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THE EARLY DIAGNOSIS OF POLIOMYELITIS

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Acute poliomyelitis is a systemic disease of virus etiology. The various strains of viruses thus far identified have a predilection for the central nervous system and the voluntary muscular system. The disease is essentially a medical problem and competent and adequate medical management is a prerequisite to obtain results therapeutically profitable to the patient. This medical management must be augmented by conscientious nursing care, high protein diet, and intelligent use of physiotherapy directed to the pathologic physiology in the muscles.

The main reliance for diagnosis is placed upon complete physical and neurological examination, which must be made as soon as possible.

It is generally understood that during poliomyelitis epidemics 80 per cent or less of those who are susceptible to poliomyelitis may develop the abortive type of the disease in which the symptoms may be transient sore throat, nausea, headache, and listlessness. These symptoms clear up entirely within 5 to 7 days so that these patients are rarely diagnosed or reported as poliomyelitis. It is only in research projects that the virus has been isolated from the nose and throat washings or from the feces of such patients and the spinal fluids have been found positive.

Twenty per cent or more of those who are susceptible in any outbreak will have one of the several types of reportable poliomyelitis. Fever is usually present. This may subside in 2 or 3 days and then reappear, or it may appear together with the symptoms of pain and stiffness in the muscles of the limbs, back, or neck. The temperature usually drops in 5 to 7 days, but the other symptoms continue and such a patient is diagnosed as a nonparalytic poliomyelitis and kept under isolation according to prevailing public health regulations. Spinal fluid findings of pleocytosis, increased total protein and positive globulin will confirm the diagnosis. Positive spinal fluid findings help to confirm the diagnosis, but negative findings are of no significance in the presence of clinical signs and symptoms.

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This patient must now be watched carefully for any paralysis or bulbar symptoms, which may appear any time from the second to the eighth day after the onset of the symptoms. The early symptoms of respiratory and circulatory failure must be appreciated and treated immediately, if bulbar cases are to be saved. The severity of the paralysis cannot be predicted. As a rule, no extension of the paralysis is seen after the eighth day, but failure of the fever to subside will usually means extension of the disease. Patients must be observed several times a day during the acute, spreading phase. This is done best with the patient in a hospital which is staffed with experienced personnel and which is equipped with oxygen tents, oxymeters, electrical suction machines, resuscitators, respirators, spirometers, rocking beds, intermittent positive pressure machines, electrophrenic respirators, an electromyograph machine, tracheotomy and bronchoscopy facilities, rehabilitation apparatus as wheel chairs and walkers, hot pack machines, tubs or a Hubbard tank for hot baths, and facilities for orthopedic appliances.

The signs of bulbar poliomyelitis are those presented by partial or complete involvement of any of the cranial nerve nuclei. The cranial nerves and their functions are:

I. Olfactory—Smell

II. Optic—Sight

III. Oculomotor—Eyeball muscles except IV and VI; upper lid, constrictor of pupil and muscles (ciliary) of accommodation. Paralysis causes ptosis of the eyelid; eye deviates out and downward; diplopia; pupil is fixed to light and accommodation.

IV. Trochlear—Superior oblique moves eye down and out.

V. Trigeminal—Muscles of mastication. Sensation to face and mucous membrane of conjunctiva, nose, mouth, tongue and uvula. Also taste fibers to anterior two-thirds of tongue.

VI. Abducens—External rectus moves eye outward.

VII. Facial—Facial muscles except those supplied by the V. Paralysis causes inability to wrinkle forehead, to close eye, to whistle, or to blow out the cheeks.

VIII. Acoustic—Hearing and equilibrium. Paralysis causes tinnitus and nystagmus.

IX. Glossopharyngeal—Supplies gag re-

flex, and taste to the posterior third of the tongue.

X. Vagus—Supplies heart, lungs, respiratory system, and all abdominal organs except pelvic. Controls speech, swallowing, and soft palate.

XI. Spinal Accessory—Supplies trapezius and strenomastoid. If paralyzed, patient cannot shrug shoulders or lift head from supine position.

XII. Hypoglossal—Muscles of the tongue. Tongue deviates to the paralyzed side.

An experienced nurse must be constantly on the watch for such signs as rapid or irregular pulse, hypertension, restlessness, shock, dyspnea, cyanosis, anxiety, apprehension, shallow or irregular respirations, nasal speech, inability to swallow, severe drowsiness, regurgitation of fluids through the nose, twitching of muscles, or the use of neck muscles in inspiration. Paralysis of the upper extremity may be the beginning of paralysis of the diaphragm on the same side through the involvement of the phrenic nerve. Loss of the abdominal reflexes may mean paralysis of the lower six thoracic segments of the spinal cord and paralysis of the abdominal muscles which are of major importance in respiration.

The differential diagnosis must be made carefully as soon as the patient is seen. There are many acute illnesses which simulate poliomyelitis. About 50 different diseases were diagnosed in patients admitted for poliomyelitis in our clinic during the past 12 years. This disease is most frequently misdiagnosed as "summer grippe."

The following table summarizes the signs which, when present, usually exclude poliomyelitis, and also shows the diseases which are commonly confused with it.

Signs Which Usually Exclude Poliomyelitis

Signs	Commonly Confused Conditions
1. Rash of any kind	Meningococcic meningitis and petechia; Rocky Mountain spotted fever.
2. Swollen glands	Infectious mononucleosis, neuroblastoma, mumps meningoencephalitis.
3. Swollen joints 4. Localized joint or bone tenderness	Acute arthritis, rheumatic fever. Bone tumors, osteomyelitis, rickets, scurvy, tuberculosis, epiphysitis, cervical or lumbar disc.
5. Bleeding gums	Blood dyscrasias, scurvy.
6. Unilateral or bilateral eyeground changes	Brain tumor or abscess.
7. Positive blood or spinal fluid serology	Congenital or acquired lues.
8. Purulent spinal fluid	Meningitis—influenzal, meningococcic, pneumococcic, staphylococcic, streptococcic.
9. Hemorrhagic or xanthochromic spinal fluid	Cerebral accident, tumor in brain or spinal cord.
10. Convulsions	Encephalitis, epilepsy, meningitis, mumps, spastic paraplegia, tuberculosis, cerebral thrombosis.
11. Extreme drowsiness without muscle spasm or muscle paralysis	Coma-diabetic, uremic, emcephalitic.
12. Sensory changes to heat, cold, pain, touch, vibration, or position	Arachnoiditis, brain tumor, hysteria, nucleus pulposus, peripheral neuritis, peroneal palsy due to syphilis, spinal cord tumor, syringomyelia, transverse myelitis, multiple sclerosis.
13. Extreme weakness without muscle paralysis	Muscular dystrophy, myasthenia gravis, progressive muscular atrophy.
14. Septic temperature	Influenza, pelvic inflammatory disease, pneumonia, septicemia, Still's disease, subacute bacterial endocarditis, leukemia, typhoid fever.
15. Paralysis of soft palate and muscles of accommodation	Myasthenia gravis, post diphtheritic paralysis.
16. Jaundice	Acute infectious hepatitis, Weil's disease.
17. Other conditions confused with poliomyelitis	Appendicitis, aseptic meningitis, Bell's palsy, laryngotracheo-bronchitis, lymphocytic choriomeningitis, New Castle disease.

SUMMARY

Clinically, poliomyelitis may be abortive, non-paralytic, or paralytic. The paralytic types may be spinal, bulbar, or encephalytic in the order of greatest frequency. The characteristic finding in the non-paralyzed patients is muscle shortening due to muscle rigidity or "spasm"; this is more prominent in the entire posterior area of the body. This muscle contraction is not necessarily related to any paralysis of any of the "opposing" muscle groups. In the paralytic patients the characteristic finding is, in addition to the muscle shortening noted in the non-paralytic, a flaccid paralysis of muscle groups, asymmetrically located.

Recovery is spontaneous and complete only in the abortive type. The other types require special muscle relaxation so that a full range of motion of all joints is obtained and maintained, special muscle exercises, special nutrition, and controlled prolonged medical observation in order to obtain maximum recovery and maximum use of the neuromuscular power the patient still retains. The amount of special care a patient will require will depend on the severity of the involvement.

The mortality rate is generally influenced by the previous experience of the locality-early diagnosis, early hospitalization, and the experience of the hospital personnel. For these reasons it is always higher in an area where an outbreak appears for the first time. Delaware has had several severe outbreaks of poliomyelitis—in 1944, 1947, 1948, 1952.