Kenya

Hospitals

Nairobi

History

Neurosurgery, in one form or another, has a long tradition in Kenya. Early skull trepanations in Kenya were reported by previous studies, which reveal that these procedures have a long tradition, being passed down from generation to generation. Modern neurosurgical development in Kenya has its origins in the late 1940s when the first elective neurosurgical procedures were performed by Dr. J. F. Jarvis, Chief of Head and Neck Surgery at the now Kenyatta National Hospital, when he operated on anterior encephaloceles, and later also performed anterior third ventriculostomy for hydrocephalus. Formal neurosurgery developed from these initial steps, with the arrival of the first trained specialist, Dr. Renato Ruberti, whose pioneering efforts resulted in the founding of the Neurological Society of Kenya (NSK), the Pan African Association of Neurological Sciences (PAANS), and the African Federation of Neurosurgical Societies (AFNS). The last quarter of the 20th century has seen the progress of neurosurgery reach its present respectable levels, with dedicated and well-trained Kenyan neurosurgical specialists focusing not only on its practice but diligently pursuing its development [1)].

A shortage of neurosurgeons and a lack of knowledge of neuroendoscopic management of hydrocephalus limits modern care in sub-Saharan Africa. Hence, a mobile teaching project for endoscopic third ventriculostomy (ETV) procedures and a subsequent program to develop neurosurgery as a permanent specialty in Kenya and Zanzibar were created and sponsored by the Neurosurgery Education and Development Foundation (NED) and the Foundation for International Education in Neurological Surgery. The objective of this work was to evaluate the results of surgical training and medical care in both projects from 2006 to 2013.

Two portable neuroendoscopy systems were purchased and a total of 38 ETV workshops were organized in 21 hospitals in 7 different countries. Additionally, 49 medical expeditions were dispatched to the Coast General Hospital in Mombasa, Kenya, and to the Mnazi Mmoja Hospital in Zanzibar.

From the first project, a total of 376 infants with hydrocephalus received surgery. Six-month follow-up was achieved in 22%. In those who received follow-up, ETV efficacy was 51%. The best success rates were achieved with patients 1 year of age or older with aqueductal stenosis (73%). The main causes of hydrocephalus were infection (56%) and spina bifida (23%). The mobile education program interacted with 72 local surgeons and 122 nurses who were trained in ETV procedures. The second project involved 49 volunteer neurosurgeons who performed a total of 360 nonhydrocephalus neurosurgical operations since 2009. Furthermore, an agreement with the local government was signed to create the Mnazi Mmoja NED Institute in Zanzibar.

Mobile endoscopic treatment of hydrocephalus in East Africa results in reasonable success rates and has also led to major developments in medicine, particularly in the development of neurosurgery specialty care sites [2)]

Spontaneous subarachnoid haemorrhage

Waveru et al., conducted a retrospective multicentre cross sectional study involving patients admitted with SAH to three referral hospitals in Nairobi. All patients with a confirmed (primary) discharge diagnosis of first-time SAH between January 2009 and November 2017 were included (n = 158). Patients who had prior head trauma or cerebrovascular disease (n = 53) were excluded. Telephone interviews were conducted with surviving patients or their next of kin to assess out-of-hospital outcomes (including functional outcomes) based on modified Rankin Scale (mRS) scores. Chi-square and Fisher's exact tests were used to assess associations between mortality and functional outcomes and sample characteristics.

Of the 158 patients sampled, 38 (24.1%) died in hospital and 42 (26.6%) died within 1 month. In total, 87 patients were discharged home and followed-up in this study, of which 72 reported favourable functional outcomes (mRS ≤2). This represented 45.6% of all patients who presented alive, pointing to high numbers of unfavourable outcomes post SAH in Kenya.

Mortality following SAH remains high in Kenya. Patients who survive the initial ictus tend to do well after treatment, despite resource constraints. : The study findings should be interpreted with caution because of unavoidable limitations in the primary data. These include its retrospective nature, the high number of patients lost to follow up, missing records and diagnoses, and/or possible miscoding of cases [3)].

1: Mansouri A, Chan V, Njaramba V, Cadotte DW, Albright AL, Bernstein M. Sources of delayed provision of neurosurgical care in a rural kenyan setting. Surg Neurol Int. 2015 Feb 25;6:32. doi: 10.4103/2152-7806.152141. eCollection 2015. PubMed PMID: 25745587.

2: Ochieng' N, Okechi H, Ferson S, Albright AL. Bacteria causing ventriculoperitoneal shunt infections in a Kenyan population. J Neurosurg Pediatr. 2015 Feb;15(2):150-5. doi: 10.3171/2014.10.PEDS14178. Epub 2014 Nov 28. PubMed PMID: 25431903.

3: Albright AL. Distal spinal cord stimulation in infants with myelomeningoceles: preliminary study. J Neurosurg Pediatr. 2015 Feb;15(2):220-2. doi: 10.3171/2014.10.PEDS14202. Epub 2014 Nov 21. PubMed PMID: 25415251.

4: Donald KA, Kakooza AM, Wammanda RD, Mallewa M, Samia P, Babakir H, Bearden D, Majnemer A, Fehlings D, Shevell M, Chugani H, Wilmshurst JM. Pediatric Cerebral Palsy in Africa: Where Are We? J Child Neurol. 2014 Oct 7. pii: 0883073814549245. [Epub ahead of print] PubMed PMID: 25296926.

5: Virk JS, Tripathi S, Randhawa PS, Kwasa EA, Mendoza ND, Harcourt J. Tumour resection volumes and facial nerve outcomes for vestibular schwannomas. Indian J Otolaryngol Head Neck Surg. 2014 Jun;66(2):191-5. doi: 10.1007/s12070-014-0714-6. Epub 2014 Mar 25. PubMed PMID: 24822161; PubMed Central PMCID: PMC4016355.

6: Nishioka K, Tanaka R, Tsutsumi S, Yamashiro K, Nakahara M, Shimura H, Hattori N, Urabe T. Cerebral dural sinus thrombosis associated with adenomyosis: a case report. J Stroke Cerebrovasc

Dis. 2014 Aug;23(7):1985-7. doi: 10.1016/j.jstrokecerebrovasdis.2014.01.027. Epub 2014 May 1. PubMed PMID: 24794947.

7: Shitsama S, Wittayanakorn N, Okechi H, Albright AL. Choroid plexus coagulation in infants with extreme hydrocephalus or hydranencephaly. J Neurosurg Pediatr. 2014 Jul;14(1):55-7. doi: 10.3171/2014.3.PEDS13488. Epub 2014 Apr 25. PubMed PMID: 24766307.

8: Wesson HK, Bachani AM, Wekesa JM, Mburu J, Hyder AA, Stevens KA. Assessing trauma care at the district and provincial hospital levels: a case study of hospitals in Kenya. Injury. 2013 Dec;44 Suppl 4:S75-80. doi: 10.1016/S0020-1383(13)70217-1. PubMed PMID: 24377784.

9: Albright AL, Okechi H. Distal cordectomies as treatment for lumbosacral myelomeningoceles. J Neurosurg Pediatr. 2014 Feb;13(2):192-5. doi: 10.3171/2013.11.PEDS13378. Epub 2013 Dec 20. PubMed PMID: 24359212.

10: Albright AL, Ferson SS, Okechi H. Cerebrospinal fluid white blood cell counts in infants with myelomeningoceles. J Neurosurg Pediatr. 2014 Feb;13(2):189-91. doi: 10.3171/2013.11.PEDS13196. Epub 2013 Dec 13. PubMed PMID: 24329161.

11: Mansouri A, Okechi H, Albright AL, Bernstein M. Reconnaissance mission to the neurosurgical department in Kijabe Hospital, Kenya: a call for the submission of ideas and strategies. World Neurosurg. 2014 Mar-Apr;81(3-4):e14-6. doi: 10.1016/j.wneu.2013.09.049. Epub 2013 Oct 8. PubMed PMID: 24120929.

12: Koech F, Orege J, Ndiangui F, Macharia B, Mbaruku N. Multiple intracranial meningiomas: a review of the literature and a case report. Case Rep Surg. 2013;2013:131962. doi: 10.1155/2013/131962. Epub 2013 Aug 29. PubMed PMID: 24069543; PubMed Central PMCID: PMC3773437.

13: Albright L. The nonattending physician. JAMA Surg. 2013 Aug;148(8):702. doi: 10.1001/jamasurg.2013.369. PubMed PMID: 23740315.

14: Albright AL, Ferson SS. Developing pediatric neurosurgery in a developing country. J Child Neurol. 2012 Dec;27(12):1559-64. doi: 10.1177/0883073812460586. Epub 2012 Oct 15. PubMed PMID: 23071068.

15: Mwang'ombe NJ. The role of young neurosurgeons in the development of neurosurgery. Asian J Neurosurg. 2012 Jan;7(1):1. doi: 10.4103/1793-5482.95686. PubMed PMID: 22639683; PubMed Central PMCID: PMC3358949.

16: Qureshi MM, Piquer J, Young PH. Mobile endoscopy: a treatment and training model for childhood hydrocephalus. World Neurosurg. 2013 Feb;79(2 Suppl):S24.e1-4. doi: 10.1016/j.wneu.2012.02.001. Epub 2012 Feb 10. PubMed PMID: 22381851.

17: Albright AL, Okechi H. Use of the NICO Myriad device for tumor and cyst removals in a developing country. Childs Nerv Syst. 2012 Apr;28(4):599-604. doi: 10.1007/s00381-012-1720-1. Epub 2012 Feb 25. PubMed PMID: 22367917.

18: Kahamba JF, Assey AB, Dempsey RJ, Qureshi MM, Härtl R. The second African Federation of Neurological Surgeons course in the East, Central, and Southern Africa region held in Dar es Salaam, Tanzania, January 2011. World Neurosurg. 2013 Sep-Oct;80(3-4):255-9. doi: 10.1016/j.wneu.2011.07.021. Epub 2011 Nov 7. PubMed PMID: 22120325.

19: Kiboi JG, Kitunguu PK, Angwenyi P, Mbuthia F, Sagina LS. Predictors of functional recovery in

African patients with traumatic intracranial hematomas. World Neurosurg. 2011 May-Jun;75(5-6):586-91. doi: 10.1016/j.wneu.2010.05.041. PubMed PMID: 21704911.

20: Mwachaka PM, Ranketi SS, Elbusaidy H, Ogeng'o J. Variations in the anatomy of ansa cervicalis. Folia Morphol (Warsz). 2010 Aug;69(3):160-3. PubMed PMID: 21154286.

21: Gathura E, Poenaru D, Bransford R, Albright AL. Outcomes of ventriculoperitoneal shunt insertion in Sub-Saharan Africa. J Neurosurg Pediatr. 2010 Oct;6(4):329-35. doi: 10.3171/2010.7.PEDS09543. PubMed PMID: 20887104.

22: Bagan M. The Foundation for International Education in Neurological Surgery. World Neurosurg. 2010 Apr;73(4):289. doi: 10.1016/j.wneu.2010.03.007. PubMed PMID: 20849780.

23: Park BE, Kitya D. Myelography as a stand-alone diagnostic procedure for degenerative spine disease in developing nations. World Neurosurg. 2010 Apr;73(4):285-8. doi: 10.1016/j.wneu.2010.02.042. PubMed PMID: 20849779.

24: Qureshi MM, Oluoch-Olunya D. History of neurosurgery in Kenya, East Africa. World Neurosurg. 2010 Apr;73(4):261-3. doi: 10.1016/j.wneu.2010.02.014. PubMed PMID: 20849774.

25: Mwachaka PM, Obonyo NG, Mutiso BK, Ranketi S, Mwang'ombe N. Ventriculoperitoneal shunt complications: a three-year retrospective study in a Kenyan national teaching and referral hospital. Pediatr Neurosurg. 2010;46(1):1-5. doi: 10.1159/000314050. Epub 2010 May 5. PubMed PMID: 20453556.

26: Margaron FC, Poenaru D, Bransford R, Albright AL. Timing of ventriculoperitoneal shunt insertion following spina bifida closure in Kenya. Childs Nerv Syst. 2010 Nov;26(11):1523-8. doi: 10.1007/s00381-010-1156-4. Epub 2010 Apr 27. PubMed PMID: 20422197.

27: Cheatham M. Profiles in volunteerism William Rambo, MD, Medical Missionary Neurosurgeon. Surg Neurol. 2008 Nov;70(5):550-1. doi: 10.1016/j.surneu.2008.05.018. PubMed PMID: 18940447.

28: Okoth PA. Neurological manifestations following partial excision in spinal meningioma: case report. East Afr Med J. 2007 Jan;84(1):44-8. PubMed PMID: 17633585.

29: Krcméry V, Fedor-Freybergh PG. Neuroinfections in developed versus developing countries. Neuro Endocrinol Lett. 2007 Jun;28 Suppl 2:5-6. PubMed PMID: 17558364.

30: Wanyoike PK, Qureshi MM. Schistosoma mansoni of the conus medularis: case report. East Afr Med J. 2004 May;81(5):271-3. PubMed PMID: 15508344.

31: Wanyoike PK. Posterior cranial fossa tumours in children at Kenyatta National Hospital, Nairobi. East Afr Med J. 2004 May;81(5):258-60. PubMed PMID: 15508341.

32: Hooker J, Eccher M, Lakshminarayan K, Souza-Lima FC, Rejdak K, Kwiecinski H, Corea F, Lima JM. Neurology training around the world. Lancet Neurol. 2003 Sep;2(9):572-9. PubMed PMID: 12941581.

33: Mwang'ombe NJ, Omulo T. Ventriculoperitoneal shunt surgery and shunt infections in children with non-tumour hydrocephalus at the Kenyatta National Hospital, Nairobi. East Afr Med J. 2000 Jul;77(7):386-90. PubMed PMID: 12862159.

34: Egziabher TG, Ruminjo JK, Sekadde-Kigondu C. Pain relief using paracervical block in patients undergoing manual vacuum aspiration of uterus. East Afr Med J. 2002 Oct;79(10):530-4. PubMed

PMID: 12635758.

35: Kuremu RT. Surgical management of peptic ulcer disease. East Afr Med J. 2002 Sep;79(9):454-6. PubMed PMID: 12625684.

36: Magoha GA, Ngumi ZW. Renal transplantation during the twentieth century: a review. East Afr Med J. 2001 Jun;78(6):317-21. Review. PubMed PMID: 12002111.

37: Ruberti RF, Saio M. Epidural Bilharzioma mansoni compressing the spinal cord: case report. East Afr Med J. 1999 Jul;76(7):414-6. PubMed PMID: 10520373.

38: Ricci MR. The arrow-head which went through the brain. East Afr Med J. 1999 Jul;76(7):411-3. PubMed PMID: 10520372.

39: Magoha GA. Local infiltration and spermatic cord block for inguinal, scrotal and testicular surgery. East Afr Med J. 1998 Oct;75(10):579-81. PubMed PMID: 10065191.

40: van den Hombergh P, Froeling FM. [Craniotomy; a ,much-alive tradition with the Kisii (Kenya)]. Ned Tijdschr Geneeskd. 1994 Dec 24;138(52):2621-5. Dutch. PubMed PMID: 7808537.

41: Chindia ML, Ng'ang'a PM. Alcohol injection in the management of paroxysmal trigeminal neuralgia: a report of six cases. East Afr Med J. 1994 Jan;71(1):49-50. PubMed PMID: 8055766.

42: Zdárek J, Denlinger DL. Neural regulation of pupariation in tsetse larvae. J Exp Biol. 1992 Dec;173:11-24. PubMed PMID: 1487712.

43: Mwaniki DL, Hassanali J. The position of mandibular and mental foramina in Kenyan African mandibles. East Afr Med J. 1992 Apr;69(4):210-3. PubMed PMID: 1644032.

44: Kakande I. Peptic ulcer surgery at a rural hospital in Kenya. East Afr Med J. 1991 Jan;68(1):15-20. PubMed PMID: 2060475.

45: Furnas DW, Sheikh MA, van den Hombergh P, Froeling F, Nunda IM. Traditional craniotomies of the Kisii tribe of Kenya. Ann Plast Surg. 1985 Dec;15(6):538-56. PubMed PMID: 3880206.

46: Dar J. Perspectives in international neurosurgery: neurosurgery in Kenya. Neurosurgery. 1985 Feb;16(2):267-9. PubMed PMID: 3883226.

47: Adeloye A. Neurosurgical education in Africa. Neurosurgery. 1982 Jan;10(1):130-2. PubMed PMID: 7057971.

48: Meschig R, Schadewaldt H, Kiwit J. [Skull surgery in the Kisii (Gusii) in the highlands of Western Kenya]. Dtsch Med Wochenschr. 1980 Dec 26;105(52):1817-21. German. PubMed PMID: 6256146.

49: Andersen JG. A bush surgeon's experiences with local analgesia for surgery on the extremities. Anaesthesia. 1976 Oct;31(8):1127-30. PubMed PMID: 984371.

50: Opuni EK, Muller R, Mueller JF. Absence of sparganum growth factor in African spirometra spp. J Parasitol. 1974 Apr;60(2):375-6. PubMed PMID: 4821128.

1)

Qureshi MM, Oluoch-Olunya D. History of neurosurgery in Kenya, East Africa. World Neurosurg. 2010 Apr;73(4):261-3. doi: 10.1016/j.wneu.2010.02.014. PubMed PMID: 20849774.

2)

Piquer J, Qureshi MM, Young PH, Dempsey RJ. Neurosurgery Education and Development program to treat hydrocephalus and to develop neurosurgery in Africa using mobile neuroendoscopic training. J Neurosurg Pediatr. 2015 Jun;15(6):552-9. doi: 10.3171/2014.10.PEDS14318. Epub 2015 Mar 6. PubMed PMID: 25745948.

[3]

Waweru P, Gatimu SM. Mortality and functional outcomes after a spontaneous subarachnoid haemorrhage: A retrospective multicentre cross-sectional study in Kenya. PLoS One. 2019 Jun 12;14(6):e0217832. doi: 10.1371/journal.pone.0217832. eCollection 2019. PubMed PMID: 31188844.