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ENDOSCOPIC 3RD VENTRICULOSTOMY AS DIVERSION OF CSF IN CHILDREN WITH HYDROCEPHALUS AND POSTERIOR FOSSA LESIONS

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Abstract:

Aim: *The purpose of this study is to determine the role of the External Third Ventriculotomy (ETV) in the treatment of hydrocephalus before or during tumor removal from the posterior fossa tumor.*

Study Design: *A Quasi experimental study.*

Place and duration: *In the pediatric Neurosurgery department of Lahore General Hospital for one-year duration from February 2019 to January 2020.*

Material and methods: *Patients reported for hydrocephalus with tumors of the posterior fossa. A third endoscopic ventriculostomy was performed and the tumors of the posterior fossa were completely or partially removed. Postoperative persistent hydrocephalus was treated with repetitive ETV or VP shunt.*

Results: *The study population consisted of 8 patients with a majority of men (6 men 75% and 2 women 25%). The age group was between 5 and 40 years old and their average age was 20.2. Postoperative bypass was not required in 7 patients (87.5%).*

Conclusion: *ETV is an alternative and effective treatment for hydrocephalus associated with posterior fossa tumors, avoiding external drainage or shunts. Reduces the risk of hydrocephalus after resection.*

Key words: *hydrocephalus, Nuroendoscopy, posterior fossa tumors, Endoscopic third ventriculostomy (ETV).*

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INTRODUCTION:

Hydrocephalus is associated with posterior damage to the fossa in 80% of cases[1-2]. A deviation is required by external drainage, bypass or a third endoscopic ventriculostomy[3-4]. Sometimes no pre-surgical treatment is offered, and persistent progressive hydrocephalus occurs in 25-30% of those cases requiring a VP or EVD valve[5-6]. External drains are subject to complications such as infection and excessive drainage[7]. ETV is an internal physiological deviation of CSF for this type of obstructive hydrocephalus[8-9]. The goal of this study is to define ETV as an alternative and effective treatment for hydrocephalus associated with posterior fossa lesions[10].

MATERIAL AND METHODS:

The study was conducted in the pediatric Neurosurgery department of Lahore General Hospital for one-year duration from February 2019 to January 2020. Patients with obstructed hydrocephalus were included due to trauma to the posterior fossa. Patients with less than 7 GCS and systemic problems (uncontrolled diabetes, uremia, liver failure, recent myocardial infarction) were excluded from the study. The diagnosis was made using computed tomography or magnetic resonance imaging. ETV was performed before resection of the tumor from the posterior fossa.

Surgical Technique

A rigid 0-degree Aesculap endoscope was used. ETV was made through the right pre-coronal incision. Fenestration was performed at the floor of the third ventricle in front of mamillary bodies and behind the infundibular recess with Fogarty catheter 6FR. An inflated balloon (5 mm to 8 mm) to expand fenestration.

The success of the third ventriculostomy was determined by clinical improvement, radiological reduction of ventricular size and shunt independence.

RESULTS:

Sexual occurrence

There were 8 patients (3: 1) with 6 (75%) men and 2 (25%) women / men for two years (Table 1).

Table 1: Sex Incidence.

Sex	No.	Percentage
Male	6	75%
Female	2	25%
Total	8	100%
Ratio of female to Male 3:1		

Age Incidence

The age group was from 5 months to 40 years old and the average age was 20.2 (Table 2).

Table 2: Age Incidence.

Age: 5 to 40 yrs	**Mean-Age** 20.2 years.

In 2 patients with tough membrane at the floor of 3rd ventricle bipolar diathermy probe was used to achi- eve the initial perforation, which was then enlarged by inflating the balloon of the Fogarty catheter. Particular attention was paid to these patients to prevent the dropping of the high and bulging basilar artery. All patients had simultaneous (partial or complete) resection of the tumor from the posterior in the supine or lateral position.

Histopathology

Acoustic 5 cases (37.5%), medulloblastoma 2 (25%) and cerebellar astrocytoma 2 (25%) were common pathologies. There was a case of Dandy Walker cyst (Table 3).

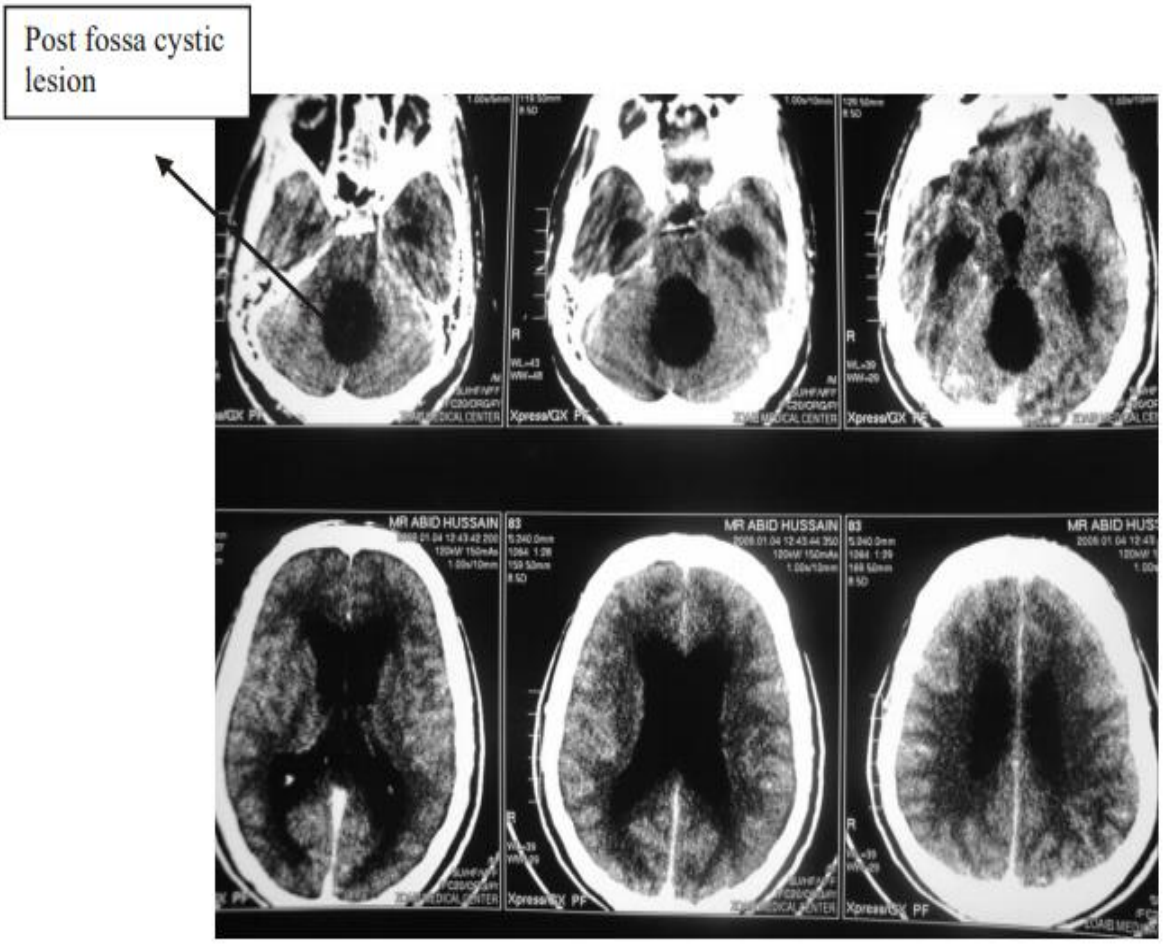
Table 3: Type of Posterior Fossa Lesion.

Type of	No.	%
Acoustic Neuroma	3	(37.5%)
Cerebellar Astrocytoma	2	(25%)
Medulloblastoma	2	(25%)
Dandy Walker malformation	1	(12.5%)
Total	**7**	**(100%)**

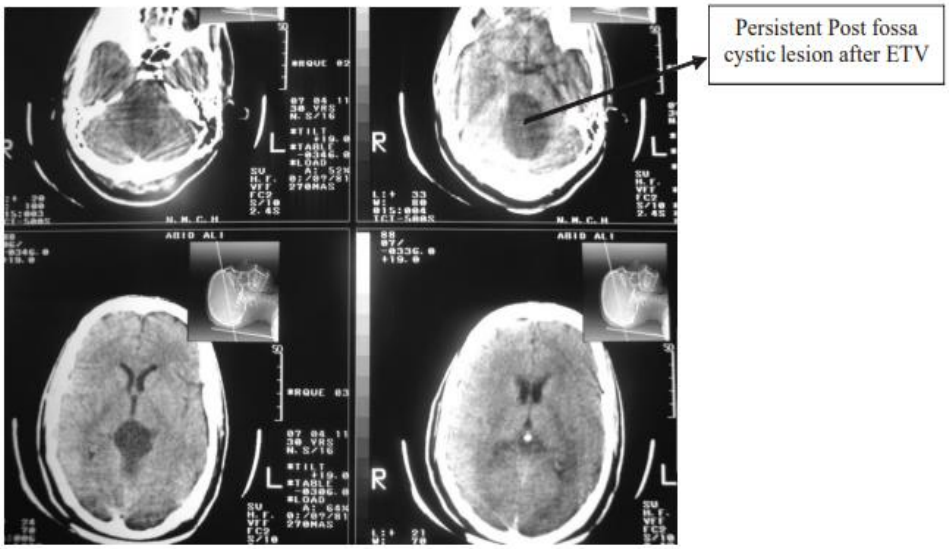
Outcome

Hydrocephalus healing was established by clinical and radiological methods. Seven patients (87.5%) had reduced ventricular size and in these cases, there was no postoperative shunting or drainage required.

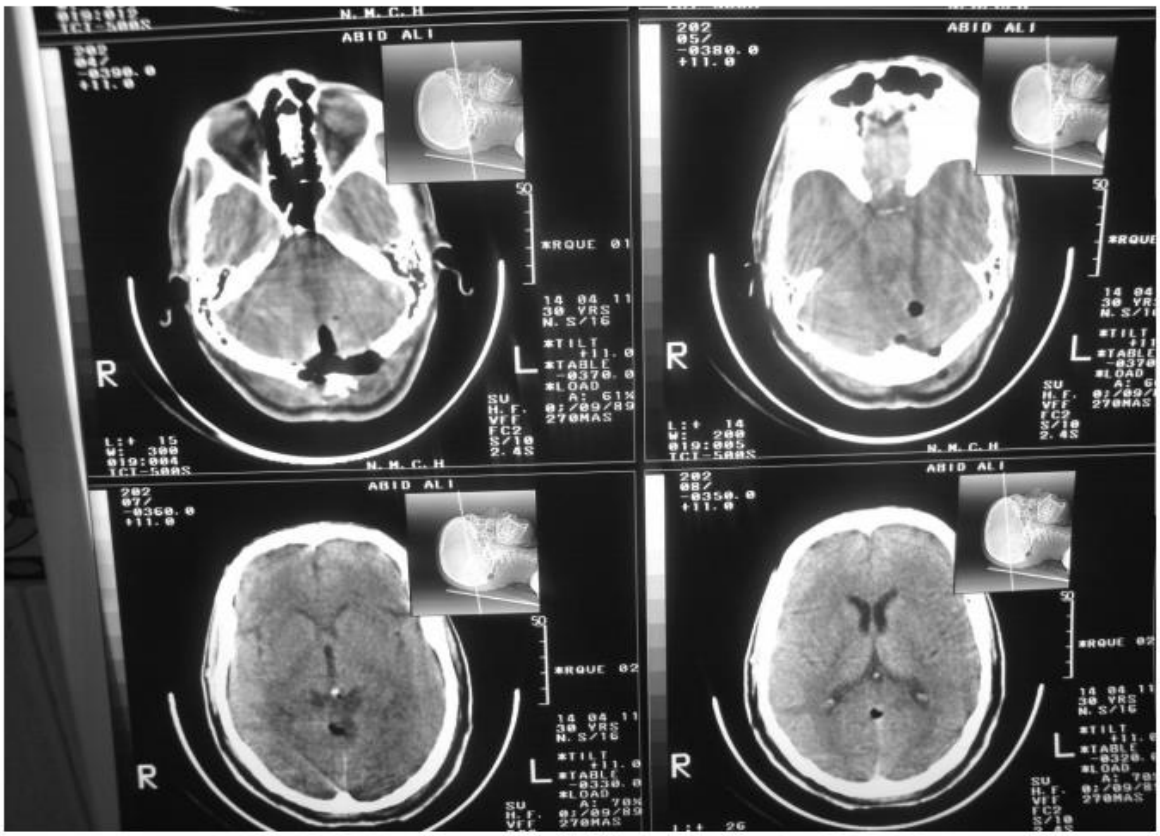
The demographics of this study are summarized in Table 1. Pictures 1, 2, 3 show the condition in which hydrocephalus is treated with ETV and then the cyst tumor is removed.



Photograph 1: *CT scan showing hydrocephalus with posterior fossa cystic lesion.*



Photograph 2: *CT scan showing resolution of hydrocephalus after ETV and persistent posterior fossa cystic lesion.*



Photograph 3: *CT scan showing excision of posterior fossa cystic lesion.*

DISCUSSION:

Further malignancies, especially central tumors, are associated with obstructive hydrocephalus. Patients with very large ventricles and very large tumors are more likely to need permanent hydrocephalus treatment after surgery[11-14]. It is believed that removal of tumors blocking the fourth ventricle causes hydrocephalus to communicate with the occluder if the volume of cerebrospinal fluid exceeds a certain level. Culey et al. Factors determining the need for a VP valve after posterior lumbar tumor in children were investigated[15]. According to them, people under 3 years of diagnosis, tumors affecting the midline, subtotal tumor resection, long-term demand for EVD, pseudomomenocele formation and CSF infections, and the need for significant postoperative valve implantation[16]. According to Firtsch, ETV is not a standard initial operation. It is suitable for patients with permanent or progressive hydrocephalus only after closing the exit from the fourth ventricle and removing the tumor[17-18].

El-Ghandour NM preferred VTE over VP in the treatment of posterior midline tumors in children because of the shorter surgery time, lower incidence, no mortality, and low failure rate. Our experience in the treatment of hydrocephalus and posterior hemorrhage also supports the use of ETV[19]. Pre-operative or pre-operative CSF deviation reduces ventricular size and cerebellitis, and helps uncover

posterior tumors of the fossa. Conversely, some authors argue that an increased hernia, tumor haemorrhage, and cerebrospinal valvular infection occur prior to craniotomy. The authors could not find such a complication in this series[20].

Rigid and flexible endoscopes are used. We used a hard 0-degree endoscope, and fenestration in the third chamber was performed with a Fogarty balloon. The success rate of VTE before resection varies between 75% and 87% in posterior tumors identified in the literature. In our study, 7 patients (87.5%) did not require CSF bypass surgery after resection.

CONCLUSION:

Endoscopic Third Ventriculostomy found an alternative and effective treatment for hydrocephalus with posterior fossa lesions prior to tumor removal. This provided relief to intracranial CSF deviation and shunt dependence. The risk of excessive drainage and cerebrospinal fluid infection due to external drainage is eliminated. The risk of hydrocephalus decreased after resection.

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