CSF or hemorrhage were excluded. Hydrocephalous was diagnosed on CT scan brain. The procedure was done under general anesthesia. Clinical Outcome of ETV was evaluated by the time of discharge and on subsequent follow up visits i.e. monthly for the first three months and then at six months. Any patient who subsequently needed VP shunting after the ETV procedure was described as having treatment failure. **Results:** We operated 27 patients during our study period. Age ranged from 2 years to 57 years with mean age 20.8 years. There were 16(59.26%) males and 11(40.74 %) females. Etiologically, 4th ventricular tumors was present in 9 patients(33.33%), tuberculous meningitis in 8(29.62%), aquiductal stenosis in 7(25.92%), brain stem glioma in 1(3.70%). cerebellar haemangioblastoma in 1(3.70%) and pineal tumor (3.70%) with infra tentorial extension in 1 (3.70%) patient. The procedure was successful in 24(88.89%) patients and converted to ventriculoperitoneal shunts in 3(11.11%) cases. Post operatively CSF leakage was present in 2 (7.40%) patients, transient memory loss in 1(3.70%), pneumocephalus in 1(3.70%) and pseudomeningocele in 1(3.70%) patients. **Conclusions:** Endoscopic third ventriculostomy is a good alternative to the VP shunt in cases of non-communicating hydrocephalous. Although ETV does have some complications but these are transient and can be minimized with proper patient selection and meticulous surgical technique.

**Key words:** ETV, Non-communicating hydrocephalous, surgical outcome.

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blockage, infection, erosions, displacement and over drainage, often necessitating repeated surgical revisions<sup>1,2,3</sup>.

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<sup>4,5</sup>. ETV has largely been replacing ventriculoperitoneal shunts for the treatment of hydrocephalous. However, endoscopic third ventriculostomy is effective only in the treatment of

non-communicating hydrocephalus<sup>6,7</sup>.

The purpose of this study was to know the surgical outcome of ETV in patients with non-communicating hydrocephalus in various age groups with different causes. Although ETV has been routinely performed in developed countries yet VP shunting is the common mode of treatment for hydrocephalus in developing countries like ours. The results of this study will encourage neurosurgeons in our part of the world to opt for ETV as the primary mode of treatment in cases of non-communicating hydrocephalus.

### METHODOLOGY

This study was conducted in Abaseen Hospital, Peshawar, from 13th December 2010 to 12th October 2011. Patients with non-communicating hydrocephalus, irrespective of gender discrimination were included in this study. Patients with communicated hydrocephalus, patients below two years of age and hydrocephalus with infected CSF or hemorrhage were excluded.

Hydrocephalus was diagnosed on CT scan brain. However MRI was done in all cases to see the anatomy of third ventricle.

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 3cm from midline and 1cm medial to 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 3<sup>rd</sup> ventricle and the membrane bulging in front of mamillary bodies and behind the infundibular recess selected for making a hole. Fenestration in the roof of third ventricle was usually done with Fogarty catheter 6FR. Balloon inflated to widen fenestration (5mm to 8mm). Haemosatosis 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 .e. monthly for the first three months and then at six months. 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. Any patient who subsequently needed VP shunting after the ETV procedure was described as having treatment failure.

### RESULTS

We operated 27 patients during our study period. Age ranged from 2 years to 57 years with mean age 20.8 years.

There were 16(59.26%) male and 11(40.74 %) female.

We operated only non-communicating hydrocephalus cases. Details of various etiological sources are highlighted in table-I.

Cause	No	%age
4 <sup>th</sup> Ventricular tumors	9	33.33%
Aquiductal stenosis	7	25.92%
Tuberculous meningitis	8	29.62%
Brain stem glioma	1	3.70%
Cerebellar haemangioblastoma	1	3.70%
Pineal tumor with infra tentorial extension	1	3.70%

**Table-I. Etiology of hydrocephalus**

The procedure was successfully performed in 24(88.89%) patients. We converted three cases (11.11%) cases into ventriculoperitoneal shunts due to altered anatomy (2 patients) or bleeding (one patient). Apart from procedure failure, we came across procedure related complications in five more patients. These complications are listed in table-II.

Complications	No	%age
Procedure failure	3	11.11%
CSF leak	2	7.40%
Pseudomeningocele	1	3.70%
Pneumocephalus	1	3.70%
Transient memory loss	1	3.70%

**Table-II. Complications of ETV**

## DISCUSSION

The treatment of hydrocephalus has been changing towards endoscopic third ventriculostomy from conventional ventriculoperitoneal shunts both internationally and in Pakistan as well. The reason is obvious i.e. its minimal invasive nature and avoidance of shunts complications. Endoscopic third ventriculostomy has been recently introduced in our city of Peshawar.

There is still controversy about the young age group as some endoscopists still report low success rate in infants. Cisterns are not well developed in patients below two years of age. So ETV may not be successful in these cases. Likewise, in communicating hydrocephalous CSF cannot absorb from subarachnoid space. So only those patients are good candidates for ETV who have non-communicating hydrocephalous<sup>8,9</sup>.

Spectrum of etiology is different in different part of the world. In the west, tuberculosis (TB) is not so common, hence post tuberculous meningitis (TBM) hydrocephalous is not so common. But in our part of the world, TB is quite common. Hence we have many more post TBM hydrocephalous cases than in the west. In the present study, 4th ventricular Tumors is responsible for 33.33% (n=9) patients followed by post TBM hydrocephalous cases i.e. 8 patients (29.62). While post TBM is the leading cause of hydrocephalous in a study of Brohi SR et al<sup>10</sup>. Other etiological factors are almost similar to the rest of the world<sup>5</sup>.

Various studies suggest various ETV failure rates

which range from 6% to 50%<sup>11,12</sup>. In the present study, the procedure failed in three patients (11.89%). Two patients had inter ventricular hemorrhage and one patient had altered anatomy. However, we believe that conversion rate can further be decreased as the surgeons getting experienced, with improvement in endoscopic technology and there is proper patient's selection.

In the early postoperative period, a decrease in the size of the ventricle is often not so significant and may not visible even before three to four weeks. Using a reduction in the size of the ventricle as an indicator of success of the ETV cannot be relied upon because patients may be improved markedly from clinical point of view may have no change in ventricle size<sup>13</sup>.

The incidence of complications with ETV has been reported ranging from 0 - 20%<sup>14,15</sup>. In our study, the overall rate of complications encountered is 18.15%. However there has been no permanent disability or morbidity. The commonest complication in our cases is CSF leak which occurred in 2(7.40%) patients. The overall complication profile is in keeping with other international studies<sup>5</sup>.

## CONCLUSIONS

Endoscopic third ventriculostomy is a good alternative to the VP shunt in cases of non-communicating hydrocephalous. Although ETV does have some complications but these are transient and can be minimized with proper patient selection and meticulous surgical technique.

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