

Neuroendoscopy in Jamaica

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ABSTRACT

This retrospective, descriptive study reviewed the patient profile, disease spectrum, indications for and results of treatment and complications of all 27 patients who had neuroendoscopy at the University Hospital of the West Indies (UHWI) over the three-year period between November 2000, when the service was first introduced, and November 2003. Nineteen (67.9%) were males and eight were females. Their mean age was 27.5 ± 21.4 years with a range of four months to 70 years. Of the entire group, 20 had hydrocephalus with raised intracranial pressure, of which 15 had endoscopic third ventriculostomy (ETV) for the treatment of obstructive hydrocephalus, using two different techniques for ventricular floor fenestration. There was no demonstrable difference in outcome between the water jet and blunt forceps techniques. Three procedures failed to relieve the hydrocephalus, requiring subsequent ventriculo-peritoneal shunts. Three patients had successful cyst fenestrations. Six patients had endoscope assisted trans-sphenoidal resection for pituitary tumours. There were five complications and no deaths. Mean hospital stay was 18.4 ± 16.7 days and mean follow-up was 29 weeks. There were no late failures. Neuroendoscopy is the treatment of choice for obstructive hydrocephalus due to aqueduct stenosis or posterior fossa tumours and has the advantage of avoiding shunt related complications. It is safe and effective for the majority of patients and has a significant role in the management of neurosurgical patients in the Caribbean.

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RESUMEN

Este estudio retrospectivo y descriptivo, examinó el perfil del paciente, el espectro de la enfermedad, las indicaciones y resultados del tratamiento, así como las complicaciones de un total de 27 pacientes sometidos a neuroendoscopia en el Hospital Universitario de West Indies (UHWI) por un periodo de tres años, de noviembre de 2000 de noviembre - cuando se introdujo el servicio por primera vez - hasta noviembre de 2003. Diecinueve (67.9%) eran hombres y ocho mujeres. Su edad promedio fue de 27.5 ± 21.4 años con un rango de cuatro meses a 70 años. De la totalidad del grupo, 20 presentaban hidrocefalo con presión intracraneal alta, y de ellos 15 tuvieron ventriculostomía endoscópica del tercer ventrículo (VET) para el tratamiento de hidrocefalo obstructivo, usando dos técnicas diferentes para la fenestración del piso ventricular. No hubo diferencia demostrable en cuanto a resultados, entre la técnica de chorro de agua y la de fórceps romos. Tres procedimientos no lograron aliviar el hidrocefalo, haciéndose necesarios subsiguientes derivaciones ventriculo-peritoneales. Tres pacientes tuvieron fenestraciones de quiste exitosas. Seis pacientes fueron sometidos a resección trans-esfenoidal con asistencia endoscópica para los tumores pituitarios. Se presentaron cinco complicaciones y no hubo muertes. La estancia promedio en el hospital fue de 18.4 ± 16.7 días y el seguimiento medio fue de 29 semanas. No hubo ningún fallo a última hora. La neuroendoscopia es el tratamiento elegido para el hidrocefalo obstructivo debido a estenosis del acueducto o tumores en la fosa posterior, y tiene la ventaja de evitar complicaciones relacionadas con las derivaciones. La neuroendoscopia es segura y efectiva para la mayoría de los pacientes, y desempeña un papel significativo en el tratamiento de los pacientes neuroquirúrgicos en el Caribe.

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INTRODUCTION

In recent years, endoscopes have been used to gain access to the brain, spine and peripheral nerves, allowing minimally invasive neurosurgery. Since its introduction by L'Espinase who inserted a paediatric endoscope into the ventricle of two

infants in 1910 (1), the first successful third ventriculostomy by Mixer in 1923 (2) and technological improvements including the introduction of rod lens lighting in 1960, endoscopy has grown immensely in its capabilities and application in neurosurgery (3).

Neuroendoscopy may be useful in the management of hydrocephalus, cystic lesions of the brain and spinal cord, tumours, vascular lesions, degenerative spine disease and nerve entrapments. Endoscopic third ventriculostomy has been recommended as the treatment of choice for obstructive hydrocephalus but the endoscope has been also used for the treatment of ventricular and arachnoid cysts, the biopsy and resection of intraventricular, pineal, sellar and other intracranial tumours, resection of colloid cysts of the third ventricle, fenestration of the septum pellucidum (septostomy) for hydrocephalus and the removal of retained ventricular catheters. It is also commonly applied to the endoscope-assisted resection of pituitary tumours. Its spinal applications include discectomy and sympathectomy. Carpal tunnel release is an example of its application to the treatment of peripheral nervous system diseases (3, 4).

However, the primary application of neuroendoscopy has been in the treatment of hydrocephalus which has a mortality of 20–25% if untreated and major physical and mental morbidity in survivors (5). While the introduction of shunts 50 years ago made hydrocephalus treatable, shunt complications occur in 40% of recipients during the first year after implantation and 50% during the second year (6). The frequency with which these complications occur is largely uninfluenced by the availability of numerous designs and touted technological advances (6). This persistent shunt related morbidity and mortality has stimulated interest in alternative treatments. Endoscopic third ventriculostomy for the treatment of hydrocephalus has the advantage of avoiding shunt related problems and does not mandate the permanent implantation of a foreign body with all its attendant potential complications thereafter (4, 6).

The goal of this study was to describe the indications, results and complications of neuroendoscopy at the UHWI since November 2000 when the service was first introduced. Literature research revealed no previous published report on neuroendoscopy from the English-speaking Caribbean.

DESIGN AND METHODS

This retrospective, descriptive study was conducted from the medical records and operative audit of the Department of Surgery, which identified 27 patients who had neuroendoscopy at the UHWI, during a three-year period between November 2000, when it was first introduced in Jamaica and November 2003. A Codman-Gaab rigid lens neuroendoscope was used in all cases and the procedure was conducted under general anaesthesia, using Ringers Lactate for irrigation.

All such patients were reviewed over this three-year period and all were included in the analysis. Data were

incomplete for nine patients due to absent documentation. Data were expressed as frequencies or means with standard deviations as appropriate and were analyzed using the Statistical Package for the Social Sciences (SPSS) version 10.0 for Windows software programme.

RESULTS

Twenty-seven patients had neuroendoscopy during the study period. Nineteen (67.9%) were males and eight were females. Their mean age was 27.5 ± 21.4 years with a range of four months to 70 years (Table 1).

In six cases, the endoscope was used as an adjunct to the trans-sphenoidal resection of pituitary tumours. Of the remaining 21 patients, all but one had hydrocephalus with raised intracranial pressure.

Examination was possible in two patients, but anatomical distortion made ventricular fenestration unsafe. Of the 18 patients in whom a fenestration procedure was performed, 15 had endoscopic third ventriculostomy (ETV) and three had cyst fenestrations. There were three failures (15%) and ventriculo-peritoneal shunts had to be inserted subsequently for persistent hydrocephalus. This was usually performed within a week.

Nine patients had obstructive hydrocephalus due to tumour obstruction of the ventricles (Tables 2, 3). Endoscopic third ventriculostomy failed in a patient who had a brain stem glioma but produced satisfactory relief of obstructive hydrocephalus in the other eight patients. The remaining six patients in this group had ETV for aqueduct stenosis, of which two failed. Four patients had a satisfactory result.

Table 1: Characteristics of patients

Characteristic (n = 27)	Mean \pm SD, range
Age (years)	27.5 \pm 21.4 (0.33-70)
Hospital stay (days)	18.4 \pm 16.7 (3-55)

Table 2: Operative procedures, indications and outcome

Operations	No	Aqueduct stenosis	Mass	Failed	Complications
Fenestration	18	6	9*	3	5
-ETV (15)					
-Cyst (3)					
Endoscope assisted surgery	6				-
Examination only	2				-
Lumbar discectomy	1				-
Total	27				5

Table 3: Diagnosis of mass

Diagnosis	No
Astrocytoma	3
Medulloblastoma	2
Haemangioblastoma	1
Thalamic tumour	1
Metastatic lung Ca	1
Abscess	1
Total	9

Of the entire group, three patients presented with blocked shunts and had ETV in an attempt to convert them to a shunt free status. Endoscopic third ventriculostomy was not possible in one of these patients due to distorted anatomy from multiple previous infections, failed in another patient with aqueduct stenosis who had had a shunt *in situ* for over ten years and succeeded in only one who had a longstanding shunt.

Three patients had cysts: one each in the third ventricle, the lateral ventricle and a parietal arachnoid cyst. One patient had lumbar discectomy done solely with the endoscope and had a satisfactory result as evaluated by complete resolution of pain.

Patients spent 3–55 days in hospital with a mean of 18.4 ± 16.7 days. Data were incomplete in this regard for nine patients. Mean follow up was 29 weeks. There was no evidence of late failures up to the time of this assessment. No patient required a second procedure.

The technique used for perforation of the ventricular floor varied in the series. In seven patients, a water jet delivered by a syringe was used for perforation; a blunt forceps technique was used in eight others who also had Fogarty balloon dilatation of the newly created opening. There was no demonstrable difference in outcome between the two groups. Each technique was associated with a hemiparesis on one occasion. Diathermy was used to create an opening in one of the patients with a ventricular cyst.

Complications occurred in the five patients who had third ventriculostomy: two patients had hemiparesis, one panhypopituitarism, one a subdural effusion and another had seizures associated with hyponatraemia. No deaths occurred. Endoscopic assisted trans-sphenoidal pituitary resection (EAS) was done in six patients without complications.

DISCUSSION

Investigations at the UHWI had suggested previously that the most common causes of hydrocephalus treated at that institution were aqueduct stenosis and tumour related ventricular obstruction, with post-meningitic hydrocephalus being far less common (unpublished data 2000). Endoscopy is therefore applicable to most patients who present to the UHWI with hydrocephalus.

Most of the patients in this series had tumour related obstructive hydrocephalus and were treated as emergencies, making it possible to schedule elective tumour resection at a later time when the patient was likely to be in a more optimal condition. In addition, our circumstances rarely permit emergency tumour resection due to the frequent unavailability of intensive care beds and nursing staff. It must be acknowledged that a policy of routine ETV for tumour related obstructive hydrocephalus may overtreat some patients who may never have needed CSF diversion (7). Endoscopic third ventriculostomy failed in a patient who had a brain stem glioma with probable obstruction of the basal cisterns associated with the tumour.

Endoscopic third ventriculostomy has been advocated as the treatment of choice for hydrocephalus due to aqueduct stenosis (8) with success rates reported to be 60–85% (8, 9). Our only failure in this group was a patient who had had a shunt *in situ* for ten years and presented with shunt obstruction. The attempt to convert him to a shunt-free status failed most likely because of the length of time he had been shunt dependent. Endoscopic third ventriculostomy has been recommended for the treatment of patients with blocked shunts who present for revision, in an effort to convert them to a shunt-free status (8). Endoscopic shunt placement for new shunts, once advocated as a means of lowering shunt revision rates by avoiding proximity of the shunt to the choroid plexus, has failed to live up to this promise (10).

While initial reports suggested that patients with communicating hydrocephalus due to previous haemorrhage and infection were unsuitable candidates for endoscopic third ventriculostomy, this has been challenged and relative success reported, except when both haemorrhage and infection co-exist (11). None of our patients had communicating hydrocephalus due to previous haemorrhage or infection.

Conclusions about long term benefit must be made with a degree of caution since late failure may in a few cases be clinically obscure and even result in death (12, 13). Ventricular size is not an immediate or entirely reliable index of success but MRI flow void demonstration can be done to confirm patency of the fenestration (14). Patients should be kept under review as for long-term follow-up of a shunt procedure and reassessed promptly if necessary (14–16).

In order to assess its cost effectiveness, the cost of ETV has been compared with a shunt procedure in Canada (17). Endoscopic third ventriculostomy cost C\$10 570 compared with C\$10 922 for a shunt procedure in one study where the ETV success rate for the treatment of aqueduct stenosis was 54%, below the approximately 75% generally reported (8) and obtained in this small group of patients. The higher success rate obtained at most institutions including our own and the lower cost makes ETV even more attractive as an alternative to an indwelling shunt.

Complications occurred in five patients; perhaps reflective of the learning curve which accompanies the introduction of most advances in surgery. Endoscopic third ventriculostomy has a mortality rate of 0.1%, 3% infection rate 2.3% haemorrhage rate, and 1.3% risk of a permanent neurological deficit (14). The two techniques used in our patients seemed to have equivalent results in this small sample. Overall, our results are comparable to those obtained in another series from the third world (18).

The endoscope has been used for tumour resection, particularly for intraventricular tumours of appropriate size. We have so far had no opportunity to apply it to the latter purpose.

Endoscopy may be used to assess the completeness of resection during transnasal, trans-sphenoidal pituitary resection or may be used as the sole method of creating a surgical corridor through which the operation may be done. The endoscope was used for the former purpose in six patients. It is not possible to quantify the contribution of this additional step (EAS) to the outcome of pituitary surgery at our institution but we will examine this in the future, particularly combined with neuronavigation, which may increase safety and efficacy and may result in more complete tumour removal as well as reduced hospital stay.

We recommend endoscopic fenestration as the treatment of choice for obstructive hydrocephalus in the Caribbean. The procedure is safe and effective for most patients and avoids the complications associated with indwelling ventricular shunts.

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