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ORIGINAL ARTICLE

Role of Endoscopic Third Ventriculostomy in Congenital Obstructive Hydrocephalus

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ABSTRACT

Object: *To improve the care of Obstructive Hydrocephalic infants, from six months to twelve months and to evaluate the efficacy and complications of Endoscopic Third Ventriculostomy (ETV).*

Study Design: *This was an observational, analytical prospective study.*

Materials and Methods: *The study was conducted in the Department of Neurosurgery PGMI, Lahore General Hospital, Lahore from July 2007 to June 2008. Total numbers of patients were 30, which were divided into two equal groups. Group A (15 patients) underwent Endoscopic Third Ventriculostomy (ETV) and Ventriculoperitoneal VP Shunt were done in Group B (15 patients). Cases were selected randomly.*

Results: *The mean age for Group A was 9 months and for Group B was 8 months Endoscopic Third Ventriculostomy (ETV) procedure found successful in older than 8 months of age while ventriculoperitoneal VP Shunt procedure found successful in all age groups. Before procedure mean head circumference for Group A was 50.86 cm and for Group B was 50.84 cm. After one year follow up mean head circumference in Endoscopic Third Ventriculostomy (ETV) Group was 50.18 cm and in VP Shunt Group was 47.38 cm. Primary success in Endoscopic Third Ventriculostomy (ETV) Group was 53.3% (8 out of 15), whereas in VP Shunt Group it was 66.7% (10 out of 15). Regarding complications, in ETV Group four patients needed Re-Ventriculostomy, one needed conversion to VP Shunt and Death occurred in one patient, whereas in VP Shunt Group three needed shunt revision.*

Conclusion: *Although results are same in both groups but Endoscopic Third Ventriculostomy (ETV) Group remain shunt free. Endoscopic Third Ventriculostomy seems to be an effective alternative than VP Shunt in the management of Hydrocephalus in infants provided careful patient selection is done and surgeon is competent enough with Endoscopic Third Ventriculostomy technique.*

Key Words: *Endoscopic Third Ventriculostomy, Ventriculoperitoneal Shunt and Hydrocephalus.*

Abbreviations: *ETV: Endoscopic Third Ventriculostomy, V. P. Ventriculoperitoneal Shunt and CSF: Cerebrospinal fluid..*

INTRODUCTION

Hydrocephalus has amazed and challenged clinicians throughout the history of medicine. The traditional treatment for all forms of hydrocephalus has been the implantation of ventricular shunt system. However, these systems have inherent tendency towards complications such as malfunction and infection. Despite great progress in shunt technology during past decades, the treatment of hydrocephalus remains a challenge. Hence, there has always been a search for alternative treatment options.[1]

Pakistan is an underdeveloped country. Most of the population presenting with congenital obstructive hydrocephalus belong to poor socioeconomic group. The surgical procedure routinely performed for such patients is the placement of Ventriculoperitoneal shunt

(VPS). This shunt system is very expensive and the family bears its cost hardly. Apart from expenses, the presence of implanted foreign material is a potential source of infection and sometimes these shunts can lead to over drainage as well. Antisiphon devices may reduce this complication but they are subject to malfunction and again are very costly.

The goal in hydrocephalus therapy is to restore cerebrospinal fluid (CSF) circulation via diversion to its near normal physiological pattern.[2] In our setup, the objective is to provide an efficacious and safe treatment achieving the above said goal.

A significant advance in the treatment of hydrocephalus has been the evolution of neuroendoscopy. Walter E. Dandy was one of the first surgeons to use a primitive endoscope to perform choroid plexectomy in a hydrocephalic patient, in early 199s. The first endoscopic third ventriculostomy (ETV) was performed by Wiliam Mixterin 1923.[3]

In endoscopic third ventriculostomy (ETV)[2] a communication is made between third ventricle and the subarachnoid spaces, restoring CSF circulation to its near normal physiological pattern.

Endoscopic third ventriculostomy (ETV) has also lead to the dramatic decrease in the use of ventricular shunts and consequently reduction in secondary morbidity related to shunt complications. It is now considered in all suitable cases as the first line treatment for obstructive hydrocephalus of all cases. This technique has been kindled by the advent of advanced fibreoptic and lens technology.[4]

Several studies over the globe has provide endoscopic third ventriculostomy (ETV) as a safe and efficacious procedure in patients with congenital obstructive hydrocephalus with minimal complications and no foreign implant like shunt.[1,2,4]

In recent studies of endoscopically guided third ventriculostomies performed for the treatment of obstructive hydrocephalus, success rate reaches 60% to 85%[5] have been reported. The variation seen in the success rates reflects patient selection, differences in technique and skill of the surgeon.

MATERIAL AND METHODS

This was an observational, analytical prospective study which was conducted in the Department of Neurosurgery, Postgraduate Medical Institute, Lahore General Hospital, Lahore. The study period was one year. This study included 30 patients divided into two equal groups. Group A (15 patients) underwent Endoscopic Third Ventriculostomy and Ventriculoperitoneal Shunt was done in Group B (15 patients). Cases were selected randomly. Non probable sample technique was applied in this study. It included all infants of ages between six to twelve months having Congenital Obstructive Hydrocephalus. All cases having shunt procedure in the past or intracranial space occupying lesion and those patients having congenital anomalies were excluded from the study. After informed consent, history including data (name, age, sex) was collected from patients. Clinical assessment (head circumference, anterior fontanelle, setting sun sign, engorged scalp veins) done in all patients. Basic routine investigations i.e. complete blood count, bleeding time, clotting time and specific investigations i.e. computed tomography of brain without contrast done on which ventricular size was measured by using frontal index. Patients were divided randomly in two groups and ETV was performed in Group A patients and Group B patients underwent VP Shunt Complications were noted in both groups. Patients were followed till six months after surgery and computed tomography of brain without contrast done at the end of follow up and ventricular size reassessed.

RESULTS

This study comprised of thirty cases from six to twelve months of ages, fifteen belonging to each group. The patients were randomly assigned to each group. The mean age for Group A was 9 months and 8 months for Group B. Twenty two patients were male and eight patients were female. The mean head circumference before surgery was 50.86 cm for Group A and 50.84 cm for Group B. The mean head circumference Group A slightly reduced to 50.18 cm but reduced significantly in Group B i.e. 47.38 cm. The mean ventricular size for Group A was 0.66 which reduced up to 0.62 while ventricular size for Group B was 0.74 which reduced up to 0.64. Early normalization of anterior fontanelle was found in Group B whereas in Group A bulge was slow in response. Setting sun sign was present in 86.7% of Group A and 93.3% in Group B. There was a gradual disappearance of this sign. Engorgement of scalp veins was present in 80% of each group. Response of both procedures was similar.

DISCUSSION

Many obstructive hydrocephalic patients worldwide are shunted due to an ongoing skeptical attitude

towards endoscopic third ventriculostomy (ETV), its complications, and long term efficacy. There have been no definitive studies comparing the two approaches ETV vs. CSF shunting in an attempt to clarify the situation and determine the optimal treatment for obstructive hydrocephalus. As controversial as the issue of ETV vs. shunting has been, the benefits of ETV are even less clearly defined for specific subsets of hydrocephalic patients, such as infants with obstructive hydrocephalus presenting in the first two years of life. This lack of clarity is not helped by the total lack of standardized studies analyzing the alternatives in infants. This study included thirty patients divided into two equal groups. Group A (15 patients) underwent endoscopic third ventriculostomy (ETV) and ventriculoperitoneal shunt (VPS) was done in group B (15 patients). Cases selected randomly.

1) Age Distribution and its Influence on Primary Success:

In our study the mean age for ETV group (n = 15) was nine months and for VPS group (n = 15) was eight months. The minimum age was six months and maximum age was twelve months. There was no statistically significant difference of ages between these two study groups.

Patients receiving ETV were mostly in twelve months of age group, i.e. 4 (26.7%) and majority of VPS patients were in eight months of age group i.e. 5 (33.3%).

The primary success in ETV was observed in more than 8 month of age group whereas in VPS primary success was distributed almost equal to all age groups. The age groups in this study were not equal in number as patients were randomly allocated to the treatment. Drake[6] performed decision analysis for quality of life outcomes comprising ETV and VPS.

In comparison to the above mentioned study my study also shows the impact of age on the success of ETV but in VPS age has no influence in the success of procedure.

2) Gender Distribution:

In our study, out of thirty patients in both groups 22 (73.3%) were male and 8 (26.7%) were female. Of the total 15 patients in ETV group 13 (80%) were male and 2 (20%) were female. Of the 15 patients in VPS group 9 (66.7%) were male and 6 (33.3%) were female, in our study no influence of gender is seen on outcome analysis of both procedures. Same results were found in Gorayeb et al. study.[7]

3) Head Circumference:

In our study the mean head circumference of ETV group was 50.86cm and 50.84cm of VPS group before procedure. At twelve months follow-up slight reduction observed in mean head circumference of ETV group (50.18cm) and significant reduction observed (47.38cm) in VPS group. Same result observed by Nowoslawska et al.[8]

4) Ventricular Size:

In this study, the mean ventricular size, (frontal index values) was 0.66 in ETV and 0.74 in VPS before surgery while after surgery 0.62 and 0.64 respectively. The reduction of the ventricular size was significantly seen in VPS group as compared to ETV. The results of our study are comparable to the study done by Nowoslawska et al, as significant ventricular size is seen in shunt implanted patients as compared to those who underwent third ventriculostomy.

5) Treatment Outcome:

Primary Success:

In our study, primary success rate in ETV group was 53.3% (8 out of 15 patients) whereas in VPS group primary success rate was 66.7% (10 out of 15 patients). The effectiveness of ETV is largely confirmed in literature, with the reports[9] showing 60-90%[10-13] success rate and about 75% rate in long term functioning ventriculostomy.[14,15] These figures are particularly significant when compared with the results of VP shunting associated with 50%[6,16] failure rate within 2 years from the operation. The results of our study are quiet close to literature although not very impressive in ETV group but almost similar in VPS. The low ETV success may be due to randomly selection of patients as there were three patients from six months age group and none of them had successful ETV and it has already been mentioned that primary success depends upon age of the patients in ETV group.

Repeat Procedure:

Procedure repetition has been advocated in several studies. In our study, 4 out of 15 patients (26.7%) from ETV group had repeated ETV and 3 out of 15 patients (20%) of them were improved clinically whereas, in

VPS group 3 (20%) out of 15 needed shunt revision and all these showed clinical improvement. Ribaupierre et al.[16] compared ETV and VPS in pediatric obstructive hydrocephalus and showed that in ETV group, 8 out of 24 patients (33%) needed re-ETV whereas 17 out of 33 (52%) of VPS had shunt revision. The percentage of repeat ETV and shunt revision in my study are comparable to other studies. The stoma closure is due to infection, blood clot or debris. Aspiration of blood clots and thorough irrigation may reduce the chance of stoma closure.

Procedure Conversion:

Only 1 (6.7%) patient of ETV group needed conversion to VPS whereas none of the VPS patient required conversion. As re-ETV was done in that patient at 3 months after first ETV and stoma was found closed but patient was not improved clinically and after a month of re-ETV patient underwent VPS and was well in follow-up. Koch et al.[15] concluded that in 4 out of 12 patient's re-ETV was not successful and these patients needed shunt operation. In terms of conversion of procedure the results of our study are better as only one patient is converted to VPS and none of the patients from VPS group required ETV. It may be due to proper management and follow-up of the patients.

CONCLUSION

As VPS is being done in all neurosurgical centers in the country for many years, surgeons are very well aware about this procedure and its outcome. In contrast, ETV has been introduced quiet recently. It will need training and will have a learning curve. In the past, there has been no study in the country which compared these results, although these results are comparable to the international studies. This study shows that ETV and VPS are quiet close to each other in terms of outcome and complications but the ETV patients have an added advantage of shunt free life. The ETV seems to be an effective alternative to insertion of a VP shunt for the treatment of hydrocephalus in infants, provided careful patient selection is done and surgeon is well versed with the ETV technique.

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