

Brain Endoscopy in a Tertiary Hospital in South-East Nigeria-initial results

Original Article

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ABSTRACT

Background: Endoscopic techniques are increasingly used for treating various diseases of the brain especially those related to hydrocephalus. The challenge for neurosurgeons in the field of brain endoscopy is to properly define the indications and refine the techniques for the safe performance of these useful procedures.

Aim/Objective: This study evaluates the authors' experience with brain endoscopy in a tertiary referral centre for Neurosurgery in South-East Nigeria and presents the initial results of brain endoscopic procedures over a period of one year following their introduction in October 2010.

Methodology: A retrospective study of all patients who had endoscopic brain surgery at the University of Nigeria Teaching Hospital Enugu between October 2010 and September 2011. Data from patients' case notes, operation notes and follow-up files were acquired and analysed using Statistical Package for Social Sciences (SPSS), version 16.

Results: Thirteen patients underwent 14 operations during the study period; 10 males and 3 females. All the patients were children aged 3–30 months. Eleven (84.6%) patients with hydrocephalus had twelve endoscopic procedures, while 2 (15.4%) patients had endoscopic fenestration of arachnoid cyst. Eleven patients had improvement in demographic and/or milestone profiles within 1–6 months of treatment, one patient needed a ventriculo-peritoneal (VP) shunting due to unfavourable ventricular anatomy, while one patient died from sepsis.

Conclusion: There was clear evidence of improvement in milestone profiles in our initial experience with brain endoscopy in a relatively small number of children, and we shall follow up with the study of a larger sample size in future in order to validate our present findings.

Keywords: Brain, children, endoscopy, hydrocephalus

INTRODUCTION

Brain endoscopy was first performed for the treatment of hydrocephalus by Lespinasse in 1910.¹ Although Dandy described an open technique for third ventriculostomy, the first successful percutaneous endoscopic third

ventriculostomy was performed by Mixer in 1923.^{2,3} The introduction of ventriculo-peritoneal shunting in 1949 by Nulsen and Spitz led to the abandonment of endoscopic procedures, however, they were reintroduced following the invention of the

rod lens by Sir Howard Hopkins, and are increasingly being performed for a variety of brain conditions especially hydrocephalus.⁴

Brain endoscopy was first performed in our centre in October 2010 and has been used for the treatment of children with obstructive hydrocephalus and arachnoid cysts. This study is, therefore, the first report on brain endoscopy emanating from our centre which is an 800-bed tertiary hospital and is one of the two main government-owned teaching hospitals which serve as referral centres for neurosurgery in the South-East Zone of Nigeria.

METHODOLOGY

We, retrospectively, studied 13 paediatric patients who had brain endoscopy for different brain conditions over a period of one year, October 2010 - September 2011. Demographic and clinical data were obtained from the case notes, neuroimaging reports, operation records and follow-up registers of the patients. Data acquisition and analysis were performed using SPSS, version 16. All endoscopic procedures were performed by the corresponding author. Endoscopic Third Ventriculostomy (ETV), diagnostic endoscopy and endoscopic fenestration of arachnoid cysts were the procedures performed.

The patients recruited into the study were those with obstructive hydrocephalus and arachnoid cysts who had endoscopic brain surgery in our centre during the study period. All the endoscopic procedures were performed using rigid 0° and 30° Hawk neuroendoscope and accessories. Improvement in cognitive and / or motor milestones or return of the occipito-frontal circumference curve towards the 98th percentile, for those with macrocephaly, was evaluated as positive indices.

RESULTS

Thirteen paediatric patients who underwent brain endoscopic procedures over a one-year period at the University of Nigeria Teaching Hospital Enugu were studied. There were 10 males and 3 females, with a male:female ratio of 3.3:1. The age range of the cohort is 3-30 months, with a mean age of 9.54 (+/-2.3) months and a median age of 6 months. Eight (61.5%) patients had congenital aqueductal stenosis, 2 (15.4%) patients had Dandy-Walker syndrome, 2 (15.4%) patients also had supra-tentorial arachnoid cysts, while 1 (7.7%) patient had aqueductal obstruction from a fourth ventricular tumour (Table 1).

Table 1. Conditions treated with brain endoscopy

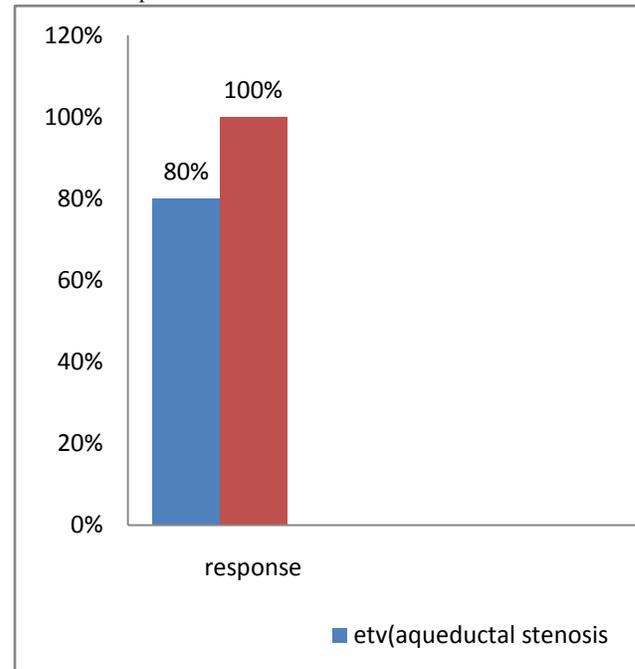
Diagnosis	No.	%
Congenital aqueductal stenosis	8	61.5
Dandy-Walker syndrome	2	15.4
Arachnoid cyst	2	15.4
Posterior fossa tumour with hydrocephalus	1	7.7
Total	13	100

Fourteen brain endoscopic procedures were performed among thirteen patients in the study. There were two diagnostic brain endoscopic procedures. Both diagnostic endoscopic procedures were performed for patients with Dandy-Walker syndrome. One of the patients with Dandy-Walker syndrome had ETV, while the other had VP shunting. Ten ETV's (71.4%) were performed in all for the following categories of patients - 1 patient with Dandy-Walker syndrome, 8 patients with aqueductal stenosis and 1 patient with aqueductal obstruction from a posterior fossa tumour (Table 2). The second patient with Dandy-Walker syndrome had VP shunting performed at the same sitting due to unfavourable anatomy of the floor of the 3rd ventricle.

Table 2. Distribution of endoscopic procedures

Procedure	No.	%
ETV	10	71.4
Endoscopic fenestration	2	14.3
Diagnostic endoscopy	2	14.3
Total	14	100

Two patients had endoscopic fenestration of arachnoid cysts (14.3%), whereas 9 ETV cases were performed as primary procedures, and the ETV in the patient with posterior fossa tumour was performed as a secondary procedure for shunt malfunction. Eight of 10 ETV patients (80%) had improvement in motor milestones within 6 months of follow-up and have remained shunt-independent, while 2 (20%) did not improve (Figure 1). One of the non-responders had repair of a lumbosacral myelomeningocele (MM) at 6 weeks of age prior to diagnosis of aqueductal malformations, while the other was the patient with posterior fossa tumour who died from severe sepsis in the post-operative period. Both patients with arachnoid cyst (100%) responded to surgery with developmental milestone improvement and good control of seizures within 6 months of treatment (Figure 1). The patient with MM had VP shunting for failed ETV (10%).

Fig 1. Relationship between endoscopic procedures and clinical response

DISCUSSION

The evaluation of our cases shows a male preponderance in the study population M:F ratio of 3.3:1, and male preponderance in congenital aqueductal stenosis (which accounts for 72.7% of our cases), has been reported in a previous study.⁵ With respect to age, patient selection for endoscopic brain surgery especially ETV has continued to elicit a robust debate worldwide and many studies have found an association between increasing age and a more favourable outcome.^{6,7,8} We found a mean age of about 9.54 months and a median of 6 months in our study, although a previous study with a larger sample size from Ibadan had a mean a mean age of 30 months.⁹ Congenital aqueductal stenosis has been associated with significantly high success rates following endoscopic treatment and is widely regarded as the poster child for ETV (Figures 2, 3 and 4).^{8,10}

Figure 2. Cranial CT of a 1-year old male showing tri-ventriculomegaly - a feature of aqueductal stenosis

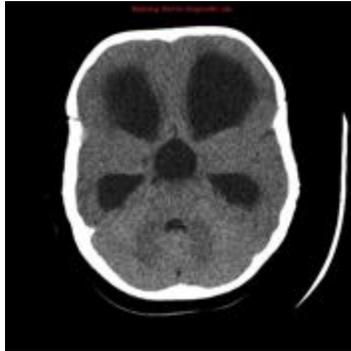


Figure 3. Intra-operative pictures (ETV)

a): Foramen of Monro

b): ETV ostium at floor of the third ventricle

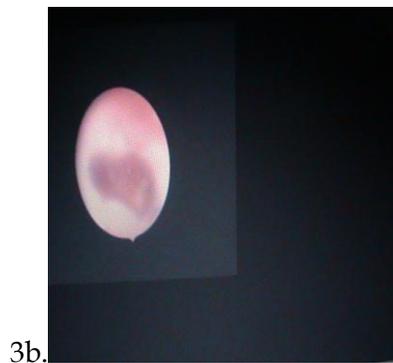


Figure 4. Clinical photograph showing the same patient 6weeks post-ETV



We, also, had an 80% positive response to ETV and 100% positive response to endoscopic cyst fenestration. High positive response to ETV similar to our findings have been reported in some previous studies of other authors.^{8,10,11} Poor response to ETV has been associated with some conditions including hydrocephalus associated with myelomeningocele.¹² Of the two patients in our study who had complications following ETV, one had a poor response and was treated with VP shunting and this patient had a repair of lumbosacral myelomeningocele at age 6weeks. The other patient had ETV as a secondary procedure for treatment of VP shunt malfunction but developed severe sepsis and died on the 4th post-operative day. Our experience from the treatment of two patients in this study with supratentorial arachnoid cyst revealed a 100% response to endoscopic cyst fenestration. Previous studies have reported successful treatment of this condition using this technique.^{12,13}

CONCLUSION

Our initial experience with brain endoscopy in South-East Nigeria suggests a good response from patients with congenital aqueductal stenosis and endoscopic fenestration for arachnoid cysts. These results strongly recommend endoscopic treatment as the first line of treatment in obstructive hydrocephalus due to aqueductal stenosis and intracranial arachnoid cysts, especially

when one considers that ETV provides a more physiologic cerebrospinal fluid diversion and is not complicated by shunt hardware problems. Our initial findings will, however, require a further validation by studies with a larger sample size so as to justify this recommendation.

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