



Neurosurgery in East Africa: Foundations

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This article is the first in a series of 3 articles that seek to provide readers with an understanding of the development of neurosurgery in East Africa (Foundations), the challenges that arise in providing neurosurgical care in developing countries (Challenges), and an overview of traditional and novel approaches to overcoming these challenges to improve healthcare in the region (Innovations). We review the history and evolution of neurosurgery as a clinical specialty in East Africa. We also review Kenya, Uganda, and Tanzania in some detail and highlight contributions of individuals and local and regional organizations that helped to develop and shape neurosurgical care in East Africa. Neurosurgery has developed steadily as advanced techniques have been adopted by local surgeons who trained abroad, and foreign surgeons who have dedicated part of their careers in local hospitals. New medical schools and surgical training programs have been established through regional and international partnerships, and the era of regional specialty surgical training has just begun. As more surgical specialists complete training, a comprehensive estimation of disease burden facing the neurosurgical field is important. We present an overview with specific

reference to neurotrauma and neural tube defects, both of which are of epidemiologic importance as they gain not only greater recognition, but increased diagnoses and demands for treatment. Neurosurgery in East Africa is poised to blossom as it seeks to address the growing needs of a growing subspecialty.

INTRODUCTION

Neurologic surgery is an advanced subspecialty of surgery, and its expertise is needed in both rural and urban areas, and in rich and poor communities. With an increase in motor vehicle traffic and resulting crashes, frequent injuries, increased recognition and awareness of congenital defects and brain tumors, the need for access to neurologic surgery has increased dramatically. In parallel, with advances in operative equipment, imaging modalities, and sophisticated perioperative care, the ability to diagnose and treat these conditions with minimal risk has improved dramatically. The availability of neurosurgical skill and resources varies between communities, regions, and countries around the world. In this upcoming series

Key words

- Disease burden
- East Africa
- Low-middle income countries
- Neurosurgery

Abbreviations and Acronyms

- ASEA:** Association of Surgeons of East Africa
COSECSA: College of Surgeons of East, Central and Southern Africa
CT: Computed tomography
DALY: Disability-adjusted life year
ECSA: East, Central, and Southern Africa
ETV: Endoscopic third ventriculostomy
FIENS: Foundation for International Education in Neurological Surgery
LMIC: Low and middle-income country
MCS: Member of College of Surgery
MMC: Muhimbili Medical Center
MOI: Muhimbili Orthopedic Institute
MRI: Magnetic resonance imaging
MUSM: Makerere University School of Medicine
NED: Neurosurgery, Education and Development
NTD: Neural tube defect
PAANS: Pan African Association of Neurological Sciences
TBI: Traumatic brain injury

WFNS: World Federation of Neurosurgical Societies

WHO: World Health Organization

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of articles, we focus on East Africa and hope to provide a brief overview of several aspects of neurological surgery in the region. From the late 1960s, when the first modern neurosurgical procedures were performed, to the present day—as neurosurgeons are trained locally—the region has undergone great political, economic, and social change. The practice of medicine has also advanced but is severely resource deficient. Although self-sufficiency is closer than ever before, challenges remain; fortunately, governmental and nongovernmental organizations continue to work to overcome them.

This article is the first in a series of 3 that seeks to provide readers with an understanding of the current state of neurosurgery in East Africa (Foundations), the challenges that arise in providing surgical care in underdeveloped countries (Challenges), and what is being done to overcome these challenges and to improve healthcare in these areas (Innovations). Despite being distinct, the 3 articles will bridge into each other and offer a full view of the practice of neurosurgery in East Africa. In this article, we review the history and current state of neurosurgical care and the burden of neurosurgical diseases in East Africa.

HISTORY OF MODERN NEUROSURGERY

Harvey Cushing (1869–1939), an American neurosurgeon, devised basic operating techniques and instruments for performing brain surgeries, and he is widely considered the father of “modern neurosurgery.” The post-Cushing era ushered in advanced neurosurgical procedures, including minimal access surgery, aneurysm clipping and coiling, all with dramatically reduced rates of mortality. Some important advances in the field of basic neurosurgery, more so as they pertain to the development of the field in low- and middle-income countries (LMICs), are noted here briefly. In the 1950s and 1960s, the use of the operating microscope pushed neurosurgery into the era of microsurgery, thus making it possible to perform complex surgeries with minimal complications. The next development responsible for advancing the field of neurosurgery was the development of computed tomography (CT). The first brain CT was performed in 1971, and it became commercially conventional over the next 2 decades. CT was followed by the development of clinical magnetic resonance imaging (MRI) in the late 1970s. In 1974, in the clinical neurotrauma arena, Teasdale and Jennett¹ described the Glasgow Coma Scale as the most practicable and reliable measurement of impaired consciousness in trauma patients. This was one of the first steps in the establishment of a uniform assessment of comatose patients with interobserver reliability and reproducibility, thus spurring the concept of specialized neurosurgical nursing care. These milestones in neurosurgery were first established in Western countries and then exported to other parts of the world with variable success and penetration.

SURGERY AND NEUROSURGERY IN AFRICA

Trephination of the skull is one of the oldest neurosurgical procedures performed, and it has been documented as a local traditional practice in several African sites, such as the Kisii tribe of Kenya.² Craniotomists, called *ababari ernetwe* (translation: surgeons of the skull) members of the Kisii tribe, performed

trephination for 2 primary conditions: acute cranial trauma and posttraumatic headache.² This procedure has remained prevalent among some tribes until recently. Even with advancement of surgical techniques, a large majority of the population does not have access to modern neurosurgery and are at continued risk of neurosurgical diseases.

Historically, surgeons in East Africa fell into 5 categories.³ The most numerous were government surgeons, exclusively Britons or of British descent, and fellows of the Royal College. Next were surgeons in private practice, either British-trained or of Asian descent. The third largest group was surgeons working for industries, who also had British qualifications. Fourth were surgeons in missionary hospitals. The least numerous were university professors—only a handful at the time—all of whom were at Makerere University School of Medicine (MUSM) in Kampala, the only such school in Africa at the time. Because of suspicion of non-native practices and a lack of widespread treatments offered by these doctors, the local population kept traditional medical practices alive.

Modern neurosurgery as an independent specialty originated in Cape Town, South Africa, after the return of Hermann de Villiers Hammann from his training at the University of Munich, Germany, in 1946. De Villiers Hammann became a full honorary consultant in 1949, and he lectured at the University of Cape Town and Stellenbosch while continuing to learn newer techniques in America and Europe. Dr. Jacques de Villiers became the first full-time neurosurgical chief-of-staff in 1970 and the first Professor of Neurosurgery in 1976. During this time, there were about 20 neurosurgeons in South Africa.

Meanwhile, neurosurgery also developed rapidly in Egypt where several Egyptian and visiting neurosurgeons practiced briefly during 1949–1956. Dr. Arne Torkildson from Norway was appointed as a visiting professor during 1951–1952 in Cairo, and he was later joined by Dr. Osman Sorour, who had trained for 2 years in Britain. Dr. Harvey Jackson, who trained at Queen Square followed, and in 1955, a 35-bed neurosurgical department was established in Cairo, and Dr. I. Shafei became its Chairman in 1957. In 1961, Prof. H. Olivecrona from Stockholm came to establish a modern setup, and specialized nursing and intensive care staff members were trained. By 1967, a full complement of neurologists, neurosurgeons, neuroanesthetists, neuroradiologists, and neuropathologists was assembled.

South Africa and Egypt remained the centers of neurosurgery in Africa and were home to the only neurosurgeons on the continent. In East Africa and Central Africa, neurosurgery remained scarce. In 1982, a review of pituitary tumors at Muhimbili Medical Centre, Tanzania, included a commentary: “The only help for patients with neurosurgical problems is from referral overseas.”⁴ In 1980, the ratio of neurosurgeons to the population was 1:75,000 in the United States, 1:140,000 in Canada, 1:400,000 in the United Kingdom, and 1:3,000,000 in Africa, which improved to 1:2,000,000 by 1990. However, 15 countries in Africa with a cumulative population greater than 46,000,000 had no neurosurgeons.

The most recently published data from 2004 for the number of neurosurgeons per region is as follows: 8856 in Europe, 6546 in the United States, and 565 in Africa. Of those in Africa, 485 are in Egypt, Tunisia, Morocco, Algeria, and South Africa. In East Africa, there are 27 neurosurgeons for 270 million people (ratio of 1:10 million).⁵

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