Contribution of Clinical Neurophysiology in Rehabilitation Medicine

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Neurologic rehabilitation is a new area of specialization for the neurologist and physiatrist. Technologic advances in diagnosis of neurologic disease, especially in neuroimaging and clinical neurophysiology, have deemphasized the traditional dependence on the meticulous history and physical examination, often followed by long waiting for further development of findings in order to make a diagnosis.

In addition, developments in therapy have resulted in greater survival of victims of neurotrauma and chronic disabling diseases, with the need for more therapeutic measures to help the neurologically impaired patient. This has been accompanied by higher expectation of patients and their families. The instruction following diagnosis: “Go home and learn to live with it, there’s nothing more that I can do” is not acceptable. Increasing numbers of neurologists with a need to help their patients, along with a relative shortage of physiatrists, is further adding to the impetus of employing rehabilitative measures. Realistically, these physicians are also affected by the need to earn a living within a system of changing reimbursement patterns. With all of these factors, the patient and family can only benefit from abandonment of the practice of making a precise anatomic-pathologic diagnosis of impairment, but giving little assistance on how to cope with the resultant disabilities and handicaps.

The purpose of this volume is to highlight some areas in this important and expanding field for neurologists and physiatrists: the background of the specialties of neurology and physiatry also will be reviewed. There is much to learn from one another in order to give better care and to develop newer methods of treatment while evaluating traditional therapies.

For about a century, neurology has been primarily a diagnostic specialty closely allied with neurologic surgery, internal medicine, pediatrics, and psychiatry and firmly grounded in anatomy, physiology, and pathology. More recently, it has developed rapidly in the fields of neurochemistry, neuroimmunology, and neuropharmacology for both diagnosis and treatment. Major changes in neuroimaging and clinical neurophysiology have simplified, made more precise, and accelerated the process of diagnosis. Because many of the diseases of the nervous system tend to be chronic and there is little functional regeneration of the central nervous system (CNS), more emphasis has been placed on restorative neurology.

However, new research techniques in cellular and molecular biology have resulted in greater awareness of the growth potential of neurons in the adult CNS. Studies are being performed to determine mechanisms responsible for the enhancement or curtailment of nerve fiber growth in the adult CNS. It has already been documented
that fetal neuronal transplants in adult mammal brain may result in synaptogenesis with beneficial functional effects. Experiments documenting regeneration in the CNS along with evidence of the plasticity have brought new hope to the field of rehabilitation medicine.

Rehabilitation medicine is a newer specialty with its origins after World War II when improved, expeditious surgical treatment, the development of antibiotics and other improvements in medical care for the serious neurotrauma cases produced many survivors who needed rehabilitative care.

Although the specialties of neurology and rehabilitation medicine have different heritages and focuses, the problems they share are similar and encompass the majority of severe disability. According to Wood7, more than 50 per cent of those with severe disability were those suffering from stroke, Parkinsonism, and multiple sclerosis. More than 25 per cent of these patients had rheumatoid arthritis, neoplasms, and paraplegia as well as geriatric conditions (including Alzheimer's disease). More than 15 per cent had types of arthritis, trauma (including neurotrauma*), pediatric conditions (including cerebral palsy, mental retardation, and congenital disorders of the nervous system*), and less than 15 per cent had other groups of disorders. Certainly, 75 per cent of the patients on a rehabilitation inpatient unit are there because of some disorder of the nervous system, and it has been estimated that the majority of patients admitted to a neurology service will require major rehabilitative intervention with 37 per cent of discharges requiring rehabilitation afterward.

The mutual target population of the two specialties can be viewed from another perspective. Kurtzke2 states that eight of the nine neurologic disorders with highest average annual incidence produce chronic problems. The exception, herpes zoster, can result in postherpetic neuralgia requiring pain rehabilitation.

Prior to proceeding further, it is important to define some of the terms of neurologic rehabilitation, and for this, the writings of Wood are invaluable. He first states that there must be a "perception of the problem" or the patient and family would not have sought medical attention. The physician then attempts to define the problem, that is, "specification of the nature" and "definition of the consequences." Finally, there must be a "review of the potential for intervention" and then the intervention or treatment.

He further points out that first there is "the disease, the intrinsic situation." The neurologist, by a careful history and sometimes specific tests, attempts to define this in pathologic terms: for example, vascular, degenerative, demyelination, infectious or trauma. By meticulous neurologic examination (and now newer techniques), it is defined in anatomic terms (peripheral nerve, spinal cord, anterior horn cells, brain stem, optic nerve, and so forth). The disease manifests itself by producing findings that include symptoms and signs (impairments).

Impairment, as defined by the World Health Organization (WHO), is any loss or abnormality of psychological, physiologic, or anatomic structure or function. When one performs a neurologic examination and finds spastic paraparesis, one is detecting and describing the impairment. Essentially, the neurologic examination is a systematic detection and description of impairments.

Disability is any restriction or lack (resulting from an impairment) of ability to perform an activity in the manner or within the range considered normal for a human being of that age. When one finds that an adult cannot walk more than 100 meters, the diagnosis is gait disability. Rehabilitation deals primarily with the effort to overcome or adapt to disability.

Handicap is a disadvantage resulting from impairment or disability that limits or prevents the fulfillment of a role that is normal for that individual. An individual may have paraparesis (impairment) with limited gait (disability) and,

* Authors' note.
because of architectural and urban barriers, have a mobility handicap and be unemployed.

Sometimes impairments may produce handicaps with disability. For example, Cyrano de Bergerac had a large nose (a structural impairment) with no disability but had a social handicap. By contrast, Franklin Delano Roosevelt had severe impairment and disability with almost no handicap.

At the present time, in spite of intensive, promising research, the CNS has limited regenerative capacity, and neurons or glia once destroyed do not regrow. An impairment present for any length of time is likely to become chronic. Even in disorders of the peripheral nervous system, the recovery process is often prolonged, requiring extensive rehabilitative measures and still having significant residual dysfunction. We do not want to suggest that these disorders are untreatable because there is no “cure” or guaranteed restoration of function. To deny patients with chronic neurologic conditions every effort to diminish their disability and handicap ignores the need for sensitivity in their management and the significant potential for improved function and quality of life. In other chronic diseases seen in medicine (and this is most of medicine except for acute infections and some surgical disorders), these patients require and benefit most from the continuing care of a skilled physician.

All medical specialists employ a variety of therapeutic methodologies to varying degrees. Too often these are limited by experience, training, and knowledge, with the patient failing to realize full benefits. These are

1. pharmacologic therapies, primarily used by internists, neurologists, and pediatricians
2. surgical therapies, used almost exclusively by surgical specialists
3. psychological therapies, primarily used by psychiatrists but to a varying degree by all doctors
4. physiologic therapies such as exercises and manipulations, primarily used by physiatrists
5. assistive devices such as prostheses, orthoses, pacemakers, and stimulators, used more and more by a variety of specialists
6. physical modalities such as heat, cold, sound, and radiation, used increasing by a variety of specialists.

The disciplines should share their knowledge and learn from one another. Each disorder in its time will need the skills and techniques of a variety of specialists. As Rusk stated: "The practice of rehabilitation, for the general practitioner or for any doctor, begins with his belief in the basic philosophy that the doctor's responsibility does not end when the acute illness is ended or surgery completed; it ends only when the individual is retrained to live and work with what is left. This basic concept of the doctor's responsibility can be achieved only if rehabilitation is considered an integral part of medical services. Any program of rehabilitation is only as sound as the basic medical service of which it is a part. The diagnosis and prognosis must be accurate (traditionally the neurologist's role), for it is through them that the feasibility of retraining is determined.”

References