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Endoscopic third ventriculostomy in post traumatic hydrocephalus. Institutional experience

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ABSTRACT

Background: Hydrocephalus is a known sequelae in traumatic brain injury patients. It may occur early or late and presents with dementia, urinary incontinence and difficulty in walking. There are two distinct types of normal pressure hydrocephalus one is idiopathic most commonly seen in the elderly age groups and the other is secondary due to a CerebroVascular Accident, trauma or surgery. The idiopathic type may not respond to the cerebrospinal fluid diversion procedure, but the secondary type responds to the cerebrospinal fluid diversion procedure. Our study aims at exploring the option of Endoscopic third ventriculostomy in these patients not making them shunt dependent.

Materials and methods: The patients with traumatic brain injury admitted to the department of neurosurgery between January 2012 and January 2018 were included in the study. Congenital hydrocephalus and secondary hydrocephalus due to spontaneous Sub arachnoid haemorrhage and tumours were excluded. 14 patients were identified and if there was some improvement in their condition after cerebrospinal fluid tap tests were planned for endoscopic third ventriculostomy.

Results: Out of the 14 patients 2 were females and the remaining 12 were males. 2 did not improve at all. 12 had some improvement out of which 3 had a failure and underwent a ventriculo peritoneal shunt. Hence there were 5 failures out of 14 which made 35.7%.

Conclusion: Endoscopic third ventriculostomy is an option which can be offered to patients with secondary hydrocephalus. The chances of failure though present the procedure is minimally invasive and improves cerebrospinal fluid dynamics.

Keywords
secondary hydrocephalus due to trauma, endoscopic third ventriculostomy, trauma induced hydrocephalus.

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BACKGROUND

Traumatic brain injury has many a sequele of which hydrocephalus is one[1,3]. The causes of hydrocephalus maybe due to intra ventricular hemorrhage, infection, hence it is referred to as secondary hydrocephalus[2]. The morbidity causes decrease in the quality of life in these patients. The treatment for this CSF diversion procedure2. The procedures practiced are Endoscopic third ventriculostomy and Ventriculoperitoneal shunt[3,4].

There is limited literature available on this topic. 0.7% to 51% is the incidence of post traumatic hydrocephalus 5. The studies prove that

surgical mode of treatment is the mainstay and the gold standard.

We being a tertiary care centre come across many such patients, being in a tier II city these patients and their families are financially and emotionally challenged. This study aims to evaluate the outcomes of both the procedures and a comparison as to which of these procedures can be offered to these patients.

Material and methods

Aims

- To evaluate symptomatic post TBI patients for raised intra cranial pressure.
- To evaluate the neurological outcome of ETV patients
- To evaluate the neurological outcome of VP shunt patients
- To establish an economical modality of treatment.

Study design

This was a prospective study which was conducted from January 2014 to January 2019. As per the institutional policy ethical clearance was sought from the institutional ethics committee. The inclusion criteria were as follows:

A. All patients above 18 years of age
B. Both male and female patients were included.
C. Moderate and severe traumatic brain injury patients
D. Hydrocephalus proven on CT scan brain.

The exclusion criteria were:

A. Children
B. Mild traumatic brain injury patients (as the incidence of hydrocephalus in such patients is very low)
C. Patients previously treated for hydrocephalus or those who have undergone prior brain surgery.
D. Malnourished patients with low serum albumin, total protein levels or hyperbilirubinemia as wound healing will not be optimum.

3000 patients were admitted during this period with traumatic brain injury were included in the study. 622 patients were diagnosed to have hydrocephalus. The option of procedure was given to the patient to decide on which procedure to opt for. The pros and cons of the procedure were discussed with the patient relatives in detail.

246 patients consented for ETV and 362 consented for VPS. The remaining 14 did not want any further intervention. These 14 patients were lost to follow up.

Procedure

Both the procedures were done by a single surgeon without any change in the steps of procedure in each surgery. Standard procedure as stated in Schmidek and Sweet operative neurosurgical techniques were followed 5.For the
endoscopic third ventriculostomy the patient is put in supine position with the neck in minimal flexion. Kochers point is identified. Vertical incision is made at the koshers point. Periosteal flap is raised. Brain canula is introduced and the ventricle tapped tractis established. Scope is introduced in ,the foramen of munro is identified with the venous anatomy. Third ventricle is entered and mammilary bodies identified , anterior to the mammilary bodies perforation is made in the membrane, liliquest membrane is identified and opened to see the basilar artery. Complete hemostasis confirmed and closure done in two layers.

Ventricle peritoneal shunt

Patient put in supine position under anaesthesia, patient is positioned with the head turned to the left side with a sand bag under the shoulder and the hip. Incision is made at the keens point and the abdomen. Tunnelling is done from the keens point to the abdomen and the peritoneal catheter placed in situ. Through the burr hole the dura is cauterised and opened. Ventricle is tapped and ventricular catheter placed. Ventricular and peritoneal catheter is connected. Peritoneal catheter is placed into the peritoneum after confirming the flow. The skin incisions are closed in layers and occlusive dressings done.

Results

The total number of patients identified was 622 out of which 246 underwent ETV and 362 underwent VPS, the rest 14 got discharged against medical advice (Table 1).

Table 1. Showing the type of procedure done.

Total Number of patients with Post traumatic Hydrocephalus	ETV	VPS	No procedure
622	246	3621	4

Table 2. Showing the results of ETV.

Total no. -ETV	Successful	Failed
246	137	106

Table 3. Complications of ETV

ETV	CSF leak	Ventriculitis	Failure Of procedure
246	3	3	109

Table 4. Showing results VPS.

VPS	Successful	Failed
362	344	18

Table 5. Complications of ETV

Etv	Shunt Malfunction	Distal Catheter Block	Infection	Proximal Catheter Block	Shunt Migration	Ventriculitis
362	18	3	2	4	3	6

Out of the 246 cases who underwent ETV 109 cases failed and underwent VPS(Table-2). The majority symptoms were patient being the same after procedure, CSF leak from wound site, altered third ventricular anatomy, 3 patients had ventriculitis and succumbed to it. These 3 patients underwent EVD after the ventricle was tapped. (Table 3)

Out of the 362 who underwent VPS 18 patients had shunt malfunction(Table 4). The malfunction ranged from 3 had distal catheter block which needed VPS revision, 2 had infection and had to be removed after which ETV was done. 4 had proximal catheter block which was managed with ETV out of which 1 case the third ventricular floor could not be identified hence underwent ventriclo atrial shunt. The 3 patients had shunt migration hence it was replaced. 6 patients had ventriculitis and succumbed to it. (Table-5)

Discussion

The condition of post traumatic hydrocephalus is a sequelae to brain trauma and the treatment is also clearly a CSF diversion procedure6,7. The 2 modalities available have good outcomes but the success rates differ. The cause of hydrocephalus is due to blockage of draining arachnoid villi8,9. Due to the pathology the VPS group has better outcomes as it does not have to depend on the arachnoid villi for draining the CSF as compared to the ETV group. Post procedure both the groups had their own set of setbacks with the failure rate in the ETV group being 44.3% compared to the VPS group being 4.97%.

Conclusion

The results show that VPS is a better procedure with relatively lesser complications, hence only intervention will help improve the quality of life thereby reducing hospital stay.

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