



PICTORIAL MANUAL OF NEUROLOGIC TESTS

MAURICE W. VAN ALLEN
ROBERT L. RODNITZKY

SECOND EDITION

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*A Guide to the Performance and Interpretation
of the Neurologic Examination*

SECOND EDITION

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Pictorial Manual of Neurologic Tests

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To Janet and Donna

Foreword to First Edition

One of the most important aspects of the care of the neurologic patient is to arrive at a correct diagnosis of disease of the nervous system and to localize a lesion correctly on the basis of the findings and their proper interpretation.

Traditionally, this activity has been held in esteem as representing a high order of knowledge and capacity for observation, analysis, and synthesis. Neurologists should not only develop a high degree of skill in the examination of the nervous system but should transmit that information to others. The appearance of a host of small and large texts on neurology and the neurologic examination attest to this desire, yet many of these guides to examination have not been sufficiently clear and vivid in the exact methods of procedure.

This manual by Doctor Van Allen represents a serious attempt to provide a starting point for the student, to depict a reasonable schema for orientation to neurologic function and to simplify the examination rather than to complicate it. The abundant illustrations and lucid descriptions should be most welcome to the student, who will find this manual of great value at the time of his introduction to patients with symptoms of disease of the nervous system. Its publication comes at an especially appropriate time when crowded medical school curricula and abbreviation of formal teaching throw an increasing burden on the student to develop his own techniques.

A. L. SAHS

Preface to Second Edition

In preparing the second edition of *Pictorial Manual of Neurologic Tests*, our objectives were to amplify and refine, wherever possible, the material contained in the first edition and introduce new material reflecting the continued evolution of techniques for neurologic diagnosis in the past decade. The single greatest advance during this time span has been outside the realm of the bedside neurologic examination—namely, the advent of computerized cranial tomography. While this innovation has, in some respects, simplified the task of those who make neurologic diagnoses, it has not diminished the importance of a logically planned and carefully performed clinical examination. Still paramount to the intelligent diagnosis of neurologic disease is the correlation between objective demonstration of neurologic dysfunction and abnormalities found on laboratory or radiologic tests. No matter how sophisticated the test, results seldom can be properly interpreted in a vacuum, that is, in the absence of solid clinical information.

This book is intended primarily to supplement the instruction of medical students. It may also be helpful to physicians training in fields other than neurology when personal instruction in the neurologic examination is not available. The practitioner may find it useful to reinforce occasionally used knowledge and to improve his efficiency and technique in neurologic diagnosis.

The manual differs from others in several respects. It is extensively illustrated with line drawings. Wherever a drawing could shorten description, facilitate understanding, or reinforce memory, it was used. Although some may doubt the need to illustrate a test of strength of the grip, we believe that proximity of pictures, description, and emphasis on meaning serve to hasten the acquisition of clinical skills. The manual is almost exclusively a guide to examination. However, the temptation to include practical applications of the information obtained from examination has not been entirely resisted.

The organization of the first section, The Basic Neurologic Examination, reflects our own approach to the examination and departs somewhat from traditional format. However, most of the tests specified in traditional outlines for the student are described, if not always in customary order.

The majority of patients requiring neurologic examination are able to walk into the physician's office, and many will not have discernible signs of organic disorder of the nervous system. Hence, the manual is organized so that the examiner may begin with a screening examination of such patients that is sufficiently searching to uncover significant evidence of dysfunction and yet is practical in terms of ordinary limitations of time and energy. This first section is designed to encourage and facilitate a more thorough examination than is commonly done

and one that, if negative, would more reliably rule out the presence of neurologic disease. One should be aware, however, that *major disease of the nervous system may be present without discernible functional alteration, no matter how searching the examination*. The examination should, of course, be regarded as preliminary to a regional or local examination when symptoms call for more detailed inspection of a symptomatic area or a disturbed function.

Some will find it advantageous to combine the neurologic examination with the general physical examination while others may find analysis easier by performing the neurologic examination separately. Many symptomatic disorders of the nervous system are causally related to disorders not primarily neurologic—e.g., atherosclerosis, valvular heart disease, metastatic malignancy, diabetes, and uremia. The possible relationship of non-neurologic findings to neurologic symptoms should always be kept in mind.

The second section describes common abnormal signs and syndromes of disease to help the examiner identify and interpret the significance of abnormalities disclosed by regional examination. Here, substantially enlarged discussions of nystagmus, myasthenia gravis, and pharmacologic testing for Horner's syndrome will be found, as well as a new portion on neurocutaneous syndromes. The next sections are concerned with special problems in examining infants, diagnosing seizure disorders, and examining comatose patients. The last two of these

sections have been extensively revised and expanded. Special supplementary diagnostic procedures that can be carried out on the ward or in the office are then described. Here the description of the technique and the indications for lumbar puncture have been revised. The section covering the mental status examination has been expanded and contains specific techniques for evaluating memory, orientation, higher intellectual functions, spoken language and reception, writing, and reading.

Some repetition of text has been a natural consequence of the organization of the book. Some has been purposeful for emphasis. Much information is necessarily omitted. The methods and signs selected for description reflect our preference based on their usefulness in our daily practice.

The neurologic examination and its related special sensory and performance tests are the most precise parts of a physical examination. The charm and unique value of the neurologic examination will not fade with progress in laboratory medicine. The examiner is able to go far beyond percussion, palpation, and auscultation. By observing function firsthand, he secures evidence of a quality not available to other disciplines except by laboratory studies. The more and greater variety of function that he can observe, the more evidence he can gather.

Bibliography has been reduced to a minimum. Those who wish to review source material may find it through the references given.

Acknowledgments

We have been reared in the tradition of neurology at Iowa established by Dr. C. E. Van Epps and carried on and expanded so admirably by Dr. A. L. Sahs. This tradition has emphasized bedside teaching and accurate diagnosis in the care of a large clinical service.

The contribution of Mr. George Buckley, who prepared the illustrations for the first edition as well as the new illustrations for this edition, is again gratefully acknowledged.

Dr. Arthur L. Benton made many valuable suggestions and contributions, especially in the preparation of the section on the mental status examination. Dr. William Bell was most helpful with the section on examination of the infant, and Drs. H. Stanley Thompson and James Corbett made valuable suggestions on neuro-ophthalmologic topics.

We also thank Mrs. Diana Allen for her competent editorial assistance.

M. W. VAN ALLEN
R. L. RODNITZKY

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History

Although the separation of history and examination is essential for record keeping, in fact the examination starts as soon as one sees the patient, and the history often is supplemented during the course of examination with unexpected findings.

Begin the history with age, occupation, handedness, residence, marital status, and military service of the patient. Then, with only the principal symptoms of the present illness in mind, establish the family and medical background to determine the setting of these symptoms. Inquire about surgical procedures, trauma and hospitalizations, parenthood, menstrual history, and yearly time on sick leave. In the system review, ask especially about diabetes, heart and lung disease, hypertension, gastrointestinal complaints, and urinary function. Questions about neurologic disorders of parents and siblings may give revealing answers. Faced with a complex problem, one may plan to question the patient further at a later time.

When the patient is an infant or child, probe into the circumstances of gestation and delivery, attainment of standard landmarks of achievement, rate of gain in weight and height, and curve of continued progress. Ask about childhood diseases, serious illnesses, and trauma.

Having established the background, proceed to reconstruct the story of the present illness. Here instruction can have only limited value to the examiner. One learns from experience how

to question people about disease. It will not always be clear when symptoms pertinent to the illness at hand actually started. Often a bit of probing will reveal that symptoms are of longer duration than at first stated. Be skeptical when serious symptoms are dated to an improbably related accident and especially a compensable one. When the neurologic symptoms are obviously secondary to a general disorder, develop the story of that disorder, chronologically fitting in the occurrence of neurologic symptoms. Note what previous treatment has been received—especially the kind and amount of drugs. Drug-induced disorders are frequently seen.

Some common symptoms of disease of the nervous system should be reviewed with each case:

1. Loss of interest, drive, and energy
2. Disorders of memory and thinking
3. Headache
4. Seizures with convulsive activity, loss or alteration in consciousness, with details of aura and character of the episode
5. Visual changes (dimness, diplopia, and monocular or binocular acuity changes)
6. Loss of hearing and tinnitus
7. Loss of balance and vertigo
8. Change in speech and difficulty in swallowing
9. Clumsiness or weakness of the extremities, tremors, and involuntary movements

10. Spinal pain
11. The distribution, nature, and duration of pain, with its aggravating and ameliorating factors
12. Sensory distortions (paresthesias) or sensory loss in face, extremities, or trunk
13. Impotence or difficulty in urination

An accurate history is often worth many hours and much money spent on supplemental procedures. Pay particular attention to the proper chronology of events and to the time relationships of the various symptoms. The aim is to reconstruct an accurate picture of the appearance, regression, progression, and modification of symptoms, properly ordered in time.

Repeat questions concerning the various organ systems as each is examined or when abnormalities are uncovered. The examiner's inquisitiveness and the patient's memory will be stimulated during examination. For example, a scar found on the scalp may lead to reiteration of a previous question about head injury. The patient may then recall the details of forgotten trauma. The interrogation is likely to be more of an ordeal for the patient than the physician realizes and important facts may be forgotten in the anxiety of an initial interview. Continued questioning during the course of examination will often produce significant information.

Always try to assess the reliability of sources of information and to check important points with as many observers as possible, particularly in regard to episodes of disturbed behavior,

mental changes, periods of altered consciousness, or convulsions.

In puzzling cases, sit down with the patient or his relatives after a day or so and review the history at leisure. New information or corrections in the temporal order of events may then further elucidate the problem and lead to a correct diagnosis.

Preliminary Evaluation of Mentation and Speech

The mental examination begins with the first meeting and handshake. The grooming, dress, carriage, and, with women, make-up and accessories give some immediate insight into the patient's self-image. Later the physician will be able to determine how appropriate this self-image is and can then estimate the stresses that plague the patient. Poor grooming, careless dress, and indifferent posture, if inappropriate to the patient's background, raise the question of mental deterioration or depression.

The patient requires a fair degree of savoir faire to maintain poise and operate efficiently if he is unaccustomed to the role of patient. Hence he is apt to display less than his best ability at organization, recall, and understanding. This is not necessarily disadvantageous since the stressful situation, while reducing

the efficiency of the normal person, will often uncover deficiencies of mentation in the ill that were not evident previously to either patient or family. The inability to do simple arithmetic or to carry out consecutive commands may be exposed as an unpleasant surprise to all concerned.

First impressions are not always sufficient to evaluate the normality of performance, considering the wide range of normal behavior and mental capacities of the patients encountered. Usually, however, when the initial interview is completed the physician will have formed a fairly accurate estimate of the patient's mental capabilities. The ability to recognize the content of questions put to him, to formulate a reasonable and fairly precise answer, and to stay on the subject without too much circumstantiality are all factors which go into judgment of normalcy of mental functioning. Alacrity in verbal response is characteristic of normal alertness, mental drive, motivation, and mood.

As the dialogue continues, the patient's level of education, vocabulary, and word usage will be evident. Only the more subtle forms of dysphasia are likely to escape the close attention to conversation which should be employed in history taking.

Do not attempt a detailed mental examination before rapport is established, usually after the physical examination or perhaps not until a second visit. A less rigorous mental examination obviously will be in order for the alert, fluent, and disgruntled

patient with sciatica, while a more detailed study will be appropriate for the patient who is slow and vague in responding, uncertain in choosing common words, or lacking in spontaneity. The patient may be deceptively alert, however, and still have appreciable specific deficits. See Supplemental Diagnostic Procedures (p. 191) for the examination for aphasia and tests for determining mental status.

The Basic Neurologic Examination



Fig 1

The energy, speed, and agility with which the patient rises and walks about provide important initial clues to his general health, his mood, and the status of his musculoskeletal and nervous systems. Maintenance of upright posture and walking bring into action a substantial portion of the nervous system, both motor and sensory. To see the patient get up and move about is as important in general orientation as is the background history. Prior to the formal assessment of gait, it is worthwhile to observe the patient as he walks to the examining room. Often more can be learned while the patient is unaware that his gait is under scrutiny.

Walking is not a delicate function, however, and compensatory mechanisms can mask deficiencies. Moreover, disorders of gait caused by non-neurologic conditions, especially joint disease, may be misleading. Nevertheless, close observation of walking may yield important evidence of dysfunction of the nervous system. Ask the patient to walk back and forth several times and observe successively his posture, balance, arm swinging, and leg movement. As in almost any aspect of the examination, allowance must be made for age and obvious non-neurologic disability. If the gait seems unusually slow and cautious, encourage the patient to walk more rapidly since this may uncover subtle abnormalities not seen when he is moving at a slower pace. Common sense must be used in asking an ill or decrepit patient to walk. Sometimes it is fitting to assist a partially disabled patient to walk when this can be done safely.