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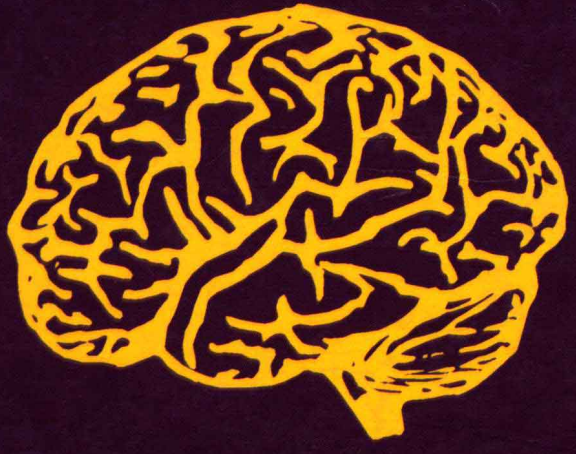
亚当斯-维克托神经病学

Adams and Victor's Principles of NEUROLOGY

（第七版） SEVENTH EDITION

Maurice Victor
Allan H. Ropper



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Maurice Victor, MD
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PREFACE

In the first edition of the *Principles of Neurology*, we remarked that the preface to a textbook is often an unnecessary appendage, doing little more than adding to the book's weight or distracting critics from its contents. The value of the book should be judged by its substance and composition. In his foreword to *Cromwell*, Victor Hugo expressed this sentiment more figuratively: one seldom inspects the cellar of a house after visiting its salons or examines the roots of a tree after eating its fruit.

Yet there has to be a place where authors can state the purpose of their work, the manner in which it was conceived, and the reasons for foisting yet another book on a medical public already overburdened with an immense literature. To sustain our analogy, although one seldom derives pleasure from inspecting the cellar of a house, one is not sorry to have done so, especially if one is to purchase it.

In writing the *Principles of Neurology*, we adopted a method that had for long been espoused on the Neurology Service of the Massachusetts General Hospital. Instead of the customary recitation of many diseases of the nervous system, we chose to introduce the subject with a consideration of the phenomenology, or cardinal manifestations, of neurologic disease. Thus the first part of this book consists of a detailed exposition of the symptoms and signs of disordered nervous function, their analysis in terms of anatomy and physiology, and their clinical implications. This is followed by an account of the natural clusterings of these phenomena, or syndromes, which are the lore of clinical neurology, and this, in turn, by a description of all the main categories and types of disease that express themselves by each syndrome. We believe this approach to neurologic disease to be a logical one, for in practice the patient presents with symptoms of disordered nervous function, from which the clinician reasons to a diagnosis. This sequence of symptom to syndrome to disease recapitulates the rational process by which this is achieved. In teaching students and residents, we have found this clinical method to be eminently successful.

The compass of our book differs in several other ways from most contemporary textbooks of neurology. We have included discussions of a number of subjects that form the core of pediatric neurology, which is heavily weighted with developmental anomalies and hereditary metabolic diseases. These are presented in the context of normal development and maturation of the nervous system. And the effects of aging and age-linked diseases (geriatric neurology) have been accorded a separate chapter. No distinction is drawn between neurosurgical neurology and medical neurology, since they differ only with reference to mode of therapy. A significant portion of the book has been allotted to psychiatric syndromes and the

major psychiatric diseases. This has been done in the belief that these diseases are neurologic in the strict sense. Further, it is our belief that all physicians, including neurologists, should be knowledgeable about the diagnosis of depressive states, neuroses, and eccentricities of personality which are commonly associated with all manner of medical illnesses. The neuropsychiatric effects of alcoholism and drug abuse are also included. Finally, we have consigned a section of the book to a description of muscle diseases, which increasingly are coming under the purview of neurologists. Thus our book provides information that is essential not only to the practice of neurology and neurosurgery, but also to the practice of internal medicine, pediatrics, and psychiatry. To aid readers from these various specialties in finding relevant material, we suggest they turn their attention to the following chapters: internists: 8, 10, 11, 16, 18, 32, 33, 34; pediatricians: 16, 28, 37, 38; emergency and intensive care physicians: 16, 17, 18, 34, 35; orthopedists: 8, 11, 44, 45; psychiatrists: 20, 21, 22, 24, 25, 56, 57, 58.

Throughout this text the emphasis is on the clinical aspects of disease. Of course, pertinent neurobiologic data are not disregarded, but always they are presented with the view of how they bear upon and explain neurologic phenomena and disease. One of our primary aims, in conformity with Oslerian tradition, is to present the clinical phenomena that we ourselves have observed. We persist in our belief that there are advantages to limited authorship. It enables the authors to select what they believe to be essential knowledge about common diseases and to view them from a particular perspective. Also it assures an evenness and uniformity of style that is more likely to please the reader.

The warm reception accorded the first six editions of *Principles of Neurology* has led us to believe that our plan of exposition has filled a need and has emboldened us to carry this work forward. During the editing of the seventh edition, each of us has undertaken a deliberate and critical review of new ideas and developments in clinical neurology and has endeavored to incorporate them. Every chapter has thus been thoroughly revised. The newest discoveries of molecular genetics have been added where relevant. The clarification of physiologic function obtained by PET and SPECT scanning and functional MRI has been expanded. Considerably greater use has been made of tables and MRI illustrations as refinements of biopathology of disease. A special effort has been made to provide the most detailed and current information about the treatment of neurologic diseases.

It is hardly possible to enumerate and adequately thank our many colleagues who in one way or another have been instrumental in the development and growth of this textbook. Foremost is our indebtedness to colleagues and teachers who had an abiding influence in shaping our ideas—Derek Denny-Brown, C. M. Fisher, Paul Yakovlev, E. P. Richardson, and Mandel Cohen. A special debt is owed to Betty Banker for her assistance in revising the chapters on muscle disease and for her help on all matters, large and small, pertaining to this book, since its inception. We are grateful also to the many colleagues with whom we have repeatedly discussed the substantive material of previous editions—Robert Young, Jay Mohr, Hugo Moser, Edwin Kolodny, and Shirley Wray.

Individual chapters or parts of chapters for the current edition were graciously reviewed by Michael Worthington (Chap 32), David Weinberg (Chap 45), and Richard Blair (neuroimaging) of St. Elizabeth's Medical Center; and by Peter Williamson and Vijay Thadani (Chap 16) and James Filiano (Chap 39) of Dartmouth-Hitchcock Medical Center. Expert advice on particularly difficult topics was provided by Harvey Levy (inherited metabolic disorders), John Leigh (the anatomy of vertical eye movements), Pauline Filipek (autism), and Paul Chapman (arteriovenous malformations). Other colleagues too numerous to mention have been sources of constant reference and constructive criticism in this and previous editions.

Finally, we wish to express our gratitude to Richard Haver, librarian at Vermont Veterans Administration Medical Center, and to Sandra Ropper, both of whom were assiduous in searching out innumerable references; to Dolores Altavilla and Dorothy Sweet for their help in preparation of the manuscript; to Winnifred Quick for her generous support of the Department of Neurology at St. Elizabeth's Medical Center; to Muza Navrozov of McGraw-Hill, whose dedication and editing skills have ensured repeated editions of readable text; and to Catherine Saggese for her successful efforts in achieving the timely production of the book.

With the publication of the seventh edition of the *Principles*, readers will recognize a change in the book's format. Raymond D. Adams, who conceived the book and was its senior author through six editions, is relinquishing his role of active authorship and will henceforth have his name incorporated in the title of the book. Although no longer burdened with the day-to-day demands of editors and publishers, Dr. Adams has retained a keen interest in the book. He has read virtually the entire seventh edition, throughout which time we have had both the pleasure and the benefit of his guiding hand and his many suggestions and contributions.

Maurice Victor
Allan H. Ropper

CONTENTS

Part 1

APPROACH TO THE PATIENT WITH NEUROLOGIC DISEASE

Chapter 1

THE CLINICAL METHOD OF NEUROLOGY

Neurology is regarded by many as the most difficult and exacting medical specialty. Students and residents coming to the neurology ward or clinic for the first time are easily discouraged by what they see. Having had brief contact with neuroanatomy, neurophysiology, and neuropathology, they are already somewhat intimidated by the complexity of the nervous system. The ritual they then witness of putting the patient through a series of maneuvers designed to evoke certain mysterious signs, the names of which are difficult to pronounce, is hardly reassuring; in fact, the procedure often appears to conceal the very intellectual processes by which neurologic diagnosis is attained. Moreover, the students have had little or no experience with the many special tests used in neurologic diagnosis—such as lumbar puncture and electroencephalographic, angiographic, and imaging procedures—nor do they know how to interpret the results of such tests. Neurology textbooks only confirm their fears as they read the detailed accounts of the many rare diseases of the nervous system.

The authors believe that many of the difficulties in comprehending neurology can be overcome by adhering to the basic principles of clinical medicine. First and foremost, it is necessary to learn and acquire facility in the use of the *clinical method.* Without a full appreciation of this method, the student is virtually as helpless with a new clinical problem as a botanist or chemist who would undertake a research problem without understanding the steps in the scientific method.

The importance of the clinical method stands out more clearly in the study of neurologic disease than in certain other fields of medicine. In most cases, the clinical method will prove to consist of an orderly series of steps, as follows:

1. The symptoms and signs are secured by history and physical examination, respectively.

2. The symptoms and physical signs considered relevant to the problem at hand are interpreted in terms of physiology and anatomy—that is, one identifies the disorder(s) of function and the anatomic structure(s) implicated by such a disorder. Often one recognizes a characteristic clustering of symptoms and signs, constituting a *syndrome.* The formulation of symptoms and signs in syndromic terms is particularly helpful in ascertaining the locus and nature of the disease. This step may be called *syndromic diagnosis.*

3. These correlations permit the physician to localize the disease process, i.e., to name the part or parts of the nervous system involved. This step is called the *anatomic,* or *topographic, diagnosis.*

4. From the anatomic diagnosis and other medical data—particularly the mode of onset, evolution, and course of the illness, the involvement of nonneurologic organ systems, the relevant past and family histories, and the laboratory findings—one deduces the *pathologic diagnosis* and, when the mechanism and causation of the disease can be determined, the *etiologic diagnosis.*

5. Finally, the physician should assess the degree of disability and determine whether it is temporary or permanent (*functional diagnosis*). This is important in managing the patient's illness and judging the potential for restoration of function, i.e., prognosis.

The foregoing approach to the diagnosis of neurologic disease is summarized in Fig. 1-1, a procedural diagram by which the clinical problem is solved in a series of sequential finite steps. This systematic approach, allowing the confident localization and often precise diagnosis of disease, is one of the intellectual attractions of neurology.

Of course, the solution to a clinical problem need not always be schematized in this way. The clinical

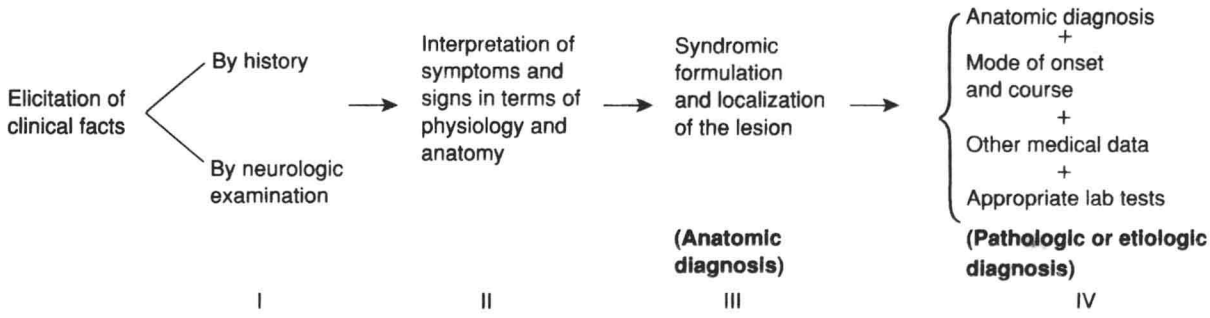

Figure 1-1

Steps in the diagnosis of neurologic disease.

method offers a much wider choice in the order and manner by which information is collected and interpreted. In fact, in some cases, adherence to a formal sequence is not necessary at all. The clinical picture of Parkinson disease, for example, is usually so characteristic that the nature of the illness is at once apparent. In other cases it is not necessary to carry the clinical analysis beyond the stage of the anatomic diagnosis, which in itself may suggest the cause of a disease. For example, when a unilateral Horner syndrome, cerebellar ataxia, paralysis of a vocal cord, and analgesia of the face of acute onset are combined with loss of pain and temperature sensation in the opposite arm, trunk, and leg, the most likely cause is an occlusion of the vertebral artery, because all the involved structures can be localized to the lateral medulla, within the territory of this artery. Thus, the anatomic diagnosis determines and limits the disease possibilities. If the signs point to disease of the peripheral nerves, it is usually not necessary to consider the causes of disease of the spinal cord. Some signs themselves are almost specific, e.g., opsoclonus for paraneoplastic cerebellar degeneration, and Argyll Robertson pupils for neurosyphilitic or diabetic oculomotor neuropathy.

Irrespective of the intellectual process that one utilizes in solving a particular clinical problem, the fundamental steps in diagnosis always involve the accurate elicitation of symptoms and signs and their correct interpretation in terms of disordered function of the nervous system. Most often, when there is uncertainty or disagreement as to diagnosis, it will be found later that the symptoms of disordered function were incorrectly interpreted in the first place. Thus, if a complaint of dizziness is identified as vertigo instead of light-headedness or if partial continuous epilepsy is mistaken for an extrapyramidal movement disorder such as choreoathetosis, then the clinical method is derailed from the beginning. Repeated examinations may be necessary to establish the fundamental clinical findings beyond doubt and to ascertain the course of the illness. Hence the aphorism that a second examination is the most helpful diagnostic test in a difficult neurologic case.

Different disease processes may cause identical symptoms, which is understandable in view of the fact that the same parts of the nervous system may be affected by any one of several diseases. For example, a spastic paraplegia may result from spinal cord tumor, a genetic defect, or multiple sclerosis. Conversely, one disease may present with different groups of symptoms and signs. However, despite the many possible combinations of symptoms and signs in a particular disease, a few combinations occur with greater frequency than others and can be recognized as highly characteristic of that disease. The experienced clinician acquires the habit of attempting to categorize every case in terms of a characteristic symptom complex, or *syndrome*. One must always keep in mind that syndromes are not disease entities but rather abstractions set up by clinicians in order to facilitate the diagnosis of disease. For example, the symptom complex of right-left confusion and inability to write, calculate, and identify individual fingers constitutes the so-called Gerstmann syndrome, recognition of which determines the anatomic locus of the disease (region of the left angular gyrus) and at the same time narrows the range of possible etiologic factors.

In the initial analysis of a neurologic disorder, anatomic diagnosis takes precedence over etiologic diagnosis. To seek the cause of a disease of the nervous system without first ascertaining the parts or structures that are affected would be analogous in internal medicine to attempting an etiologic diagnosis without knowing whether the disease involved the lungs, stomach, or kidneys. Discerning the cause of a clinical syndrome (etiologic diagnosis) requires knowledge of an entirely different order. Here one must be conversant with the

clinical details, including the mode of onset, course, and natural history of a multiplicity of disease entities. Many of these facts are well known and not difficult to master; they form the substance of later chapters.

TAKING THE HISTORY

In neurology more than any other specialty, the physician is dependent upon the cooperation of the patient for a reliable history, especially for a description of symptoms that are unaccompanied by observable signs of disease. And if the symptoms are in the sensory sphere, only the patient can tell what he* sees, hears, or feels. The first step in the clinical encounter is to enlist the patient's trust and cooperation and make him realize the importance of the examination procedure. The following points about taking the neurologic history deserve further comment:

1. Special care must be taken to avoid suggesting to the patient the symptoms that one seeks. The clinical interview is a bipersonal engagement, and the conduct of the examiner has a great influence on the patient. Repetition of this truism may seem tedious, but it is evident that conflicting histories can often be traced to leading questions that either suggested symptoms to the patient or led to a distortion of the patient's story. Errors and inconsistencies in the recorded history are as often the fault of the physician as of the patient. As a corollary, the patient should be discouraged from framing his symptom(s) in terms of a diagnosis that he may have heard, but should be urged to give as accurate a description of the symptom as possible—being asked, for example, to choose a single word that best describes the quality of his pain.

2. The practice of making notes at the bedside or in the office is particularly recommended. The patient who is given to highly circumstantial and rambling accounts can be kept on the subject of his illness by discrete questions that draw out essential points. Immediate recording of the history assures maximal reliability. Of course, no matter how reliable the history appears to be, verification of the patient's account by a knowledgeable and objective informant is always desirable.

3. The setting in which the illness occurred, its mode of onset and evolution, and its course are of paramount importance. One must attempt to learn precisely how each symptom began and progressed. Often the nature of the disease process can be decided from these data alone. If such information cannot be supplied by the patient or his family, it may be necessary to judge the course of the illness by what the patient was able to do at different times (e.g., how far he could walk, when he could no longer negotiate stairs or carry on his usual work) or by changes in the clinical findings between successive examinations, provided that the physician had recorded the findings accurately and quantitated them in some way.

4. Since neurologic diseases often impair mental function, it is necessary, in every patient who might have cerebral disease, for the physician to decide, by an initial assessment of the mental status and the circumstances under which symptoms occurred, whether or not the patient is competent to give a history of the illness. If the patient's power of attention, memory, and coherence of thinking are inadequate, the history must be obtained from a relative, friend, or employer. Also, illnesses that are characterized by seizures or other forms of episodic confusion abolish or impair the patient's memory of events occurring during these episodes. In general, students (and some physicians as well) tend to be careless in estimating the mental capacities of their patients. Attempts are sometimes made to take histories from patients who are feebleminded or so confused that they have no idea why they are in a doctor's office or a hospital, or from patients who for other reasons could not possibly have been aware of the details of their illnesses.

THE NEUROLOGIC EXAMINATION

The neurologic examination begins with observation of the patient while the history is being obtained. The manner in which the patient tells the story of his illness may betray confusion or incoherence in thinking, impairment of memory or judgment, or difficulty in comprehending or expressing ideas. Observation of such matters is an integral part of the examination and provides information as to the adequacy of cerebral function. The physician should learn to obtain this type of information without embarrassment to the patient. A common error is to pass lightly over inconsistencies in history and inaccuracies about dates and symptoms, only to discover later that these flaws in memory were the essential features of the illness. Asking the patient to give his own interpretation

*Throughout this text we follow the traditional English practice of using the pronoun *he, his,* or *him* in the generic sense whenever it is not intended to designate the gender of a specific individual.

of the possible meaning of symptoms may sometimes expose unnatural concern, anxiety, suspiciousness, or even delusional thinking.

The remainder of the neurologic examination should be performed as the last part of the general physical examination, proceeding from an examination of the cranial nerves, neck, and trunk to the testing of motor, reflex, and sensory functions of the upper and lower limbs. This is followed by an assessment of the function of sphincters and the autonomic nervous system and suppleness of the neck and spine (meningeal irritation). Gait and station (standing position) should be observed before or after the rest of the examination. The neurologic examination is always performed and recorded in a sequential and uniform manner in order to avoid omissions and to facilitate the subsequent analysis of case records. In addition, it is often instructive to observe the patient in the course of his natural activities, such as walking or dressing; this may disclose subtle abnormalities of gait and movement that might not be evident in formal testing.

The thoroughness of the neurologic examination must of necessity be governed by the type of clinical problem presented by the patient. To spend a half hour or more testing cerebral, cerebellar, cranial nerve, and sensorimotor function in a patient seeking treatment for a simple compression palsy of an ulnar nerve is pointless and uneconomical. The examination must also be modified according to the condition of the patient. Obviously many parts of the examination cannot be carried out in a comatose patient; also, infants and small children as well as patients with psychiatric disease need to be examined in special ways. The following comments apply to the examination procedure in these and other particular clinical circumstances.

PATIENTS WHO PRESENT SYMPTOMS OF NERVOUS SYSTEM DISEASE

Numerous guides to the examination of the nervous system are available. For a full account of the methods, the reader is referred to the monographs of DeMyer, Ross, Mancall, Bickerstaff and Spillane, Glick, and the staff members of the Mayo Clinic, each of which approaches the subject from a somewhat different point of view. The monograph of DeMyer is particularly recommended to students. An inordinately large number of tests of neurologic function have been devised, and it is not proposed to review all of them here. Some are described in subsequent chapters dealing with disorders of mentation, cranial nerves, and motor, sensory, and autonomic functions. Many tests are of doubtful value and should not be taught to students of neurology. Merely to perform all of them on one patient would require several hours and probably, in most instances, would not make the examiner any the wiser. The danger with all clinical tests is to regard them as indisputable indicators of disease rather than as ways of uncovering disordered functioning of the nervous system. The following tests are relatively simple and provide the most useful information.

Testing of Higher Cortical Functions

These functions are tested in detail if the patient's history or behavior during the general examination has provided reason to suspect some cognitive defect. Questions should then be directed toward determining the patient's orientation in time (day and date) and place and insight into his current medical problem. Attention, speed of response, ability to give relevant answers to simple questions, and the capacity for sustained mental effort all lend themselves to straight-forward observation. Useful bedside tests of attention, concentration, memory, and clarity of thinking include the repetition of a series of seven digits in forward and five in reverse order, serial subtraction of 3s and 7s from 100, recall of three items of information or a short story after an interval of 3 min, and naming the last five presidents or prime ministers. The patient's account of his recent illness, medical consultations, dates of hospitalization, and the day-to-day recollection of medical procedures, meals, and other incidents in the hospital are excellent tests of memory; the narration of how the tests were done and the patient's choice of words (vocabulary) provide information about his intelligence and coherence of thinking. Many other tests can be devised for the same purpose. Often the examiner can obtain a better idea of the clarity of the patient's sensorium and soundness of intellect by using these few tests and noting the manner in which he deals with them than by relying on the score of a formal intelligence test.

If there is any suggestion of a speech or language disorder, the nature of the patient's spontaneous speech should be noted. In addition, his ability to read, write, and spell; execute spoken commands; repeat words and phrases spoken by the examiner; name objects and parts of objects; and solve simple arithmetical problems should be assessed. Bisecting a line, drawing a clock or the floor plan of one's home or a map of one's country, and copying figures are useful tests of visuospatial perception in cases of suspected cerebral disease. The

testing of language, cognition, and other aspects of higher cerebral function are considered in Chaps. 21, 22, and 23.

Testing of Cranial Nerves

The function of the cranial nerves must be investigated more fully in patients who have neurologic symptoms than in those who do not. If one suspects a lesion in the anterior fossa, the sense of smell should be tested in each nostril, and then it should be determined whether odors can be discriminated. Visual fields should be outlined by confrontation testing, in some cases by testing each eye separately; if any abnormality is suspected, it should be checked on a perimeter and scotomas sought on the tangent screen or, more accurately, by computed perimetry. Pupil size and reactivity to light and accommodation (during convergence), the range and rate of ocular movements, and the presence or absence of nystagmus should next be observed. Details of these test procedures and their interpretation are described in Chaps. 12, 13, and 14.

Sensation over the face is tested with a pin and wisp of cotton; also, the presence or absence of the corneal reflexes should be determined. Facial movements should be observed as the patient speaks and smiles, for a slight weakness may be more evident in these circumstances than on movements to command. The auditory meati and tympanic membranes should be inspected with an otoscope. A 256 double-vibration tuning fork held next to the ear and on the mastoid discloses hearing loss and distinguishes middle ear (conductive) from neural deafness. The vocal cords need to be inspected with special instruments in cases of suspected medullary or vagus nerve disease, especially when there is hoarseness. Pharyngeal reflexes are meaningful if there is a difference on the two sides; bilateral absence of these reflexes is seldom significant. Inspection of the tongue, when protruded and at rest, is helpful; atrophy and fasciculations may be seen and weakness detected. Slight deviation of the protruded tongue as a solitary finding can usually be disregarded. Any abnormality in pronunciation should be noted. The jaw jerk and the snout, buccal, and sucking reflexes should be sought, particularly if there is a question of dysphagia, dysarthria, or dysphonia.

Tests of Motor Function

In the assessment of motor function, it should be kept in mind that observations of the speed and strength of movements and of muscle bulk, tone, and coordination are usually more informative than the tendon reflexes. It is essential to have the limbs fully exposed and to inspect them for atrophy and fasciculations as well as to watch the patient maintain the arms outstretched in the prone and supine positions; perform simple tasks, such as alternately touching his nose and the examiner's finger; make rapid alternating movements, particularly such movements that necessitate sudden acceleration and deceleration and changes in direction; rapidly touch the thumb to each fingertip and supinate and pronate the forearm; and accomplish simple tasks such as buttoning clothes, opening a safety pin, or handling common tools. Estimates of the strength of leg muscles with the patient in bed are often unreliable; there may seem to be little or no weakness even though the patient cannot step up on a footstool without help or arise from a kneeling position. Running the heel down the front of the shin and rhythmically tapping the heel on the shin are the only tests of coordination that need be carried out in bed. The maintenance of the outstretched and supinated arms against gravity is a useful test; the weak one, tiring first, soon begins to sag, or, in the case of a corticospinal lesion, to resume the more natural pronated position. The strength of the legs can be similarly tested, either with the patient supine and the legs flexed at hips and knees, or with the patient prone and the knees bent. Also, abnormalities of movement and posture and tremors may be exposed (see Chaps. 4 and 6).

Tests of Reflex Function

Testing of the biceps, triceps, supinator (radial-periosteal), patellar, Achilles, and cutaneous abdominal and plantar reflexes permits an adequate sampling of reflex activity of the spinal cord. Elicitation of tendon reflexes requires that the involved muscles be relaxed. Underactive or barely elicitable reflexes can be facilitated by voluntary contraction of other muscles (Jendrassik maneuver). The interpretation of the plantar response offers special difficulty because several different reflex responses can be evoked by stimulating the sole of the foot along its outer border from heel to toes. These are (1) the quick, high-level withdrawal-avoidance response; (2) the slower, spinal flexor noci-fensor reflex (flexion of knee and hip and dorsiflexion of toes and foot); dorsiflexion of the large toe as part of this reflex is the well-known Babinski sign; and (3) the plantar grasp reflex. Avoidance and withdrawal responses interfere with the interpretation of the Babinski sign and can sometimes be overcome by utilizing the several

alternative stimuli that are known to elicit the Babinski response (squeezing the calf or Achilles tendon, flicking the fourth toe, downward scraping of the shin, lifting the straight leg, etc.). An absence of the superficial cutaneous reflexes of the abdominal, cremasteric, and other muscles is a useful ancillary test for detecting corticospinal lesions.

Testing of Sensory Function

This is undoubtedly the most difficult part of the neurologic examination. Usually sensory testing is reserved for the end of the examination and, if the findings are to be reliable, it should not be prolonged for more than a few minutes. Each test should be explained briefly; too much discussion of these tests with a meticulous, introspective patient may encourage the reporting of useless minor variations of stimulus intensity.

It is not necessary to examine all areas of the skin surface. A quick survey of the face, neck, hands, trunk, and feet with a pin takes only a few seconds. Usually one is seeking differences between the two sides of the body (it is preferable to ask whether stimuli on opposite sides of the body feel the same rather than to ask if they feel different), a level below which sensation is lost, or a zone of relative or absolute anesthesia. Regions of sensory deficit can then be tested more carefully and mapped out. Moving the stimulus from an area of diminished sensation into a normal area enhances the perception of a difference.

The finding of a zone of heightened sensation ("hyperesthesia") calls attention to a disturbance of superficial sensation. Variations in sensory findings from one examination to another most often reflect differences in technique of examination as well as inconsistencies in the responses of the patient.

Sensory testing is considered in greater detail in Chap. 9.

Testing of Stance and Gait

No examination is complete without watching the patient stand and walk. An abnormality of stance and gait may be the most prominent or the only neurologic abnormality, as in certain cases of cerebellar or frontal lobe disorder. Also, an impairment of posture and highly automatic adaptive movements in walking may provide the most definite diagnostic clues in the early stages of Parkinson disease and progressive supranuclear palsy (Chap. 7). Walking is the most effective way to bring out dystonic postures in the hands, feet, and trunk. And having the patient walk tandem or on the sides of the soles may disclose a lack of balance. Hopping or standing on one foot may also betray a lack of balance or weakness, and standing with feet together and eyes closed will bring out a disequilibrium that is due to impairment of labyrinthine-vestibular function or deep sensory loss (Romberg test).

THE MEDICAL OR SURGICAL PATIENT WITHOUT NEUROLOGIC SYMPTOMS

In this situation, brevity is desirable, but any test that is undertaken should be done carefully and recorded accurately and legibly. The patient's orientation, insight, and judgment and the integrity of speech and language functions are readily assessed in the course of taking the history. With respect to the cranial nerves, the size of the pupils and their reaction to light, ocular movements, visual and auditory acuity (by questioning), and movements of the face, palate, and tongue should be tested. Observing the bare outstretched arms for atrophy, weakness (pronating drift), tremor, or abnormal movements; checking the strength of hand grip and dorsiflexion at the wrist; inquiring about sensory disturbances; and eliciting the supinator, biceps, and triceps reflexes are usually sufficient for the upper limbs. Inspection of the legs as the feet, toes, and knees are actively flexed and extended; elicitation of the patellar, Achilles, and plantar reflexes; testing of vibration and position sense in the fingers and toes; and assessment of coordination by having the patient alternately touch his nose and the examiner's finger and run his heel up and down the front of the opposite leg complete the essential parts of the neurologic examination. This entire procedure does not add more than 3 or 4 min to the physical examination. The routine performance of these few simple tests may provide clues to the presence of disease of which the patient is not aware. For example, the finding of absent Achilles reflexes and diminished vibratory sense in the feet and legs alerts the physician to the possibility of diabetic or alcoholic-nutritional neuropathy even when the patient has no symptoms referable to these disorders.

Accurate recording of negative data may be useful in relation to some future illness that requires examination.

THE COMATOSE PATIENT

Although subject to obvious limitations, careful examination of the stuporous or comatose patient yields considerable information concerning the function of the nervous system. The demonstration of signs of focal