Neurosurgery in rural Nigeria: A prospective study

Taopheeq Bamidele Rabi^{1,2}, Edward Oluwale Komolafe^{1,3}

¹Department of Surgery, Division of Neurological Surgery, Federal Medical Centre, Ido-Ekiti, ²Department of Surgery, Division of Neurological Surgery, Lautech Teaching Hospital, Osogbo, ³Department of Surgery, Division of Neurological Surgery, Obafemi Awolowo University Teaching Hospitals Complex, Ile-Ife, Nigeria

ABSTRACT

Background: Africa has very few neurosurgeons. These are almost exclusively in urban centers. Consequently, people in rural areas, most of the African population, have poor or no access to neurosurgical care. We have recently pioneered rural neurosurgery in Nigeria. **Objectives:** This report details our initial experiences and the profile of neurosurgical admissions in our center. **Methods:** A prospective observational study of all neurosurgical patients managed at a rural tertiary health institution in Nigeria from December 2010 to May 2012 was done. Simple descriptive data analysis was performed. **Results:** A total of 249 males (75.2%) and 82 females (24.8%) were managed. The median age was 37 years (range: Day of birth – 94 years). Trauma was the leading cause of presentation with 225 (68.0%) and 35 (10.6%) having sustained head and spinal injuries, respectively. Operative intervention was performed in 54 (16.3%). Twenty-four (7.2%) patients discharged against medical advice, mostly for economic reasons. Most patients (208, 63.4%) had satisfactory outcome while 30 (9.1%) died. **Conclusion:** Trauma is the leading cause of rural neurosurgical presentations. There is an urgent need to improve access to adequate neurosurgical care in the rural communities.

Key words: Africa, Nigeria, rural neurosurgery, rural surgery

Introduction

Africa has the highest burden of diseases globally.^[1] Although little is factually known of the burden of surgical diseases,^[2] 11% of the global burden of diseases may be attributable to surgically treatable causes.^[3] In Africa, the Bellagio report of 2007 concluded that a significant burden of disease is attributable to surgical conditions in Sub-Saharan Africa.^[4] Access to surgical care in developing countries remains scarce, and this is even more so for neurosurgery.^[2]

Africa has very few neurosurgeons. A recent estimate put the ratio of neurosurgeons in Africa to population at 1 neurosurgeon: 4,000,000 people.^[5] This low ratio has made neurosurgical services unavailable to a large section of the population. The problem of African

neurosurgery has been the focus of several recent publications.^[5-9] The outlook in Nigeria is even worse with about 27 neurosurgeons serving an estimated population of 170 million (ratio of 1:6.3 million). The African neurosurgeons are, almost exclusively, in urban centers. As of 2011, a United Nations report estimated that 632 million people, representing 60.4% of Africa's population, live in rural areas.^[10] Many of these people have poor or no access to neurosurgical care.

We pioneered full-time rural neurosurgery in Southwestern Nigeria in November 2010. The hospital is a federal government-owned tertiary health center located in Ido-Ekiti, which is a remote and rural suburb in Southwestern Nigeria. The hospital caters for the health needs of Ekiti State and neighboring communities in Osun, Ondo, and Kwara states with an estimated population of 5 million people in its catchment areas. We have an intensive care unit equipped with two ventilators. The center has no computerized tomographic

Address for correspondence:

Dr. Taopheeq Bamidele Rabi, Department of Surgery, Division of Neurological Surgery, Lautech Teaching Hospital, Osogbo, Nigeria. E-mail: eshohealth@gmail.com

Access this article online

Quick Response Code:

Website:

www.ruralneuropractice.com

DOI:

10.4103/0976-3147.188624

This is an open access article distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 3.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as the author is credited and the new creations are licensed under the identical terms.

For reprints contact: reprints@medknow.com

How to cite this article: Rabi TB, Komolafe EO. Neurosurgery in rural Nigeria: A prospective study. J Neurosci Rural Pract 2016;7:485-8.

or magnetic resonance imaging machine. We rely on machines in urban centers which are on the average 80 km away for specialized neuroimaging. There are also no facilities for neuroendoscopy and fluoroscopy. This report details our initial experiences and the profile of neurosurgical admissions in our center.

Methods

We kept a prospective database of all neurosurgical inpatients managed at our center from December 2010 to May 2012. The data included patient demography, nature and course of diseases, neuroimaging findings, details of management, and outcome of care. Outcomes were assessed using the Glasgow outcome scale and Frankel grading of spinal cord injuries depending on the disease type. Glasgow outcome scores of 4 and 5 and Frankel Grades D and E were considered satisfactory. We performed simple descriptive statistics of the data.

Results

Demographics

We managed a total of 331 patients: 249 males (75.2%) and 82 females (24.8%). The median age was 37 years (range: day of birth – 94 years). Majority of the patients were adults (280, 84.6%) although most patients (224, 67.7%) were below the age of 45 years [Table 1].

Disease profile

Trauma was the leading cause of presentation with 269 patients (81.3%) having trauma-related conditions. 225 (68.0%) and 35 (10.6%) patients sustained head and spinal injuries, respectively [Table 2]. Most trauma cases were due to road traffic crashes (RTCs) (216, 80.3%). Other causes of trauma were assault (19, 7.1%), fall at home (flat surface) 4 (1.5%), fall from height 20 (7.4%), gunshot wound to the head (2, 0.7%), fallen trees (2, 0.7%), and trivial head banging (3, 1.1%). Of the head injury patients, 149 (66.2%), 33 (14.7%), and 43 (19.1%) had mild, moderate, and severe traumatic brain injuries, respectively. The other conditions were tumors (23, 6.9%), spondylosis (18, 5.4%), spina bifida (7, 2.1%), and hydrocephalus (6, 1.8%). Subacute/chronic subdural hematomas, intracranial infections, and encephalocoele were responsible for presentation by 7, 5, and 2 patients, respectively. One patient each presented with craniostylosis, postlaminectomy cervical deformity, and birth trauma with a huge subgaleal hematoma.

Interventions

Fifty-four patients were managed operatively (operation rate: 16.3%). The procedures are detailed in Table 2 and included: Trauma craniotomy,^[11] craniotomy for tumor

Table 1: Patient demographics

	No	%
Sex		
Male	249	75.2
Female	82	24.8
Age (Years)		
0-15	51	15.4
>15-45	173	52.3
>45-65	69	20.8
>65	38	11.5

Table 2: Pattern of disease conditions

	No	%
Trauma		
Head Injury	225	67.9
Mild	149	66.2
Moderate	33	14.7
Severe	43	19.1
Spinal Injury		
Cervical	18	51.4
Thoracic	14	40.0
Lumbar	3	8.6
Birth trauma	1	0.3
Congenital Malformations		
Hydrocephalus	6	1.8
Spina Bifida	7	2.1
Encephalocoele	2	0.6
Craniostylosis	1	0.3
Tumours		
Spinal	11	3.3
Brain	11	3.3
Scalp	1	0.3
Spondylosis	18	5.4
Post-laminectomy cervical deformity	1	0.3
Subacute/Chronic subdural haematoma	7	2.1

excision,^[12] elevation of depressed skull fractures,^[11] decompressive laminectomies,^[13] and burr hole for hematoma^[4] and abscess^[14] drainage. Other procedures are spinal stabilizations,^[13] ventriculoperitoneal shunting,^[11] and spinal tumor excision.^[15] Two cases each of spina bifida and encephalocoele were repaired.

Outcomes

A total of 210 patients (63.4%) had satisfactory outcome [Table 3]. Thirty (9.1%) had severe disabilities while 23 (6.9%) were referred to other facilities because of proximity to relations or for management facilities not available in our center. Thirty-eight patients (11.5%) discharged themselves against medical advice while thirty patients (9.1%) died. The median follow-up period is 9 months (range 1–20 months).

Discussion

Access to surgical care and especially neurosurgical care is poor in rural areas of the world.^[11,12] This is even

Table 3: Summary of outcomes

	No	%
Good	182	54.9
Moderate disability	28	8.5
Severe Disability	30	9.1
DAMA	38	11.5
Referred	23	6.9
Death	30	9.1

Good: GOS 5/Frankel E, Moderate disability: GOS 4/Frankel D, Severe disability: GOS 3/Frankel, A, B, C DAMA: Discharged Against Medical Advise (including 3 cases of abscondment)

more so in Africa.^[4] In Nigeria, neurosurgical services have only been available in major cities before the commencement of neurosurgical services in our center. That effectively hampered access to neurosurgical care for many of the large and growing Nigerian population who are mostly resident in rural areas.

In line with various earlier reports from both urban and rural centers, neurotrauma was the leading cause of admission to our service.^[11-13,15,16] A large number of our patients were admitted for injuries resulting from RTCs. This is the pattern from several other reports from developing countries.^[13,15-17]

The low rates of congenital malformations of the central nervous systems in our series are different from the pattern of higher numbers reported in recent literature from urban centers in Nigeria.^[13,14,18] It is possible that the actual incidences vary between the rural and urban centers which may suggest either compliance with folic acid use or less exposure to such risk factors as teratogenic drugs and irradiation. However, a more plausible explanation may be that the parents of children with congenital anomalies are less inclined to seek care in rural than urban areas of Nigeria. This second hypothesis may be supported by the fact that parents of five of the children with spina bifida declined surgery. Furthermore, we have previously shown that periconceptional use of folic acid is poor in Nigeria.^[19] As such folate, use should not explain these differences.

The pattern of head injury cases seen in our rural service generally followed the pattern reported from other rural and urban centers with mild cases more in number than severe cases which are also more than the moderate ones.^[16,20,21] Our overall mortality rate of 9.1% is also similar to that reported from rural Tanzania.^[21]

This pioneer documentation of the pattern of neurosurgical disorders in rural Nigeria calls attention to the burden of neurosurgical diseases in rural areas and may help to reecho the position of Ivers *et al.* that “providing surgical care in resource-constrained

settings is an issue of global health equity and must be featured in national and international discussions on the improvement of global health.”^[22]

Conclusion

Trauma is the leading cause of rural neurosurgical presentations. Improving access to neurosurgical care in the rural communities is needed to reduce the overall global burden of diseases.

Acknowledgment

We would like to thank Dr. (Mrs) Ololade Ojo, the former Medical Director of the Federal Medical Centre, Ido-Ekiti, Nigeria, who provided the enabling environment to pioneer rural neurosurgery in Nigeria. We also appreciate the contributions of all members of staff of the hospital to the proper functioning of the new unit.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

References

1. World Health Organization. The Global Burden of Disease: 2004 Update. Geneva: World Health Organization; 2008. p. 39-49.
2. Taira BR, Kelly McQueen KA, Burkle FM Jr. Burden of surgical disease: Does the literature reflect the scope of the international crisis? *World J Surg* 2009;33:893-8.
3. Debas HT, Gosselin R, McCord C, Thind A. Surgery. In: Disease control priorities in developing countries. 2nd ed. New York: Oxford University Press; 2006. p. 1245-60.
4. Bellagio Essential Surgery Group. Improving Access to Surgery in Sub-Saharan Africa. 2007. Available from: <http://www.dcp2.org/file/137/Bellagio%20Report%20-%20Increasing%20Access%20to%20Surgical%20Services.pdf>. [Last accessed on 2012 Dec 12].
5. Dechambenoit G. Action Africa! *World Neurosurg* 2010;73:251-3.
6. de Villiers JC. A place for neurosurgery in a developing country? *Surg Neurol* 1996;46:403-7.
7. El-Fiki M. African neurosurgery, the 21st-century challenge. *World Neurosurg* 2010;73:254-8.
8. Park BE. The African experience: A proposal to address the lack of access to neurosurgery in rural Sub-Saharan Africa. *World Neurosurg* 2010;73:276-9.
9. Vargas J, Mayegga E, Nuwas E, Ellegala DB, Kucia EJ, Nicholas J. Brain surgery in the bush: Adapting techniques and technology to fit the developing world. *World Neurosurg* 2013;80:e91-4.
10. United Nations. Department of Economic and Social Affairs, Population Division. *World Urbanization Prospects, the 2011 Revision: Highlights*. New York; 2012.
11. Bishop CV, Drummond KJ. Rural neurotrauma in Australia: Implications for surgical training. *ANZ J Surg* 2006;76:53-9.
12. Agrawal D. Transforming trauma healthcare delivery in rural areas by use of an integrated call center. *J Emerg Trauma Shock* 2012;5:7-10.
13. Emejulu JK, Osuafor C, Ogbuagu CN. Audit of the demographic pattern of neurosurgical cases in a tertiary health institution: The need to relate

- service delivery to disease profile in dwindling resources and manpower shortage. *AJNS* 2009;28.
14. Adeleye AO, Olowookere KG. Central nervous system congenital anomalies: A prospective neurosurgical observational study from Nigeria. *Congenit Anom (Kyoto)* 2009;49:258-61.
 15. Adeolu AA, Abiona TC, Komolafe EO, Adeolu JO, Adegbehingbe OO. Epidemiology of neurotrauma in Ife-Ijesha zone of Nigeria. *World Neurosurg* 2013;80:251-4.
 16. Agius S, Ansari S, Zrinzo A. Pattern of head injuries in Malta (EU): A small Mediterranean Island. *Br J Neurosurg* 2012;26:212-5.
 17. Beavogi K, Suare IS, Barry AO, Diallo MS, Haba M, Camara AM, *et al*. Investigation of epidemiology of neurotrauma in the Republic of Guinea. *Zh Vopr Neirokhir Im N N Burdenko* 2011;75:38-41.
 18. Idowu OE, Apemiye RA. Outcome of myelomeningocele repair in sub-Saharan Africa: The Nigerian experience. *Acta Neurochir (Wien)* 2008;150:911-3.
 19. Rabiu TB, Tihamiyu LO, Awoyinka BS. Awareness of spina bifida and periconceptional use of folic acid among pregnant women in a developing economy. *Childs Nerv Syst* 2012;28:2115-9.
 20. Emejulu JK. Epidemiological patterns of head injury in a newly established neurosurgical service: One-year prospective study. *Afr J Med Med Sci* 2008;37:383-8.
 21. Winkler AS, Tluway A, Slottje D, Schmutzhard E, Härtl R; East African Neurosurgical Research Collaboration. The pattern of neurosurgical disorders in rural Northern Tanzania: A prospective hospital-based study. *World Neurosurg* 2010;73:264-9.
 22. Ivers LC, Garfein ES, Augustin J, Raymonville M, Yang AT, Sugarbaker DS, *et al*. Increasing access to surgical services for the poor in rural Haiti: Surgery as a public good for public health. *World J Surg* 2008;32:537-42.

Author Help: Online submission of the manuscripts

Articles can be submitted online from <http://www.journalonweb.com>. For online submission, the articles should be prepared in two files (first page file and article file). Images should be submitted separately.

1) First Page File:

Prepare the title page, covering letter, acknowledgement etc. using a word processor program. All information related to your identity should be included here. Use text/rtf/doc/pdf files. Do not zip the files.

2) Article File:

The main text of the article, beginning with the Abstract to References (including tables) should be in this file. Do not include any information (such as acknowledgement, your names in page headers etc.) in this file. Use text/rtf/doc/pdf files. Do not zip the files. Limit the file size to 1 MB. Do not incorporate images in the file. If file size is large, graphs can be submitted separately as images, without their being incorporated in the article file. This will reduce the size of the file.

3) Images:

Submit good quality color images. Each image should be less than 4096 kb (4 MB) in size. The size of the image can be reduced by decreasing the actual height and width of the images (keep up to about 6 inches and up to about 1800 x 1200 pixels). JPEG is the most suitable file format. The image quality should be good enough to judge the scientific value of the image. For the purpose of printing, always retain a good quality, high resolution image. This high resolution image should be sent to the editorial office at the time of sending a revised article.

4) Legends:

Legends for the figures/images should be included at the end of the article file.