Spectrum of Non-Emergency Neurosurgical Conditions in Maiduguri

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ABSTRACT

Background: Neurosurgical conditions are fairly common in our facility. They present to the emergency unit and trauma centre in an emergency state, and otherwise to the outpatient clinic of our facility. Our facility has three (3) neurosurgeons, addressing the growing burden of neurosurgical conditions. There is little information on the pattern of presentations of these non-emergency neurosurgical conditions to the outpatient clinic in our centre. **Objective**: To determine the pattern of presentations of non-emergency neurosurgical conditions at our facility's outpatient clinic. **Patients and Methods:** A prospective observational study that recruited all patients with non-emergency neurosurgical conditions who presented to the outpatient neurosurgical clinic of the University of Maiduguri Teaching Hospital from February 2023 to January 2024. Data was analyzed using a statistical package for social sciences (SPSS) version 26. **Results:** A total of 139 patients were recruited during the study period. The majority (67.6%) were males with a male-to-female ratio of 2.1:1. The most common age range at presentation was 17-45 years (37.4%) with a mean age of 37years ± 20.104 SD. Back pain (25.9%) from lumbar spondylosis was the most common clinical symptom, followed by weakness of the limbs (13.6%). Forty-six-point seven percent (65 patients) presented with cranial pathologies, while 49.7% (69 patients) presented with spinal pathologies. Spondylosis (27.3%) and hydrocephalus (9.4%) were the most common diagnoses at presentation in adults and children, respectively. Majority (62.6%) of the patients required surgical intervention at the time of presentation. **Conclusion:** Lumbar spondylosis and hydrocephalus are our facility's most common indications for outpatient neurosurgical consultations.

Keywords: Neurosurgical conditions, Outpatient clinic, Spectrum, Presentations, Maiduguri

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Introduction

Neurosurgical conditions contribute to the global burden of diseases. Some of these conditions are managed surgically, while others require non-surgical interventions.[1] Generally, they constitute about 15% of all surgical cases in low and middle income countries (LMICs), so the need for a huge workforce to address this burden cannot be overemphasized.[2] Despite the growing burden of neurosurgical conditions, there remains a global shortage of neurosurgeons, especially in low-resourced settings,[3-5] with few centres for neurosurgery training. Most practicing neurosurgeons in Nigeria are in the major cities, making neurosurgical care inaccessible to many patients, with many especially rural dwellers, travelling very long distances to access neurosurgical services. Consequently, most cases are left untreated, leading to increased morbidity and possible mortality.[6] Allocation of resources and further training of personnel to address the burden of

neurosurgical conditions require knowledge of the burden and pattern of clinical presentations.[7]

Maiduguri, the capital of Borno state, is one of the six states constituting northeast Nigeria. The state has a total population of 6,111,500 (2022) and shares a border with Niger Republic, Cameroun and Chad. Currently, the state has three (3) neurosurgeons, all practicing at the University of Maiduguri teaching hospital (UMTH), a tertiary health care centre located in Maiduguri, addressing the burden of neurosurgical conditions of the state and other neighboring countries. This translates to a ratio of one neurosurgeon to 2,037,166.7 populations, which is grossly inadequate. In our facility, emergency neurosurgical conditions present at the neurotrauma centre and the accident and emergency unit, while non-emergency ones go to the outpatient neurosurgical clinic. No study was done to determine the burden and pattern of these non-emergency neurosurgical conditions in the outpatient clinic in our centre.

Therefore, this study aimed to determine the pattern of presentations of non-emergency neurosurgical conditions in Maiduguri.

Methods: This prospective study reviewed all patients with non-emergency neurosurgical conditions who presented for the first time to the outpatient neurosurgical clinic of the University of Maiduguri Teaching Hospital, from February 2023 to January 2024. A convenience sampling technique was employed, in which all patients with non-emergency neurosurgical conditions were recruited as they presented consecutively. Patients' demographic characteristics, clinical presentations and diagnoses (cranial, spinal and peripheral) were entered into a well-designed proforma and analyzed using the Statistical Package for Social Sciences (SPSS) version 26. Results were presented in tables and pie charts. The p-value was set at 0.05.

Results: A total of 139 patients were reviewed during the study period. The majority (67.6%) were males with a male-to-female ratio of 2.1:1. The most common age range at presentation was 17-45 years (37.4%) with a mean age of 37 years ± 20.104 SD (table 1). Back pain (25.9%) was the most common clinical symptom, followed by weakness of the limbs (13.6%), table 2. One hundred and thirty six (97.8%) of the patients had a Glasgow coma scale score of 14-15 at presentation (figure 1). Sixty five (46.7%) patients presented with cranial pathologies; 56 (40.2%) had acquired pathology, while 9 (6.5%) had congenital conditions. The most common acquired and congenital cranial pathologies were brain tumors (20.8%) and hydrocephalus (5.8%), respectively (table 3). Of the 69 (49.7%) patients that presented with spinal pathologies; 57 (41.1%) had acquired, while 12 (8.6%) had congenital conditions. Lumbar spondylosis 13 (9.3%) and myelomeningocele 7 (5.0%) patients were the most common acquired and congenital spinal pathologies, respectively (table 4). The least common presentation was that of peripheral pathologies 5 (3.6%). Three (2.2%) of these patients presented with brachial plexus traction injury, and two (1.4%) with neurofibroma of the posterior neck and occiput. Eighty seven (62.6%) patients presented with pathologies requiring surgical intervention, 52 (37.4) presented with conditions that do not require surgical intervention.

Table 1: Demographic characteristics of participants

Variables	Number	Frequency (%)
Gender		
Male	94	67.6
Female	45	32.4
Total	139	100
Age (years)		
0-1	21	15.1
2-6	10	7.2
7-12	7	5.0
13-16	4	2.9
17-45	52	37.4
46-65	37	26.6
>65	8	5.8
Total	139	100

Table 2: Clinical presentations of the study participants

Variables	Number	Frequency (%)
Cranial symptoms		
Headache	12	8.6
Altered consciousness	9	6.5
Seizure	8	5.8
Visual impairment	2	1.4
Gait abnormality	8	5.8
Hemiparesis	4	2.8
Head enlargement	12	8.6
Scalp swellings	5	3.6
Others	5	3.6
Spinal/peripheral symptoms		
Back swellings	8	5.8
Back pain	36	25.9
Neck pain	10	7.2
Limbs weakness	15	10.8
Peripheral swellings	1	0.7
Others	4	2.9
Total	**139**	**100**

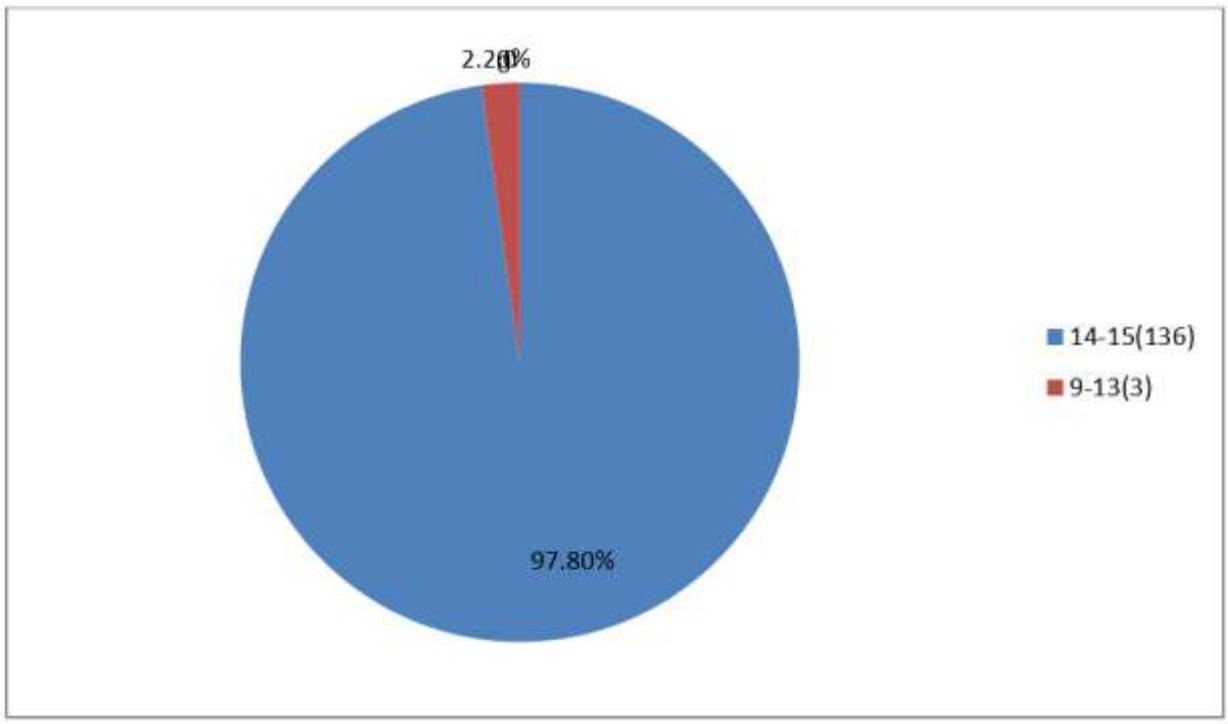

Figure 1: Glasgow coma scale of study participants at presentation

Table 3: Diagnosis-cranial pathologies

Variables	Number	Frequency (%)
Congenital		
Hydrocephalus	8	5.8
Encephalocele	1	0.7
Acquired		
Head injury		
Mild	9	6.5
Moderate	2	1.4
Supratentorial tumors		
Meningioma	11	7.9
Glioma	3	2.2
Pituitary adenoma	4	2.9
Metastasis	1	0.7
Craniopharyngioma	1	0.7
Infratentorial tumors		
Pilocytic astrocytoma	5	3.6
Medulloblastoma	2	1.4
Ependymoma	0	0.0
Others	2	1.4
Hydrocephalus	5	3.6
Others	11	7.9

Table 4: Diagnosis- spinal pathologies

Variables	Number	Frequency (%)
Congenital		
Meningocele	1	0.7
Myelomeningocele	7	5.0
Lipomyelomeningocele	1	0.7
Others	3	2.2
Acquired		
Spinal cord injury		
Cervical	5	3.6
Thoracic	3	2.2
Lumbar	0	0.0
Spondylosis		
Cervical	12	8.6
Lumbar	13	9.3
Cervical/Lumbar	4	2.9
Lumbosacral	9	6.5
Disc prolapsed	8	5.8
Pott's disease		
Cervical	0	0.0
Thoracic	3	2.2
Lumbar	0	0.0

Discussion

The neurosurgical clinic represents a specialized service where neurosurgeons review patients to ascertain the presence and extent of nervous system pathologies and the spine.[8] It serves as an avenue for obtaining information regarding the burden and pattern of presentations of non-emergency neurosurgical conditions in our facility.

Our study showed male predominance with a male-to-female ratio of 2.1:1, consistent with the findings of Winkler *et al.* in Tanzania and Farhan *et al.* in Pakistan,[7,9] even though their study designs slightly differ, as all patients with neurosurgical conditions were considered rather than non-emergency cases that presented to the outpatient clinic. Our finding was contrary to that of Menegatti *et al.* in Italy and Von Gaudecker *et al.* in Kenya, who reported female preponderance in outpatient neurosurgical presentations.[8,10] The male predominance in our study could be attributed to the better health seeking behaviour of males than females in our environment.

The most common age range at presentation was 17-45 years, with only eight patients (5.8%) presenting above 65, similar to the findings of other authors.[8,10] This shows that non-emergency neurosurgical conditions commonly occur among the productive age group in the study area. Therefore, early diagnosis and treatment is paramount, as the loss of productive days by affected members may push the household into poverty with consequent impact on the community's growth and economic development.

The most common reasons for outpatient neurosurgical clinic visits in adults and children were back pain (25.9%) and head enlargement (8.6%), respectively. Our findings were contrary to that of Winkler *et al* and Farhan *et al* that reported altered level of consciousness/loss of consciousness and back/scalp swelling in patients with traumatic brain injury and neural tube defects respectively.[7,9] The fact that only non emergency neurosurgical conditions were considered in our study could explain why altered level of consciousness in patients with traumatic brain injury was not the most common reason for outpatient consultation in our facility, as most of these patients present to the neurotrauma centre of our facility in the acute setting. Neural tube defects are fairly common in our environment, however, were not the most common reason for outpatient consultations among children in our centre, as these congenital abnormalities mostly present to the special baby care unit (SCBU) from where they have access to our neurosurgical services.

Spinal pathologies (49.7%) were slightly more prevalent than cranial pathologies (46.7%) at the time of presentation. Peripheral pathologies (3.6%) were the least common indication for outpatient neurosurgical consultations in our facility, probably because cosmetic which is the main reason for presentation, especially in patients with neurofibroma, is given less priority. So also, the fact that these patients may present to the plastic surgeons as well, may account for the few number of cases recorded in our study. Our findings conform to those of Menegatti *et al.* in Italy in private and public outpatient neurosurgical clinics.[8]

Our top four diagnoses were spondylosis (38 patients), brain tumors (29 patients), hydrocephalus (13 patients) and neural tube defects (12 patients). However, Winkler *et al.* reported traumatic brain injury, tuberculosis of the spine, spina bifida and space-occupying cerebral lesions as the top four diagnoses in a hospital-based prospective study on the pattern of neurosurgical disorders in rural northern Tanzania,[7] where both emergency and nonemergency patients were considered which accounted for why traumatic brain injury was the most prevalent. However, excluding the emergency presentation (traumatic brain injury) in Winkler *et al* study, tuberculosis of the spine was the most prevalent nonemergency presentation as opposed to spondylosis in our study. The availability of an effective national tuberculosis control program in Nigeria may explain why tuberculosis of the spine was not among the top four diagnoses in our study.

Our findings were also contrary to that of Farhan *et al.* in Pakistan, who reported neurotrauma, neural tube defects, chronic subdural haematoma and hydrocephalus.[9] The differences could be attributed to the fact that most of our neurotrauma cases present to the neurotrauma centre of our facility in the acute setting.

The most common diagnosis in adults was spondylosis, precisely lumbar spondylosis, followed by head trauma and meningioma. It was in variance to the findings of Farhan *et al.* that reported neurotrauma and chronic subdural haematoma in adults.[9] Even though our centre has the facilities for

the treatment of these common conditions, more effort is needed to ensure the availability of implants for spinal instrumentation as well as a functioning operating microscope for meningioma and other brain tumor surgeries. So also, the need for resource allocation and further training of personnel on minimal access spine surgery cannot be overemphasized, as the expertise is lacking in our facility.

Among paediatric patients, hydrocephalus was the most prevalent, followed by neural tube defects, which agrees with other authors' findings.[9,11] Majority of the hydrocephalus were acquired, probably due to the high incidence of poorly treated meningitis in our environment. Ventriculoperitoneal shunt is the only surgical treatment we offer to patients with hydrocephalus, as the expertise and facility for endoscopic third ventriculostomy (ETV) are nonexistent. This was similar to the findings of Rana *et al.* in Pakistan.[12] It was reported that in developing nations, neuroendoscopic procedures are the most effective, as they require less revision and continued care appointments for patients with childhood hydrocephalus.[13] Therefore, the provision of facilities for ETV and the expertise is needed to provide optimal surgical care to our facility's most prevalent pediatric neurosurgical condition.

Brain tumors (20.8%) constitute quite a significant number, with meningioma seen in adult patients being the most common. Our finding was consistent with that of other authors.[14,15] However, it was contrary to that of Dobec-Meic *et al* in Croatia that reported gliomas as the most common intracranial neoplasms.[16] This could be attributed to the racial differences in the populations under study. Blacks were reported to have higher incidence of meningioma than other racial groups.[17] Pilocytic astrocytoma was the most common intracranial tumor in children, followed by medulloblastoma, which agrees with other authors' findings.[18,19]

Most (62.6%) of the patients required surgical intervention at presentation, contrary to the 15.76% and 11.45% reported by Menegatti *et al.* in Italy in public and private neurosurgical outpatient clinics respectively.[8] This could be attributed to the delay in presentation in our setting, as most patients do not avail themselves for medical care until symptoms became unbearable.

Our prospective observational study showed the burden and pattern of presentations of non-emergency neurosurgical conditions to the outpatient neurosurgical clinic of university of Maiduguri teaching hospital over one year. The short duration of the study and modest number of patients seen are some of the limitations of this study.

Conclusion: Spondylosis in adults and hydrocephalus in children are the most common diagnoses in the outpatient neurosurgical clinic of our facility in Maiduguri. The majority required surgical intervention at the time of presentation. Therefore, a concerted effort is needed in terms of an increase in workforce, further training of available personnel and resource allocation torward the management of these common cases.

Conflict of interest

The authors declare that they have no competing interests

Authors' contribution

Usman Daibu wrote the greater part of the work. Babagana Usman and Babagana Mohammed helped develop the work and review it.

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