

Delivery of Primary Neurosurgical Care in Developing Countries

—Scope for Mutual Cooperation—

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Abstract

As with other specialized services there is an ever increasing gap in neurosurgical care between developed and developing countries. The need for neurosurgery has always been present in developing countries, but the recent introduction of computed tomography has identified many previously undetected cases, increasing the number of patients seeking treatment. However, developing countries suffer severe shortages of trained manpower, proper equipment, and expertise to initiate the services to meet this demand. In contrast, some developed nations are experiencing a surplus of neurosurgeons leading to problems in case exposure. A well-designed cooperative project between these countries can answer some of these problems, becoming an ideal example of mutual benefit.

Key words: neurosurgical care, developing countries, Nepal

Introduction

Modern neurosurgery has evolved enormously since its conception some 100 years ago, especially since the introduction of computed tomography and microsurgery. Neurosurgery, initially intended to prevent death, has evolved now into a way to decrease morbidity and improve function. Some centers have even begun preventive neurosurgery based on active disease detection and treatment before symptoms arise. The number of neurosurgeons has increased from a handful to some 100,000 around the world, and even leading to a surplus.^{8,12,13)} On the other hand, some countries have not been able to introduce neurosurgery to date.¹⁸⁾ This paper deals with some of the contrasts in neurosurgery between developed and developing countries and the possible benefit of mutual cooperation.

Proposed Neurosurgical Project in Nepal

I. Present status

Here the present status of neurosurgery in Nepal is presented. Like other developing countries, Nepal

gives the highest priority to primary health care (PHC). Investment in PHC is the most appropriate in terms of cost-effectiveness.²⁵⁾ PHC emphasizes the most needed areas of child health, maternal health, and other communicable diseases. At the same time, the availability of tertiary health care to some extent is important. Neurosurgery requires a large initial investment, extensive manpower training, and a high level of technical support, but a health care system which excludes the neurosurgical area is incomplete, besides which even the poorest nations have their own legitimate need for neurosurgery.^{1,19)} If properly managed, a neurosurgical service can be cost effective except for some tertiary care,²⁰⁾ and such services have been successful in some of the most remote parts of the world.²⁶⁾

With a population of 20 million, Nepal has a severe shortage of services in this field. Neurosurgery is not recognized as a separate specialty in Nepal, even the tertiary hospitals lack this service, and there is no certification for neurosurgeons. The need for such a center was pointed out by Dr. Gongal, the first neurosurgeon in Nepal some 15 years ago, and the concept of this service was presented during the symposium at Kagoshima in 1992.^{9,16-19)}

There are only two medical schools with about 100 new medical students a year. Due to the growing de-

mand for physicians, large number of medical students still get their training in neighboring countries. Another medical school will be opened shortly in the western part of Nepal. Due to the lack of adequate working facilities, specialists either do not return home or go abroad after some frustrating years in their home country.¹⁾ At present at least three Nepalese neurosurgeons are working abroad while only one is working in the country. Private organizations have started installing computed tomography scanners due to its cost-effectiveness²⁾ but there is no equal development for dealing with the diseases identified. The few people who can afford travel to foreign countries do so, but even this is not possible in an emergency. The legitimate need for such a service is obvious from the 6 to 7 months waiting list for surgery at Bir Hospital, the only center with a neurosurgeon and providing a neurosurgical service.

The absence of relevant data makes the assessment of the actual need for neurosurgical care difficult, but present statistics show the number of patients needing neurological and neurosurgical care in Nepal is about 500,000 new cases a year. At present only 0.5% of these patients are receiving treatment. Besides the usual cases seen worldwide, infectious diseases like meningitis, encephalitis, brain abscess, neurocysticercosis, and cerebral hydatid disease are very common. Tuberculosis alone is present in 1% of the population,⁹⁾ a considerable number of whom have cerebral and spinal infection. Neurocysticercosis is endemic in south-eastern region. Epidemic outbreaks of meningitis and encephalitis occur every year.¹⁰⁾ Loss of life from minor neurological diseases like brain abscess, epidural hematoma or blindness due to hydrocephalus, and paraplegia due to spinal tuberculosis are some of the readily preventable tragedies. The absence of a good traffic system results in head injury taking an epidemic form. Many spinal injuries are secondary to falls from mountains or trees while collecting firewood. Acute mountain sickness with cerebral edema is occasionally seen among mountaineers visiting this country.

II. Future prospects

To start such a service in a developing country, assistance from developed nations is indispensable. There are enough neurosurgeons to cover the whole population of the world, but the distribution is very uneven.^{3,7,15)} For example, Japan has more than 6000 neurosurgeons with a neurosurgeon/population ratio of 1:20,000, the highest in the world.¹¹⁾ Although it is hard to define an ideal neurosurgeon/population ratio, this figure clearly exceeds the number suggested by European Association of 1:250,000 for "job

satisfaction."⁶⁾ The numbers of patients per neurosurgeon are decreasing, leading to problems in adequate case exposure and development of skills in developed countries, whereas the situation is completely the opposite in developing countries.

Physicians from countries with surplus neurosurgeons can go and work in areas where there is a severe lack of such expertise.¹³⁾ If this situation is properly managed, the discrepancy in services can be resolved with benefits to all involved,¹⁴⁾ besides the great deal of knowledge to be gained by physicians from developed countries working in such places.^{1,23,24)}

III. Design of the project

Nepal needs at least 80 neurosurgeons (1:250,000 population) in 10 centers (1:2,000,000 population) scattered evenly throughout the country to cover the entire population. To manage emergency cases alone requires about 40 neurosurgeons. Nepal will not be able to meet this need for several decades unless it takes a step in the right direction now.

A cooperative project should be formulated starting from awareness generation in Nepal and internationally on the urgent need for primary neurosurgical care in Nepal. National policy makers should be made aware that neurosurgery does not always imply complicated surgery, but that there are cases which can be managed with simple technology and training which will prevent death or disability. Planning of the project should be done by Nepalese who are aware of national constraints, supported by experts from experienced nations. Machinery and other technology should be as simple as possible, as sometimes technology used in the past is more appropriate than the latest development. The project should start small and gradually enlarge with as the system matures. The project should be designed to become self-reliant within a given period.

IV. Objectives

Treatment: The system should concentrate on providing quantitative primary neurological care, with minimal emphasis on tertiary care (Table 1). To make the best use of manpower and equipment, it should deal with referral cases only, limit the hospital stay, and refer back the patients after definitive treatment. It should encourage other hospitals to manage simple cases on their own.

Patients with neurosurgical problems need long-term follow-up but need not necessarily stay in the expensive hospital bed. A nursing home adjacent to the hospital where patients can stay with minimal charges under limited medical supervision can reduce

Table 1 Type of neurosurgical care

Primary neurosurgical care	Tertiary neurosurgical care
Head and spinal trauma	Malignant brain tumor
Infectious diseases:	Multiple metastasis
brain abscess	Severe diffuse axonal injury
CNS tuberculosis	Difficult endovascular treatment
CNS parasitic diseases	Functional neurosurgery
Congenital diseases:	
hydrocephalus	
neuronal tube defect	
Vascular lesions:	
SAH	
Benign tumors	

CNS: central nervous system, SAH: subarachnoid hemorrhage.

the financial load and ensures rapid turnover of patients.

Education: No one should underestimate the benefits of an indigenous training program, which is less expensive and more appropriate to the situation in the home country. It gives a continuous supply of manpower, the "brain drain" will not be a problem, and even during the training period the trainee can provide services.^{4,5)} The 5.5 year course provided by a Japanese government scholarship allows the training of one foreign neurosurgeon at a cost of about 17,000,000 yen in Japan. The expenditure on 10 such trainees is enough to build a hospital and start a training program in many developing countries. More than 10 neurosurgeons can be trained in the home country at the cost of one trained in Japan. It is preferable to have basic training in the home country followed by 1–2 years exposure to advanced technology in developed countries.

Research: Only systematic analysis of the data can provide exact estimates of the neurosurgical needs of a community. On the basis of such data, it would be possible to advise medical institutions to plan for future needs. Such data will be the basis from which the center can formulate strategies for the treatment and training.

As central nervous system parasitic and infective diseases are no longer a public health problem in developed nations, basic research on these diseases has stopped. The developing nations should have their own research program to cope with the neurosurgical problems most prevalent in their regions.²¹⁾

V. Management

A sound management system is the most important factor for the success of a program. Expertise in management is one of the most likely areas in which experienced nations can contribute to design-

ing a project. Management includes making the institution financially, technically, and administratively self-reliant, allowing operation without outside support. To decrease the administrative and financial burden, many hospital services like drug supply, food supply, laundry, *etc.*, can be allocated to private agencies.

Most developing countries lack a proper health insurance system.⁸⁾ State-run hospitals claim to provide free treatment, although in practice this is not so. It is impossible for a nation to provide free medical services in specialized care. Most countries manage this problem by having beds with different charges. Fees collected from expensive beds will make up the deficit from cheap beds. A scientific patient-charging system should be incorporated after consideration of the socioeconomic conditions of the country. Volunteer organizations can provide assistance to patients needing financial support. The hospital administration should not be involved in such decision making, which is often the cause of failure of such programs.

VI. Manpower

During the initial period of establishment there will be a shortage of trained manpower, so manpower support should be sought from other centers. Guest neurosurgeons can support the surgical work at the institute as well as help develop local manpower. The host country needs to provide housing and other facilities for the guest workers.

Discussion

It is not logical to delay the development of neurosurgery in developing countries just because care is becoming more expensive due to the introduction of advanced equipment. Many developed countries started neurosurgery at the beginning of the 20th century,²²⁾ when communicable diseases were still prevalent. It is becoming more and more difficult for developing countries to meet the neurosurgical standards achieved by developed countries. Developing countries have their own legitimate needs for neurosurgical services and should try to develop their own standards. Developing countries should lay a firm infrastructure today so that neurosurgery can take a meaningful role in the future when it becomes possible to provide such services in larger scale. Involvement of neurosurgical community from different parts of the world has great potential for mutual cooperation and benefit.

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