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Original Research Article

To study the incidence, etiological factors of obstructive hydrocephalus and calculating accuracy of Endoscopic Third Ventriculostomy Success Score (ETVSS)

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ABSTRACT:

Background and methods:

The aim of the study is to study the incidence, etiological factors of obstructive hydrocephalus and calculating accuracy of Endoscopic Third Ventriculostomy Success Score (ETVSS). The present study was conducted as an observational study on patients admitted in surgical wards of Sanjay Gandhi Memorial Hospital associated with S.S. Medical College, Rewa (M.P.)

Results:

It is evident from the study that maximum cases of hydrocephalus presented are seen in age group >10 yrs. The incidence of hydrocephalus is more in males (66.6%) as compared to that of females (33.4%). Male:Female ratio found in our study is 2:1. Maximum patients of hydrocephalus had the etiology of brain tumor (60%) followed by aqueduct of sylvius stenosis (26.6%), post-hemorrhagic (13.3), infectious etiology (with/without brain tumor) (26.6%). It is evident from above study that Endoscopic Third Ventriculostomy Success Score (ETVSS) is quite successful in predicting the success of ETV. The overall success rate of ETV found in our study was 63%.

Conclusion:

It is concluded from our study that overall ETV is the safe procedure and improvement in GCS and papillary status is seen in maximum no of cases. Incidences of hydrocephalus are more in males as compared to that of females and most of the patients are above the age of 10 years. Aqueduct of sylvius stenosis and tumors were the leading etiologies responsible for hydrocephalus. ETVSS is quite successful in predicting the success of ETV. The overall success rate of ETV found in our study was 63%.

Keywords: incidence, etiological, hydrocephalus & Endoscopic Third Ventriculostomy Success Score (ETVSS)

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Study Resign: Observational study

1. Introduction

Endoscopic third ventriculostomy (ETV) is considered an alternative treatment for obstructive hydrocephalus[1]. It is shown in hydrocephalus second to congenital aqueduct of sylvius stenosis, posterior third ventricle tumor, cerebellar infarct, Dandy-Walker malformation, Galen aneurysm, syringomyelia with Chiari malformation type I, intraventricular hematoma, post infective hydrocephalus, hydrocephalus with multiple loculations, encephalocele, posterior fossa brain tumor and craniosynostosis[2]. It is also shown in block ventriculo – peritoneal shunt or slit ventricle syndrome[3].

Proper pre-surgical scan for detailed examination of the posterior veins from the midline, the presence or absence of the Liliequist membrane is helpful. Lumbar elastance measurement and resistance can tell in advance the patency of cranial subarachnoid space and complex hydrocephalus, which determines the end result[4]. Water jet splitting is an effective ETV system in a dense environment.Ultrasonic contact probe can be helpful for selected patients. Intraoperative ventriculo-stomography procedure can help ensure the adequacy of the endoscopic procedure, thus facilitating the need for shunt. Internal monitoring of patented channel performance and pre-pontine tank scars are predictors of ETV failure risk. Such patients are ideal candidate are shunt surgery. Magnetic resonance imaging and phase four comparison with magnetic resonance imaging is effective in assessment of subarachnoid space and patency of stoma after ETV[5]. Proper case selection, postoperative care that includes ICP monitoring and the need for external ventricular removal, repeated lumbar puncture and drainage of CSF when needed, is must. Ommaya reservoir in some particularly selected patients can help increase success and reduce post-operative complications. Most complications start after surgery, but fatal complications can develop late which indicates the importance of long- term follow-up[6].

2. Materials and Methods

The present study was conducted as an observational study on patients admitted in surgical wards of Sanjay Gandhi Memorial Hospital associated with S.S. Medical College, Rewa (M.P.) during the period of February 2020 to July 2021(18 Months).

STUDY DESIGN:- Prospective observational study
STUDY DURATION:- 18 months I.e. from February 2020 to July 2021
STUDY POPULATION:- Patients who were diagnosed with hydrocephalus and underwent E.T.V.

INCLUSION CRITERIA:
1. Patient having obstructive hydrocephalus of various
etiologies like hydrocephalus secondary to congenital aqueduct of sylvius stenosis, posterior third ventricle tumor, cerebellar infarct, Dandy- Walker malformation, Vein of galen aneurysm, cerebello-pontine angle tumor (and other posterior fossa brain tumor), Myelomeningocele with hydrocephalus etc.

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EXCLUSION CRITERIA:
1. Post hemorrhagic hydrocephalus.
2. Post infective hydrocephalus.
3. Communicating hydrocephalus (e.g. NPH, hydrocephalus secondary to intra-ventricular hemorrhage, ventriculitis, meningitis and post-operative cases after complete excision of mass lesions)

3. Result

TABLE 1: DISTRIBUTION OF INCIDENCE OF HYDROCEPHALUS

S. NO.	AGE	CASES	PERCENTAGE
1.	<1m	2	6.6
2.	1m to 6m	2	6.6
3.	6m to 1yr	0	0
4.	1yr to 10yr	6	20
5.	>10yr	20	66.7

In our study, out of all cases of hydrocephalus, maximum cases are > 10 yrs of age i.e. 66.7% and showing male preponderance.The male to female ratio was 3:2.

TABLE 2: RELATION BETWEEN INCIDENCE OF HYDROCEPHALUS AND GENDER

GENDER	INCIDENCE	PERCENTAGE
MALE	20	66.6
FEMALE	10	33.3

It is evident from above table that the incidence of hydrocephalus in SGMH Rewa is more in males (66.6%) as compared to that of females (33.4%). Male:Female ratio found in our study is 2:1.

TABLE 3: DISTRIBUTION OF CASES OF HYDROCEPHALUS AS PER ETIOLOGY

CAUSE OF HYDROCEPHALUS	NO.OF CASES	PERCENTAGE
Aqueduct of sylvius stenosis	8	26.6
Tumor	18	60.0
Posthemorrhagic hydrocephalus	4	13.3

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Infectious etiology (with/without brain tumour)	8	26.6

It is evident from the above table that maximum patients of hydrocephalus had the etiology of brain tumor (60%) followed by aqueducta stenosis (26.6%), post-hemorrhagic (13.3), infectious etiology (with / without brain tumor) (26.6%).

TABLE 4: CALCULATING ACCURACY OF ETVSS

ETVSS	NO.OF CASES	SUCCESSFUL ETV	SUCCESS PERCENTAGE
LOW (UPTO 40)	3	3	100
MODERATE (50-70)	8	5	62.5
HIGH (70-100)	19	11	57.8

It is evident from above table that ETVSS is quite successful in predicting the success of ETV. The overall success rate of ETV found in our study was 63%.

4. Discussion

Endoscopic techniques are increasingly used in the management of various neurological disorders, in recent times. [1-4] Endoscopic Third ventriculostomy (ETV) has been widely accepted for treatment of obstructive hydrocephalus of various etiologies. [5 - 10] ETV success rate is low in post-hemorrhagic, post-infective hydrocephalus cases. ETV is safe in well- selected patients.Factors like good pre-surgery planning, accurate photography, information for surgeons and excellent postoperative care help to improve outcomes.The first ETV was produced by William Mixter, a urologist, in 1923. He used a urethroscope to perform a third ventriculostomy on a child with obstructive hydrocephalus.

DISTRIBUTION OF INCIDENCE OF HYDROCEPHALUS ACCORDING TO AGE

As per study C Anand Jaiswal et al. Out of 50 cases of hydrocephalus cases, 4%were neonate, 38% were under 6 months of age, 46% were under 1 year, and 78% were less than 5 years of age. Only 6% cases were above 10 year of age. The male to female ratio was 3:2. Maximum cases were of acquired type (62%) followed by congenital type (38%). According to severity 24%mild, 50% moderate, and 26% severe type of hydrocephalus were found.

In our study, out of 50 cases of hydrocephalus maximum cases are > 10 yrs of age i.e. 66.7%. Only 2 cases are of AGE between 1m to 6m.2 cases are of age less than 2m.None of the case is found in the age group of 6m-1yr.In the age bar of 1yr -10yr,6 cases were there (which is about 20% of the total).

The study of C Anand Jaiswal et.al.was mainly perfomed in pediatric population, that's why maximum patients were of the age of <5 yrs of age, but our study was mainly performed in the department of surgery and neurosurgery, that's why maximum cases are of age >10 yrs.

RELATION BETWEEN INCIDENCE OF HYDROCEPHALUS AND SEX

It is evident from observation table that the incidence of hydrocephalus in SGMH Rewa is more in males (66.6%) ascompared to that of females (33.4%). Male:Female ratio found in our study is 2:1.

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As per the study of Santosh Kumar N. Deshmukh et al. sex distribution of cases of hydrocephalus i.e. male : female is 1.7:1.In our study, the ratio is found to be 2:1.

DISTRIBUTION OF CASES OF HYDROCEPHALUS AS PER ETIOLOGY

It is evident from the above study that maximum patients of hydrocephalus had the etiology of brain tumor (56.6%) followed by aqueduct of sylvius stenosis(26.6%),post-hemorrhagic (13.3),brain infarct(3.3%).

As per the study of Triantafyllos Bouras etal. the cause of hydrocephalus was aqueduct of sylvius stenosis in 29.3% of patients, tumor in 37.6%, meningomyelocele in 7.6%, cysts in 2.6%, cerebellar infarct in 0.9%, Dandy-Walker malformation in 0.6%, and Chiari malformation Type I in 0.4%; 7.4% of the patients had posthemorrhagic hydrocephalus, 1.8% had post-infectious hydrocephalus, and 1.2% had normal pressure hydrocephalus. Hydrocephalus was due to other causes in 1.3% of cases and the cause was not reported in 9.8%[7].

As per study of Dr. James Drake et.al., the most common causes of hydrocephalus were aqueduct of sylvius stenosis in 50% of patients and tectal glioma in 25% of patients. The duration of treatment failure ranged from 5 weeks to 7.8 years (mean 2.5 years).

In our study, the cause of hydrocephalus was brain tumor in 60% of cases followed by aqueduct of sylvius stenosis in 26.6%, post- hemorrhagic 13.3%, infectious etiology (with / without brain tumor) in 26.6% all conditions.

CALCULATING ACCURACY OF Endoscopic Third Ventriculostomy Success Score (ETVSS)

Kulkarni et al. developed the ETV Success Score (ETVSS) to predict the 6-months success rate of ETV in pediatric patients with hydrocephalus, based on age, etiology and presence of a previous shunt. It is evident from our study that ETVSS is quite successful in predicting the success of ETV. The overall success rate of ETV found in our study was 63%.

According to a study by Abhaya V. Kulkarni et. al., ETVSS ranges from 0 to 90, and the number itself is approximately equal to the percentage of probability that ETV will be successful in 6 months. For example, an 8-month-old child with aqueduct of sylvius stenosis and no previous shunt may have ETVSS of (30 + 30 + 10) = 70, or about 70% chance of having a successful\ without failing the post procedure. for 6 month.

For the High-ETVSS Group, ETV appeared to have a lower risk of failure from the beginning of the postoperative phase onwards. There was a reasonable division of survival curves over 3 years that appeared to be progressively deteriorating over time, but the number of patients treated with shunt in this analysis was limited. The 3-year success rate for the High- and Moderate-ETVSS teams was 72%[9].

In our study, the high ETVSS, success rate is 57.8%. In the Moderate-ETVSS Group, ETV appeared to have a high failure rate at first, but gradually became more and more popular over time. In our study, the Moderate-ETVSS Group, success rate is 62.5%.

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In the Low-ETVSS Group, the initial risk of ETV failure was very high, as expected, but among those who survived this first phase, their risk of ETV failure was lower than the risk of shunt failure approximately 6 months after surgery. Although survival curves appeared to fall within 42 months, the number of ETV patients excluded from analysis was significantly lower with firm conclusions. Within the Low-ETVSS Group, shunt implants appear to have high success for at least the first 2 years after treatment, although the long-term failure rate still appears to favour ETV[10].

In our study, the low ETVSS group, success rate is 100%. The variability found in our study may be due to the limited
number of scenarios we considered in our study.

5. Conclusion

It is concluded from the above study that overall ETV is the safe procedure and improvement is seen in maximum no of cases. Incidences of hydrocephalus are more in males as compared to that of females and most of the patients are above the age of 10 years. Aqueduct of sylvius stenosis and tumors were the leading etiologies responsible for hydrocephalus. ETVSS is quite successful in predicting the success of ETV. The overall success rate of ETV found in our study was 63%.

6. References

1. Yadav YR, Parihar V , Pande S, Namdev H, Agarwal M. Endoscopic third ventriculostomy. J Neurosci Rural Pract 2012;3:163-73.
2. Grogorean VT, Popescu M, Sandu AM, Toader S. Ven- triculoepiploic Shunt, a new surgical procedure for the treatment of hydrocephalus. J Experimental Med Surg Res. 2010; 1: 55-63.
3. Majid A , Butt B, Ghauri A, Khokhar TI, Ashraf N, Ahmad N. Role of endoscopic third ventriculostomy in congenital obstructive hydrocephallous. Pak J Neurol Surg. 2009; 13 (2): 70-4.
4. Brohi SR, Brohi AR, Siddiqui MA, Mughal SA, Saeed S. Outcome of endoscopic third ventriculostomy in hy-drocephalus. J Surg Pak. 2010; 15 (1): 25-8.
5. Sufianov AA, Sufianova GZ, Iakimov IA. Endoscopic third ventriculostomy in patients younger than 2 years, outcome analysis of 41 hydrocephallous cases. J Neuro-surg Pediatr. 2010; 5: 392-401.
6. Peretta P, Ragazzi P, Galarza M, Gentori L, Giordano F, Mussa F, et al. Complications and pitfalls of neuro-endoscopic surgery in children. J Neurosurg Pediatr. 2006; 105: 187-93.
7. Sacko O, Boetto S, Cances VL, Dupuy M, Roux FE. Endoscopic third ventriculostomy, outcome analysis in 368 procedures. J Neurosurg Pediatr. 2010; 5: 68-74.
8. Jenkinson MD, Hayhurst C, Jumaily MA, Kandasamy J, Clark S, Mallucci CL. The role of endoscopic third ventriculostomy in adult patients with hydrocephalus. J Neurosurg. 2009; 110: 861-6.
9. Hailong F, Guagfu H, Haibin T, Hong P, Yong C, Wei-dong L, et al. Endoscopic third ventriculostomy in the management of communicating hydrocephalous, a pre-liminary study . J Neurosurg. 2008; 109: 923-30.

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10. Brockmyer D, Abtin K, Cary L, Walker ML: Endosco-pic third ventriculostomy: an outcome analysis. Pediatr Neurosurg 1998; 28: 236-40. Hailong F, Guagfu H, Haibin T, Hong P, Yong C, Weidong L, et al. Endo-scopic third ventriculostomy in the management of communicating hydrocephalous, a preliminary study . J Neurosurg. 2008; 109: 923-30.