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**SPECTRUM OF NEUROSURGICAL OPERATIONS AT THE UNIOSUN TEACHING  
HOSPITAL, OSOGBO, NIGERIA**

## SPECTRUM OF NEUROSURGICAL OPERATIONS AT THE UNIOSUN TEACHING HOSPITAL, OSOGBO, NIGERIA

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### ABSTRACT

#### Introduction

The field of neurosurgery is growing in Nigeria and in many parts of Africa. Nonetheless, there is little information on the types of neurosurgical operations being performed in the country especially outside of the early-generation neurosurgery centres. This study details the spectrum of neurosurgical operations in a new generation neurosurgery centre.

#### Methods

A retrospective review of neurosurgical operations performed at the UNIOSUN Teaching Hospital, Osogbo, Nigeria from October 2011 to June 2022 was done. The neurosurgery operation register was reviewed for data on patients' demographics, clinical diagnoses, types of operations performed and kinds of anaesthesia used. Simple descriptive statistical analysis was done.

#### Results

269 operations were performed in 257 patients. Males were 175(68.1%). Their ages ranged from 10days to 96years with a mean of 38.5years. 62(24.1%) were children. The most common diagnoses were acute traumatic brain injury (57, 22.2%), chronic subdural haematomas (38, 14.8%), brain tumours (30, 11.7%), hydrocephalus (25, 9.7%) and lumbar spondylosis (22, 8.6%).

The most common procedures were burr holes (61, 22.7%), laminectomy (61, 22.7%), ventriculo-peritoneal shunt (27, 10.0%), craniotomy for tumour excision (25, 9.3%) and trauma craniotomy (24, 8.9%). Adjunct procedures included spinal stabilisation using Adeolu's technique (20, 7.4%), spinal wiring (5, 1.9%), lumbar discectomy (7, 2.6%) and skull-base repair (2, 0.7%). 148(55.0%) of the procedures were done as emergency. General anaesthesia with endotracheal intubation was the most common type of anaesthesia (200, 74.3%).

#### Conclusion

A wide spectrum of neurosurgical operations was performed. These were mostly carried out in male adults and as emergency procedures.

**Keywords:** Neurosurgery; Neurosurgical operations; Nigeria

### INTRODUCTION

The field of neurosurgery is growing in Nigeria as it is in many parts of Africa. The first formal neurosurgical operation in Nigeria was performed by the pioneer of neurosurgery in Nigeria, Professor E. Latunde Odeku on October 25, 1962, who was later joined by Emeritus Professor Adelola Adelaye to develop the neurosurgical services at the University College Hospital, Ibadan, Nigeria.<sup>1,2</sup> Thereafter, neurosurgical services were

provided in Lagos, Enugu, Jos and Sokoto in the early generation centres.

Following the training of a new set of neurosurgeons, neurosurgical services started in many centres across the country such as Ilorin, Ile-Ife, Nnewi, Abuja and Zaria among others. Despite the steady growth in the numbers of neurosurgical centres and the number of attending neurosurgeons in the country, there is little information on the types of neurosurgical operations being performed in the country especially outside of the early-generation neurosurgery centres.

Several reports from Nigeria have indicated the paucity of literature on many neurosurgical conditions and services in the country.<sup>3-8</sup> Hence, there is a need for studies such as this which details the spectrum of neurosurgical operations performed in a new generation neurosurgery centre.

## METHODS

A retrospective review of neurosurgical operations performed at the UNIOSUN Teaching Hospital, Osogbo, Nigeria, from October 2011 to June 2022 was done.

### *Hospital Setting*

UNIOSUN Teaching Hospital, Osogbo, Nigeria, was previously known as LAUTECH Teaching Hospital, Osogbo, Nigeria. It was initially jointly owned by the Oyo and Osun states of Nigeria and served as the teaching hospital to the Ladoke Akintola University of Technology, Ogbomosho, Nigeria. Following the dissolution of its joint ownership in 2021, the hospital acquired its current name and serves as the teaching hospital to the Osun State University, Osogbo.

The hospital receives patients mainly from Osun state and also from the neighbouring Oyo, Ondo, Ekiti and Kwara states of Nigeria with an estimated population base of five million people. Sometimes, clients come from the Republic of Benin where some indigenes of the state have relations.

The hospital's computerized tomographic (CT) scan machine has not been working in the last five years. Patients who need CT scans are sent to private radiology centres in the town. Patients had to go to other cities or states which are in the range of 60-100 kilometers away when those were faulty or before they were installed. Magnetic resonance imaging (MRI) machine is only available in neighbouring states. There is no dedicated neurosurgical intensive care unit (NICU). The general ICU is a four-bedded unit with 2-3 ventilators that work on and off.

### *Neurosurgery Personnel & Services*

EOK has been providing neurosurgical services in the hospital as a visiting neurosurgeon since 2003. TBR was initially a visiting neurosurgeon from the latter part of 2011, but started providing full-time services by mid-2012. He temporarily relocated to another centre from late 2020 to mid-2021. There are no neuro-anaesthetist or peri-operative nurses specific for neurosurgical services. These personnel serve the various surgical units in the hospital. Clinical services were disrupted in the hospital from 2015-2018 by series of industrial unrests and from 2020-2021 by restrictions and lock-downs occasioned by the COVID-19 pandemic.

### *Data Collection*

The neurosurgery operation register was reviewed for data on patients' demographics, clinical diagnoses, types of operations performed and the types of anaesthesia employed. The main procedure performed at a theatre session was taken into consideration while others done at the same session were taken as adjunct procedures. Patients below the age of 18 years were classified as children in line with the hospital's protocol.

### *Data Analysis*

Simple descriptive statistical analyses of the data were done using SPSS version 26 (IBM corp; 2019). Results are presented in texts and as frequencies and percentages in tables. Proportions were compared by Chi-square analyses. A p-value of <0.05 was considered statistically significant.



## RESULTS

### Demographics

Two hundred and sixty nine operations were performed in 257 patients. Males were 175 (68.1%). Their ages ranged from 10days to 96years with a mean age of 38.5years. 62(24.1%) were children. (Table 1)

### Clinical Diagnoses

The most common diagnoses were acute traumatic brain injury (57, 22.2%), chronic subdural haematomas (38, 14.8%), brain tumours (30, 11.7%) and hydrocephalus (25, 9.7%). Surgeries for lumbar spondylosis, spine trauma, stroke and craniospinal infections were done in 22(8.6%), 17(6.6%), 16(6.2) and 15(5.8%) respectively. Other diagnoses are as set out in Table 2. The clinical diagnoses according to age group are set out in table 3. Congenital malformations presented in childhood, trauma-related conditions were mostly in the young adults and middle age groups, while tumours and degenerative spine conditions were mostly in the middle age and elderly groups. These differences showed statistical significance with a Pearson Chi-square value of 383.3 and p-value of 0.00.

**Table 1: Demographics**

	Number (n)	Percentage (%)
<b>Sex Distribution</b>		
Male	175	68.1
Female	82	31.9
Total	257	100.00
<b>Age Distribution (years)</b>		
0-1	26	10.1
>1-10	19	7.4
11-20	28	10.9
21-30	23	8.9
31-40	30	11.7
41-50	41	16.0
51-60	34	13.2
61-70	40	15.6
71-80	9	3.5
81-90	6	2.3
91-100	1	0.4

**Table 2: Diagnoses**

Diagnosis	Number (n)	Percentage (%)
Acute traumatic brain injury (TBI)	57	22.2
Chronic subdural haematoma	38	14.8
Brain tumours	30	11.7
Hydrocephalus	25	9.7
Lumbar spondylosis	22	8.6
Spine trauma	17	6.6
Stroke	16	6.2
Cranio-spinal infections	15	5.8
Spine Tumour	11	4.3
Spina bifida	8	3.1
Cervical spondylosis	8	3.1
Encephalocele	3	1.2
Adeloye-Odeku Disease*	2	0.8
Arachnoid cyst (intracranial)	2	0.8
Syringomyelia	1	0.4
Craniosynostosis	1	0.4
Brachial Plexus Injury	1	0.4

\*Dermoid cyst over the anterior fontanelle

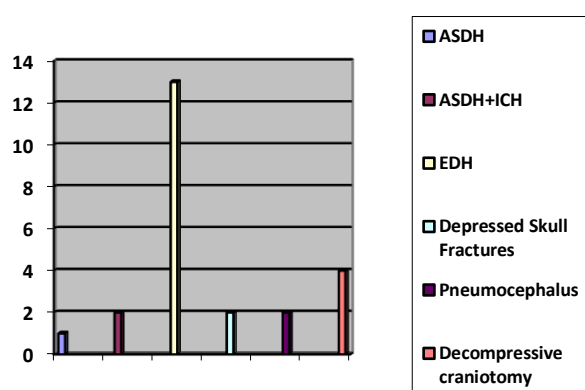
### Main Operative Procedures

The procedures performed were burr holes (61, 22.7%), laminectomy (61, 22.7%), ventriculoperitoneal shunt (27, 10.0%), craniotomy for tumour excision (25, 9.3%), trauma craniotomy (24, 8.9%), debridement  $\pm$  skull fracture elevation (19, 7.1%), external ventricular drain insertion (13, 4.8%), craniectomy (8, 3.0%), repair of spina bifida (8, 3.0%), and spinal wiring (4, 1.5%). Others were neuro-endoscopy (3, 1.1%), repair of encephalocele (3, 1.1%), dermoid cyst excision (2, 0.7%) and cystoperitoneal shunt (2, 0.7%). Nerve repair, craniotomy for stroke and removal of migrated spinal implant were done in 1(0.4%) each (Table 4). The neuro-endoscopy procedures were a case each of endoscopic third ventriculostomy, endoscopic trans-sphenoidal excision of a pituitary tumour and endoscopic fenestrations of septa of multi-loculated hydrocephalus. Details of craniotomies for trauma and tumour are provided in figures 1 and 2 respectively.

**Table 3: Summary of Diagnosis according to age group\***

Summary of Diagnosis																		
AGE GROUP (YRS)	ARACHNOID CYST	BRAIN TUMOUR	CERVICAL SPONDYLOSIS	CRANIOSYNOSTOSIS	CSDH	CVD	DERMOID	ENCEPHALOCOELE	HYDROCEPHALUS	INFECTION	LUMBAR SPONDYLOSIS	NERVE REPAIR	SPINA BIFIDA	SPINE TRAUMA	SPINE TUMOUR	SYRINX	TBI	TOTAL
0-1	0	0	0	1	0	0	2	2	15	0	0	0	6	0	0	0	0	26
1-10	2	2	0	0	0	0	0	1	5	0	0	0	2	0	0	0	7	19
11-20	0	9	0	0	0	0	0	0	3	6	0	0	0	1	2	0	7	28
21-30	0	0	0	0	2	0	0	0	1	2	2	0	0	4	1	0	11	23
31-40	0	4	0	0	4	3	0	0	0	1	1	1	0	6	0	0	10	30
41-50	0	8	1	0	6	1	0	0	1	4	6	0	0	1	4	0	9	41
51-60	0	3	1	0	10	4	0	0	0	1	6	0	0	0	2	1	6	34
61-70	0	4	4	0	9	6	0	0	0	1	5	0	0	5	1	0	5	40
71-80	0	0	2	0	2	2	0	0	0	0	2	0	0	0	0	0	1	9
81-90	0	0	0	0	4	0	0	0	0	0	0	0	0	0	1	0	1	6
91-100	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
<b>TOTAL</b>	<b>2</b>	<b>30</b>	<b>8</b>	<b>1</b>	<b>38</b>	<b>16</b>	<b>2</b>	<b>3</b>	<b>25</b>	<b>15</b>	<b>22</b>	<b>1</b>	<b>8</b>	<b>17</b>	<b>11</b>	<b>1</b>	<b>57</b>	<b>257</b>

\* Pearson Chi-square value = 383.3; p-value = 0.00.

**Figure 1: Trauma craniotomies**

### Adjunct Operative Procedures

The adjunct procedures included spinal stabilisation using Adeolu's technique (20, 7.4%), cranioplasty (1, 0.4%), spinal wiring (5, 1.9%), lumbar discectomy (7, 2.6%) and skull base repair (2, 0.7%).

### Timing of Operation

One hundred and forty eight (148, 55.0%) of the procedures were done as emergency. The rest (129, 45.0%) were performed on the weekly elective operating sessions.

### Anaesthesia

General anaesthesia with endotracheal intubation was utilized in 200(74.3%) sessions. Local anaesthesia using xylocaine (combined with adrenaline) was employed in 54(20.1%) cases which were mainly burr hole procedures. Other modes of anaesthesia were conscious sedation (14, 5.2%) and general anaesthesia via laryngeal mask airway (LMA) (1, 0.4%).

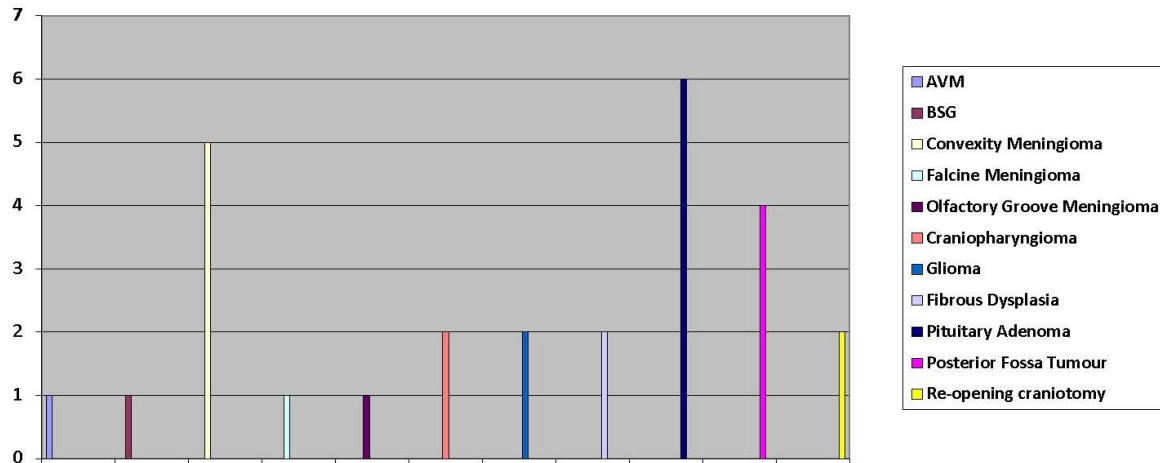
### Intra-operative complications

The major intra-operative complications were severe primary haemorrhage (4, 1.5%), cardiac arrest (successfully resuscitated) (1, 0.4%), unintended dural tears (3, 1.1%) and death (2, 0.7%).

**Table 4: Operative Procedures**

Procedure	Number (n)	Percentage
<b>CRANIAL SURGERY</b>		
Burr Hole	61	22.7
Chronic subdural haematoma (CSDH)*	(39)	(63.9)
Subdural empyema (SDE)	(4)	(6.6)
Cerebral Abscess	(4)	(6.6)
Intracerebral Haematoma (ICH)	(7)	(11.5)
Trauma	(3)	(4.9)
Stroke	(4)	(6.6)
Extradural Haematoma (EDH)	(2)	(3.3)
Pneumocephalus	(2)	(3.3)
Brain Tumour Biopsy	(1)	(1.6)
Cerebellar abscess	(2)	(3.3)
VP shunt	<b>27</b>	<b>10.0</b>
Tumour craniotomy	<b>25</b>	<b>9.3</b>
Trauma craniotomy	<b>28</b>	<b>10.4</b>
Scalp wound Debridement + Skull Fracture Elevation	<b>19</b>	<b>7.1</b>
External Ventricular Drain Insertion	<b>13</b>	<b>4.8</b>
Craniectomy	<b>8</b>	<b>3.0</b>
Extradural haematoma	(2)	(25.0)
Intracerebral Haematoma	(4)	(50.0)
Trauma	(3)	(37.5)
Stroke	(1)	(12.5)
Cerebellar haematoma (stroke)	(1)	(12.5)
Skull Osteomyelitis	(1)	(12.5)
Impaled foreign body (Nail)	(1)	(12.5)
Repair of encephalocele	<b>3</b>	<b>1.1</b>
Neuro-Endoscopy	<b>3</b>	<b>1.1</b>
Excision of Dermoid Cyst	<b>2</b>	<b>0.7</b>
Cysto-Peritoneal Shunt (CPS)	<b>2</b>	<b>0.7</b>
Strip craniectomy for craniosynostosis	<b>2</b>	<b>0.7</b>
Stroke craniotomy	<b>1</b>	<b>0.4</b>
<b>SPINAL SURGERY</b>		
Laminectomy	<b>61</b>	<b>22.7</b>
Lumbar Spondylosis	(25)	(41.0)
Spine Trauma	(12)	(19.7)
Cervical Spondylosis	(8)	(13.1)
Spine Tumour	(11)	(18.0)
Pott's Disease	(5)	(8.2)
Syringomyelia	(1)	(1.6)
Repair of Spina Bifida	<b>8</b>	<b>3.0</b>
Spinal Wiring	<b>4</b>	<b>1.5</b>
Removal of Migrated Spinal Implant	<b>1</b>	<b>0.4</b>
<b>PERIPHERAL NERVE SURGERY</b>		
Brachial Plexus Nerve repair	<b>1</b>	<b>0.4</b>
<b>TOTAL</b>	<b>269</b>	<b>100.0</b>

\*including 1 (complicating VP shunt for brain tumour hydrocephalus) done in combination with tumour excision



**Figure 2: Tumour craniotomies**

## DISCUSSION

This study showed that a wide-spectrum of neurosurgical conditions was operated upon at this tertiary level university hospital. Traumatic brain injury and a trauma-related condition, chronic subdural haematoma, predominate. The patients were mostly young male adults and in the middle-age group.

Burr holes and laminectomy were the most commonly performed procedures. These were closely followed by ventriculo-peritoneal shunt for CSF diversion, craniotomy for the excision of brain tumours and trauma craniotomies.

The male predominance in this study conforms with the sex distribution of neurosurgery patients in operated and non-operated cohorts reported from other parts of Nigeria and many parts of Africa.<sup>8,9,10</sup> This may be due to the leading role of trauma in the aetiology of neurosurgical conditions as males are more likely to engage in transport-related ventures that have been shown to be responsible for most cases of traumatic brain injury and spinal injury.<sup>11-14</sup>

The rate of burr holes performed in our centre is similar to that reported from

Ethiopia.<sup>10</sup> They were done mostly for the drainage of chronic subdural haematomas and generally under local anaesthesia.

Laminectomies were done mostly for degenerative disease of the spine affecting mainly the lumbar region (lumbar spondylosis). This pattern is similar to that reported from another African centre.<sup>10</sup> For lumbar spondylosis, laminectomies were sometimes combined with discectomy as indicated. We employed the Adeolu's technique in performing spinal stabilisation using Rush nails and spinal wires. The utility of this technique in resource-constrained settings such as ours has been documented.<sup>15,16</sup> We do not have the required imaging equipment and instrumentation for pedicle screw fixation and other advanced spinal procedures.

The mainstay of cerebrospinal fluid (CSF) diversion in our centre is ventriculoperitoneal (VP) shunt. This was augmented with endoscopic fenestration of multiple ventricular septa (using adapted urological cystoscope) in a child with multi-loculated hydrocephalus. A case of endoscopic third ventriculostomy was also performed using the cystoscope. Further use of the instrument was discontinued on

account of poor vision of the endoscope and its inappropriate size for neuro-endoscopy. Therefore, the non-availability of neuro-endoscope has not allowed more of such endoscopic procedures to be performed. As in our centre, VP shunt remains the mainstay of treating hydrocephalus in many parts of Nigeria and Africa although the use of endoscopic third ventriculostomy alone or in combination with other adjunct endoscopic procedures is increasing.<sup>17-21</sup>

The poor state of infrastructures in the hospital in the areas of neuro-imaging and operating room facilities/equipment and the erratic ICU back-ups were some of the challenges faced in managing neurosurgical patients in the centre and undoubtedly contributed to the low level of operated case loads. Patients who had cerebral aneurysms and those who needed advanced spine operations were, for example, referred to other facilities and such cases were, therefore, not reflected in this study.

As we did not review the full case records of the patients, details of the complications of surgeries performed and their outcome are beyond the scope of the current study. Only those stated in the operation register have been highlighted. Such review(s), when conducted, would give an insight into the impact of neurosurgical services being rendered in our centre and allow for a surgical audit of our services.

## CONCLUSION

A wide spectrum of neurosurgical operations was performed despite limitations of equipment and instrumentations. The operations done were mostly in male adults and as emergency procedures under mainly general anaesthesia.

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