

Chapter 26 Neurosurgery In Africa

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The debate on the progress in neurosurgery around the world is very interesting because of the achievements already accomplished in the different fields of neurosurgery, largely thanks to the progress in neurosciences and the support of new technologies. However, despite this progress, there are some frustrations; insufficiency of this progress to solve many of our daily problems and the current state of neurosurgery in developing countries are just two. The best achievements in medicine are those underlined by their results on patients' treatment. So, we can consider nowadays that a large part of the world population living in developing countries do not benefit yet from all the progress in neurosurgery.

In Africa, despite the quite acceptable development of neurosurgery in some countries, almost the entire continent is still significantly lagging in the development of this field. This is attributable to many factors, including inadequate health care planning, lack of resources, lack of encouragement for local training of neurosurgeons, and lack of adequate local conditions to enable neurosurgeons to practice properly. All of these factors lead neurosurgeons trained in Europe not to return home.

It is obvious that the future development of neurosurgery will depend mainly on the efforts African neurosurgeons make to improve neurosurgery in their respective countries. However, support from the international neurosurgical community (the World Federation of Neurosurgical Societies [WFNS] and other neurosurgical associations) could help improve the state of neurosurgery in Africa.

NUMBER AND DISTRIBUTION OF NEUROSURGEONS IN THE WORLD

It's difficult to know the number of neurosurgeons in the world and in the different countries because there are fluctuations in the available resources, like the World Directory of Neurological Surgeons or the Lists of National Societies Members of the WFNS. Taking into consideration these two sources, there are 23,940 neurosurgeons in a world with a population of 5,479,000,000 people, making the ratio 1 neurosurgeon to 230,000 people. Table 26.1 shows the number and ratio in different continents in the world. There is a large disparity in the distribution of neurosurgeons around the world between different continents and different countries. Thus, we can see in Table 26.2 that 60% of neurosurgeons take care of 14% of the world population, whereas we see that in underdeveloped countries, only 6% of neurosurgeons take care of 34% of the world population.

NUMBER AND DISTRIBUTION OF NEUROSURGEONS IN AFRICA

In Africa, we have conducted two surveys: one in 1994 and the second in 1998 under the auspices of the World Health Organization (WHO) working group in neurosurgery created between the WFNS and the WHO (1). The results have shown that in Africa, a continent of 35,000,000 km², 700,000,000 people in 52 countries have only 565 neurosurgeons, for a ratio of 1 neurosurgeon to 1,238,000 people and 1 neurosurgeon to 70,000 km². Most of these neurosurgeons are concentrated in North and South Africa, where there are 486 neurosurgeons, for a ratio of 1 neurosurgeon to 358,000 people, whereas in Sub-Saharan Africa there are only 79 neurosurgeons, for a ratio of 1

neurosurgeon to 3,600,000 people; still, there are some countries with only 1 neurosurgeon to 9,000,000 people (Table 26.3).

BIOMEDICAL EQUIPMENT

With respect to biomedical equipment, 18 countries have no computed tomography (CT) scanners, and 13 countries have one CT scanner each. Only northern African countries and South Africa have a suitable number of CT scanners and some magnetic resonance imaging scanners. However, in these countries, the equipment is unevenly distributed, and the majority of the population does not have access to this equipment because of poor economic resources and the lack of medical insurance. Many African neurosurgeons are still in the premicroscopic area of neurosurgery.

Obviously, this situation has multiple consequences. In countries with no neurosurgeons, there are high mortality and morbidity rates for neurosurgical diseases, especially very simple ones (such as posttraumatic hematomas, brain abscesses, hydrocephalus, and benign tumors). In developing countries with neurosurgeons but without adequate equipment, the consequences are less dramatic but still very serious. Because of delays in diagnoses, patients may present with advanced gross pathological features, and difficulties in intensive care and neurosurgical management can affect the neurosurgical results and require a great deal of sacrifice and devotion from neurosurgeons as they provide their services.

In addition to the consequences for patients, the lack of basic technological requirements, such as neurosurgical diagnosis facilities, operating microscopes, bipolar coagulation equipment, and microinstruments, affects the skills of neurosurgeons in the long term and has a negative influence on public health authorities who think it is difficult to achieve satisfactory outcomes for patients with neurosurgical diseases. This nihilistic behavior is perpetuated among neurosurgeons and hospital staff members who begin to think that conditions cannot be improved.

ORGANIZATION AND TRAINING

The Pan-African Association of Neurological Sciences was created in 1972 to bring together national African societies of neurological sciences and neurosurgery. It still represents African neurosurgeons in the WFNS. Its mandate includes organizing a congress every 2 years and publishing a quarterly journal entitled the African Journal of Neurosciences. Furthermore, there are national societies in many African countries. These societies are mainly societies of neurological sciences. Societies of neurosurgery exist in only six countries, namely, South Africa, Egypt, Tunisia, Algeria, Morocco, and Nigeria.

In countries where there are no neurosurgeons, the first priority is the training of general surgeons to perform some basic life-saving neurosurgical procedures, such as treatment of intracranial hematomas, treatment of compound depressed fractures, placement of shunts, and treatment of brain abscesses. Twenty-three African countries still give priority to this training. In countries where there are neurosurgeons, the priority is the complete training of neurosurgeons, which is needed in most of the countries. These young neurosurgeons should be trained locally in their region or subregion, because when they are trained abroad (Europe or North America), they often remain in the country of their training because the conditions are better than those of their own countries.

There are two training options for young African neurosurgeons. Training outside Africa occurs mostly in departments of neurosurgery in Europe. This training, although vital to African neurosurgery, has two possible major drawbacks, i.e., incomplete training and maladaptation of these neurosurgeons to the specific conditions of their countries. The second option is local training, which is generally based on a system that is slightly different from the European system with respect to duration, curriculum, and assessment.

DOMINANT PATHOLOGY

A dominant pathology can be classified by frequency in the daily practice of head trauma, infections, hydrocephalus, spinal cord pathology, tumors, and strokes. Most patients are 20 years or younger because of the young age of the population. Their central nervous system infections are still dominated by tuberculosis and parasitic infections, which require a specific course of training for neurosurgeons. The patients with brain tumors illustrate the delay in diagnosis and the advanced pathology we see in our hospitals. As a consequence of this delay in diagnosis, we have a high mortality and morbidity rate with long hospital stays.

The vascular pathology seen in these patients demonstrates the lateness in the practice of neurosurgery on the African continent. Thus, for example, an aneurysmal subarachnoid hemorrhage is considered very rare by many neurosurgeons in Africa, whereas the frequency in Europe is between 0.2 and 7.9 in autopsy series and between 6 and 9 for 100,000 patients in clinical series. In Africa, very limited series based on few cases have been published, and the authors concluded that cerebral aneurysms were rare in Africa. In Morocco, more than 20 years ago, it was required to perform an autopsy study to demonstrate that the incidence of cerebral aneurysms was not different in Morocco than in other places (3, 5, 6). When we started to search more for cerebral aneurysms, we discovered more cases, and the number doubled every 5 years. The study of our first series of cerebral aneurysms (200 cases) showed us the real reasons for the small incidence of cerebral aneurysms in our country and probably in other places in Africa (4). Of course, neurosurgeons in Africa have to deal with this pathology with limited technology, which requires more training for neurosurgeons in our places and more knowledge on basic sciences and internal medicine.

REASONS FOR THE DELAY IN THE DEVELOPMENT OF NEUROSURGERY IN AFRICA

Two reasons are generally put forward to explain the delay in the development of neurosurgery in Africa. The first reason is the lack of funds, with the meager resources available being applied first to primary health care. The second reason involves the health system in Africa, which is based on public health priorities in which neurosurgery has a very small place or no place at all. However, the real reasons are the implementation of these public health programs and the failure of pioneering neurosurgeons to exert enough pressure on health care planners and to prove the value of neurosurgery in their country. So, neurosurgeons in Africa bear the most important responsibility of improving the neurosurgical practice in their continent. They should have a positive behavior and work with a great deal of devotion to overcome the lack of facilities and the harsh local conditions to prove the value of neurosurgery in public health problems. They should be organized in national societies, accept some disparity between different services, and ask for the necessary equipment outside of the latest technological innovations.

NEUROSURGICAL DEVELOPMENT GUIDELINES IN MOROCCO

This positive behavior of pioneering neurosurgeons allowed us to have a quite good development of neurosurgery in

the last 30 years in Morocco. Thus, between 1960 and 1968, we had only two neurosurgical services (one in Rabat and one in Casablanca), with one medical school in Rabat. The first resident training program started in neurosurgery in 1968. Today in Morocco, we have more than 110 neurosurgeons for 30,000,000 people (1 neurosurgeon to 290,000 people), 28 residents, and 15 services of neurosurgery (6 in university hospitals and 9 in provincial hospitals). This development of neurosurgery occurred thanks to four guidelines (3):

Encouragement of local training of young neurosurgeons. We think that encouraging the local training of young neurosurgeons is a major factor in the development and quick promotion of neurosurgery in the country. This local training is based on a system slightly different from the European system: it lasts 5 years, with compulsory training in general surgery and neurology and an annual examination, plus a national final examination. At the end of the training, young neurosurgeons are encouraged to undergo additional training (refresher training) for 6 months to 1 year, which is often undertaken in Europe or North America. Although this local training initially presented some difficulties because of a lack of updated material for apprenticeships and a lack of local neurosurgical meetings, it has many advantages, i.e., establishing neurosurgery as a specialty in different medical universities in the country, placing pressure on the public health system responsible for the continuing expansion of neurosurgery, making neurosurgeons aware of and concerned with local pathological conditions, and training neurosurgeons who can work under local conditions.

Unfortunately, many African countries that have established one or two services of neurosurgery and a medical school have not instituted local training in neurosurgery and are still waiting for the return of a few neurosurgeons receiving training abroad. This practice has considerably delayed the development of neurosurgery in those countries.

Organization and promotion of neurosurgery, with the creation of the Moroccan Society of Neurosurgery in 1984.

The integration of neurosurgery in the health pyramid system, starting by leveling neurosurgery at teaching hospitals and then creating gradually other services at provincial hospitals.

Stimulation of clinical research to have accurate statistics on local pathology, which represents the best way to convince health care planners.

CONCLUSION

Although neurosurgery has made a huge progress in the last 50 years, we must recognize that the current state of African neurosurgery represents one of the most important frustrations of neurosurgery in the 21st century. The African neurosurgeons bear the vital responsibility for the development of neurosurgery in their countries. The lack of neurosurgical equipment has, of course, serious consequences on patient care, but this lack of equipment can be overcome with the intelligence and the energy of the local neurosurgeons using internal solutions available in the country. Of course, the support of the international neurosurgical community remains important for the development of neurosurgery in Africa.

Three initiatives already taken by the WFNS are very important for the development of neurosurgery in Africa. 1) The organization of the 13th World Congress of Neurological Surgery in June 2005 in Marrakech, Morocco; 2) The

creation of a universal set of instruments at a low price dedicated to neurosurgeons in developing countries; and 3) The creation of a foundation for the training of young neurosurgeons from developing countries, which can allow scholarships for the training of neurosurgeons in their area. The first reference center was created in Rabat in 2002 to train young African neurosurgeons. We hope that other neurosurgical organizations all over the world can join the efforts of the WFNS to participate in the development of neurosurgery in Africa.

TABLE 26.1. Distribution of neurosurgeons in the world			
	Population (in millions)	Neurosurgeons	Ratio (adjusted)
World	5,479	23,940	1:230,000
North America	370.8	4583	1:081,000
South America	305.7	2489	1:123,000
Central America	30.4	85	1:358,000
Europe	799	6594	1:121,000
Asia	3,235.3	9618	1:336,000
Australia	21.1	103	1:205,000
Africa	700	565	1:1.238,000

TABLE 26.2. Distribution of neurosurgeons in the world			
Group of countries	No. of neurosurgeons	Population (in millions)	Ratio (adjusted)
Group 1 (19 countries)	14,254 (60%)	732 M (14%)	1:52,000
Group 2 (52 countries)	8006 (34%)	2,826 M (52%)	1:354,000
Group 3 (43 countries)	1680 (6%)	1,835 M (34%)	1:1,092,000
Total	23,940	5,393 M	1:225,000

TABLE 26.3. Distribution of neurosurgeons in Africa, dominant pathology, need in training, and equipmenta

Groups of countries	Total population	No. of neurosurgeons	Dominant pathological conditions	Training needs	Equipment needs
Group 1 Algeria, Egypt, Morocco, South Africa, Tunisia	174 million	486 (1:358,000 inhabitants)	Head trauma, infections, hydrocephalus, spinal cord pathological conditions, tumors, and stroke	Workshops and seminars for neurosurgeons; short visits to European centers	Shunts and surgical instruments
Group 2 Libya, Sudan, Senegal, Nigeria, Kenya, Cameroon, Zimbabwe	188 million	52 (1:3,600,000)	Same as group 1	Courses and complete training for neurosurgeons; training for general surgeons	Surgical instrument sets for craniotomies and laminectomies; CT scanners; shunts

Group 3	250 million	27	Same as group 1	Training for	Instrument sets
Ethiopia,		(1:9 million)		general surgeons;	for craniotomies
Tanzania,				complete training	and
Mauritius,				for neurosurgeons	laminectomies;
Namibia,					CT scanners
Botswana,					
Guinea,					
Ghana,					
Burkina Faso,					
Congo,					
Brazzaville,					
Ivory Coast,					
Gabon,					
Malawi,					
Mozambique,					
Uganda,					
Somalia,					
Togo,					
Democratic					
Republic of					
the Congo					

Group 4	46 million	0	Same as group 1	Training for general surgeons; complete training for neurosurgeons	Surgical instrument sets
Niger, Mali,					
Equatorial					
Guinea,					
Mauritania,					
Guinea					
Bissau,					
Lesotho,					
Swaziland,					
Rwanda,					
Madagascar,					
Comoro					
Islands,					
Burundi					

aCT, computed tomography.

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