

POLIOMYELITIS PROBLEMS

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ETIOLOGY

Notwithstanding the intensive studies of investigators, very little information of practical value has been added to our knowledge of poliomyelitis during the past forty years. It was Wickman who determined in 1905 that this disease is communicable and that human carriers are capable of transmitting the infectious agent to man. In 1909 Landsteiner and Popper injected monkeys with nerve tissue taken from patients who had died of poliomyelitis and thus produced in them a disease corresponding to poliomyelitis in humans. Very shortly that accomplishment was confirmed by Flexner and Lewis. This experimental work formed the basis for our modern acceptance of the theory that poliomyelitis is caused by a filtrable virus.

As early as 1914 Flexner and Noguchi reported globoid bodies in the spinal fluid of poliomyelitis patients, and about three years later Nuzum and Herzog, Mathers and Rosenow independently described pleomorphic cocci. Until this day Rosenow has been steadfast in his conviction that a microdiplococcus phase of a specific streptococcus is the causative agent for poliomyelitis. Furthermore, in recent years Scobey has insistently questioned the virus theory and asserts that a toxin accounts for the pathologic findings. However, as a filtrable virus is commonly accredited as the etiologic factor it has seemed as though this particular aspect of the disease was more or less satisfactorily settled. In addition it is generally conceded that there are four distinct groups of poliomyelitis virus. Group I, however, accounts for most human cases of the disease, and monkeys are usually required for transference of this strain.

Now a comparatively recent announcement is accompanied by some feeling of dismay. Following the original description of a new virus (1948) by Dalldorf and Sickles an investigation has been conducted by Curnen, Shaw and Melnick, and it is definitely stated that the new virus (coxsackie) is not the poliomyelitis virus. Nevertheless, this new virus which has been disclosed in southern New England, North Carolina and Texas produces symptoms identical to those of nonparalytic poliomyelitis. Moreover, spinal fluid findings may also be characteristic for

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poliomyelitis but the disease seems to have no serious consequences and lasts only about one week.

In view of the foregoing announcement it seems that trained investigators have added one more problem to the nebulous conditions enveloping poliomyelitis. One might almost be tempted to make the contradictory statement that the more we learn about poliomyelitis, the less we know.

EPIDEMIOLOGY

There is nothing about poliomyelitis which seems more strange than its epidemiologic character. It has long been crowned as a hot weather disease. In 1916 New York City had its warmest summer in more than 40 years and recorded approximately 13,000 cases of poliomyelitis, which is undoubtedly the largest epidemic of the kind. Moreover, comparatively few cases were diagnosed unless paralysis was present. It is true that some small outbreaks have occurred in colder seasons and climates. In December 1916 less than a score of cases were reported in Grafton, West Virginia and scarcely more than a year ago the disease was reported among the Eskimos in Alaska. Nevertheless, summer temperatures are frequently looked to by public health workers as a barometer for poliomyelitis prevalence. In addition to heat, a lack of rainfall seems to be a contributing factor in promoting spread of the infection.

Considering that nearly all of the common acute infectious diseases predominate in the fall and winter or winter and spring, seasons when life is principally within doors and schools are in session, we are forced to ponder why poliomyelitis is epidemic in the summer. Foods, including milk and water, have all been acquitted as vectors. However, if there were poliomyelitis virus in the water it would not be destroyed by the amount of chlorine used for purification.

Usually August and September are the peak months for poliomyelitis. Those months are not merely likely to be the warmest of the year but they include the fly season. However, flies and other insects are believed not to play a significant part in transmission of the disease. It seems as though all sources of transmission of the infectious agent including pollens and farm animals have been investigated without illuminating results except that, as Wickman pointed out, there are human carriers. Can it be that the disease is transmitted only by person to person contact? It does not seem likely and yet scarlet fever was once considered uncontrollable by public health workers.

SUSCEPTIBILITY

One of the strangest features of this disease is that with the great advances in sanitation and higher scale of living poliomyelitis seems to

thrive. In the meantime most of the other common contagious diseases have declined markedly, with the exception of measles. However, the upward trend in poliomyelitis prevalence is not so precipitous as it may seem. As long ago as 1865 Taylor of New York, in referring to infantile paralysis, stated, "This disease is much more common now and is rapidly increasing." Does sanitation bear any relationship to poliomyelitis? Localities known to be unsanitary usually have fewer cases of poliomyelitis than good neighborhoods. Children who from an early age play in the streets may acquire subclinical infections of poliomyelitis virus and as a consequence develop immunity. Among the so-called better classes children are more sequestered and also more susceptible.

Race and color are not ordinarily considered factors in susceptibility, but I have been told by Chinese physicians that they had never seen poliomyelitis in their own country. Until recent years we very seldom had any Negro patients with this disease in the Contagious Disease Hospitals of Chicago.

Many observations have been made in respect to the physical characteristics of those stricken with poliomyelitis, but widely spaced upper incisors, and a square or other shaped type of head can scarcely be of any significance in susceptibility. One year we were greatly impressed by the fact that nearly every poliomyelitis patient in the Cook County Contagious Disease Hospital was a blond. Moreover, it has always seemed to me that the disease prefers blonds. However, there is at least one outstanding characteristic which is nearly always evident. As a rule the patient is well developed and presents an exceptionally well nourished appearance.

The state of nutrition in relation to susceptibility is one of the many problems which has been investigated in poliomyelitis. Moreover, it was found that mice deficient in thiamine showed increased resistance to poliomyelitis virus when experimentally infected. The question of hormone disturbances has also been considered as an influence on susceptibility. Nevertheless there is a tendency at the present time to assume that the virus of poliomyelitis is as widespread as that of measles. If such a theory is correct it should mean that nearly everyone in an urban population is infected before reaching adult life. This should not imply that under those circumstances paralysis would be frequent or even that a knowledge of infection was recognized. But, as pointed out by Casey et al., subclinical infections could account for immunity in most adults. On the other hand, some refer to poliomyelitis as a rural disease.

Second Attacks. It has seemed as though one attack of poliomyelitis probably conferred a lifetime immunity. However, the actual duration of any immunity that one may have is unknown regardless of whether he has experienced the disease or not. Twenty-nine undoubted second at-

tacks have been reported and in addition seventeen which are questionable. One explanation for the occurrence is that the virus strains were immunologically different in the two episodes.

SYMPTOMS

Opinion has decreed that the incubative period is generally from one to two weeks, although it may be as short as three days or more than fourteen. However, at just what hour, day or even the approximate time infection occurred is usually a difficult problem to solve. It is a matter of extreme rarity for a patient to give a history of exposure to a known case of poliomyelitis. Furthermore, since human beings are the only known reservoirs of infection, although other sources are suspected, it is seldom possible to decide when the patient was exposed.

In considering symptoms we are confronted again with obstacles because the onset is not always the same and what follows will depend on the course of the disease. As with any infection some elevation of temperature is to be expected and this is almost certain to occur. Nausea is not infrequent but emesis is less common. Headache occurs in a large percentage of patients and adults often complain of backache. Although gastrointestinal disturbances including either diarrhea or constipation are many times referred to by patients in their homes, those symptoms have not been prominent in our hospitals. Some patients are unusually alert and others are stuporous. Very few are extremely irritable. A sore throat may be complained of and the oropharynx is often injected. The face may be flushed and sometimes a circumoral pallor is markedly evident. The foregoing symptoms may be witnessed for the first two or three days of the illness and yet during that time there may be no evidence of paralysis. Often the reflexes are exaggerated but as a rule there is no muscular pain or tenderness. However, a head drop can usually be elicited if this sign is sought for, and with flexion of the head toward the chest stiffness of the neck is generally determined.

There is no way of knowing at the beginning of the disease whether paralysis will develop or where it may strike. A single group of muscles may become involved, resulting in nothing more than a foot-drop, or one or more extremities may be affected. In most cases the full extent of any paralysis comes like a thunderbolt. Much less often one area after another of the central nervous system is damaged and the disease progresses to what may become a fatal termination within a week or less. It is only in very rare instances that paralysis is postponed until six or seven days after the first symptoms of illness.

The early occurrence of pain and tenderness in paralyzed muscles has always been greatly overemphasized. In reality such symptoms are very uncommon. However, when paralysis is well established, perhaps two to

three days after its appearance in an extremity, passive motion of the part is likely to be painful. This is practically always true in untreated patients and almost invariably so by the end of a week irrespective of therapy. However, the pain is confined almost entirely to the normal muscles which have contracted or are "in spasm" because of the weakness or inactivity of the opposing muscles.

In many instances, if not in all, the examiner may be led to believe that paralyzed muscles are very tender because the patient resents handling, but it is chiefly the fear of manipulation that disturbs the patient.

FORMS OF POLIOMYELITIS

Various classifications have been suggested but for practical purposes four distinct forms can be recognized, although a fifth should be mentioned first. This is the "abortive," a term often improperly used to denote a case of poliomyelitis without paralysis. In reality, an abortive attack is one in which there is a systemic infection without involvement of the central nervous system. However, since there is no accepted scientific method for establishing such a fact a diagnosis of the kind can only be presumptive.

Nonparalytic forms may have all the usual symptoms at the onset but develop no paralysis.

The spinal form is the one most commonly recognized because in addition to the ordinary symptoms there is some evidence of paresis or paralysis.

An encephalic form can also be recognized and is characterized by drowsiness or stupor and sometimes by sweating.

The fourth form is the bulbar which accounts for most deaths. Its distinguishing features are paralysis of palatal muscles, nasal voice, and often paralysis of all muscles of deglutition and, as a consequence, inability to swallow. In some cases there may be merely a facial paralysis which is practically always unilateral.

One or all of the last three forms mentioned may occur in the same individual; this sometimes occurs when the disease continues to progress for perhaps a week after the first evidence of paralysis.

The so-called dromedary examples of poliomyelitis consist of an initial illness of two or three days following which there is an apparent recovery. However, after three to seven days there is a secondary rise of temperature and some form of paralysis makes its appearance.

DIAGNOSIS

It is frequently stated that no two cases of poliomyelitis are exactly alike. Such an assertion is likely to cause confusion in the mind of a novice

who may wonder what to expect. Since symptoms do show great variations it is advisable, in the presence of an epidemic, to consider the possibility of every illness being poliomyelitis until this disease can be definitely excluded.

How can a diagnosis of nonparalytic poliomyelitis be made? Or how can the nature of the illness in the preparalytic stage of the spinal form be decided with a fair degree of certainty? There is no practical laboratory test available in either instance. Virus studies are possible but few laboratories are equipped for such work. Moreover, the virus cannot always be obtained from the oropharynx and it is not found in the blood or spinal fluid. Consequently a stool examination or rectal washings are required for isolation of the causative factor.

Notwithstanding the foregoing assertions it is only fair to state that Rosenow maintains that a precipitin reaction test will settle any doubt in a high percentage of cases. He also has great faith in his diagnostic skin test. Furthermore, he has reported that a microdiplococcus from the spinal fluid can be seen in unstained specimens by the electron microscope. Fox has pointed out that the sedimentation rate may be helpful in excluding a diagnosis of poliomyelitis since a normal rate is found in this disease whereas an increased rate would be expected in the case of a septic infection.

Inasmuch as there is no accepted diagnostic laboratory test it is usually necessary to rely on practical methods. The general appearance of the patient may convey a great deal of meaning to one who is familiar with the disease, but much more important are two signs whose presence or absence can be disclosed in a few moments. These are the head drop and ventral flexion. The former is elicited by having the patient lie supine and then slowly raising his body by means of the examiner's hands placed behind the patient's shoulders (Fig. 25). Almost invariably the head cannot be supported in the plane of the body and will fall back or drag on the table as the shoulders are lifted if the patient has poliomyelitis. The other sign simply consists of attempting to flex the head on the chest to determine if there is stiffness of the neck. This latter sign may also be sought if the patient is able to sit up in bed. Then with his knees drawn up he is asked to bend forward and touch them with his forehead. If he has poliomyelitis, even if there is no paralysis, his response after several efforts will almost always be "I can't, it hurts my back." The presence of these two signs justifies a lumbar puncture and an examination of the spinal fluid.

In the early stage of the disease polymorphonuclears may predominate in the increased cell count. However, by the time the average patient is first seen by a physician 90 per cent of the cells are likely to be lympho-

cytes. Cell counts seldom go beyond a few hundred per cu. mm. but occasionally exceed a thousand, and very rarely the number is normal. A count in excess of 10 is considered abnormal. The Pandy test may or may not be positive early in the disease and the glucose content is not decreased. A culture of the spinal fluid should be negative.

DIFFERENTIAL DIAGNOSIS

In the midst of an epidemic a great variety of diseases and conditions have been confused with poliomyelitis. Among them are some that have

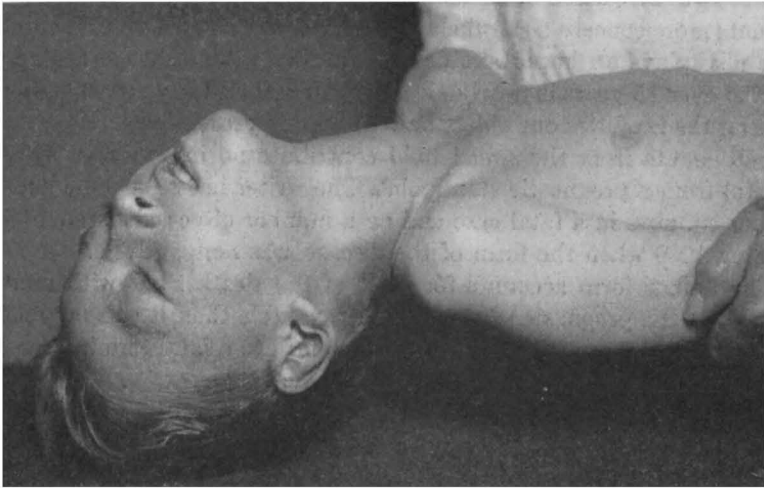


Fig. 25. "Head-drop"—inability to support head when shoulders are raised from table. (Patient is fully rational.)

been observed by the writer and which will merely be mentioned here. They are: practically all forms of bacterial meningitis but particularly tuberculous, tetanus, rheumatic fever, mononucleosis, brain abscess, brain tumor, trichinosis, mumps meningoencephalitis, lymphocytic choriomeningitis, transverse myelitis, lead poisoning, Guillain-Barré syndrome, laryngeal diphtheria, scurvy, tonsillitis, postdiphtheritic paralysis, acute pharyngitis, diabetes and hysteria; also osteomyelitis, a foreign body in the plantar surface of the foot causing a limp, appendicitis and fracture of the fibula, skull fracture and spontaneous subarachnoid hemorrhage. It would seem as though most of the foregoing conditions could be diagnosed without great difficulty, but in some instances an immediate decision should not be expected.

PROGNOSIS

At the onset it is not possible to foretell what course the disease will take, nor, in those cases which develop paresis or paralysis, is there any way of knowing whether the involvement will remain stationary or whether it will progress. However, if a patient shows no evidence of muscular weakness within four days of the onset it is likely but not certain that the attack will be nonparalytic. Clinically there is one sign in particular which gives cause for alarm and that is extreme apprehensiveness. The alert, talkative and apprehensive patient is often the one who will not survive. In such a case the temperature is likely to be high—103 to 104° F. On the other hand, the deeply stuporous child causes the parents more concern as a rule but the prognosis is much more favorable. Age also plays an important part in fatality rates. The percentage of deaths over 15 years is nearly always greater than for younger patients. Among the fatalities our oldest patient was 67 years of age.

Cell counts from the spinal fluid contribute no information which is helpful from a prognostic standpoint. The writer has seen cell counts of 12 per cu. mm. in a fatal case and on a number of occasions counts exceeding 1000 when the form of the disease was nonparalytic.

The bulbar form accounts for most of the deaths, but with modern treatment the prognosis is much more favorable than it was only a few years ago. Respiratory paralysis may also lead to a fatal termination if a mechanical respirator is not immediately available.

Pregnancy seems to exert no serious influence on the course of the disease in the mother nor does the disease in the mother affect the unborn child. The virus, we believe, does not pass the placental barrier. Nevertheless the French have reported at least two cases in which it was claimed paralysis was present at the time of delivery. It is possible that birth injuries might be suggestive of poliomyelitis. In 1948 there were eight pregnant women among the poliomyelitis patients at the Cook County Contagious Hospital. The stage of gestation varied from the first trimester to term. One patient died from a condition not related to poliomyelitis; one woman delivered a normal baby at term and the other patients were all in good condition when released from the hospital. Several months later we learned that others in the group of eight had normal deliveries.

The pregnant mother with poliomyelitis is often worried much more about her infant than her own welfare. Therefore, it is fortunate that her fears can usually be allayed. However, if there is a suggestion of respiratory paralysis with impending need for a mechanical respirator, cesarean section should be considered if the pregnancy is sufficiently advanced.

TREATMENT

Prophylaxis. There is no known method for establishing active immunity. At least two vaccines have been developed for the purpose. One of these was found to be dangerous and the other shown to be without value. For passive immunity the situation seems much the same. Human convalescent poliomyelitis serum or possibly normal adult serum might be chosen but neither of these has been tested on a sufficiently large scale to determine its worth for such a purpose. The possibility of causing a virus hepatitis by using human blood might be a strong objection to such a procedure, although gamma globulin could be used without that danger. We wish to know if gamma globulin is reliable as a temporary preventative of poliomyelitis. Some physicians believe it is of value and administer 2.5 cc. or more to children each year during or just before the usual period for poliomyelitis. However, there is no scientific proof thus far to justify this method.

None of the sulfonamides nor any of the newer antibiotics has been proved to be effective in either the prevention or treatment of poliomyelitis.

During periods when the disease is prevalent advice to parents from public health sources is more or less the same year after year. Keep children out of crowds and away from strange playmates, do not allow them to go swimming or to wading pools, and be sure they do not over-exert themselves. However, there is nothing to indicate that the foregoing warnings have ever contributed anything toward the control of poliomyelitis. Also, operations about the nose and mouth, especially those pertaining to tonsils and adenoids, are considered hazardous. This is because poliomyelitis, especially the bulbar form, has been known to follow such operations. The disease has also occurred after the extraction of a tooth. One investigator suggests that it is not the operation but the shock produced by the anesthetic that is responsible for the development of the disease.

Other problems which have received much serious thought pertain to summer camps and the question of closing schools or postponing their reopening. Recently it has been shown on a statistical basis that no more cases occur in summer camps than if the children had remained at home, so now it is felt by some authorities that there is no objection to well conducted camps as long as children are not accepted from localities where poliomyelitis is known to exist. It has also been recommended that if a case of poliomyelitis develops in a camp, all children be held there and not allowed to go home. At the same time new admissions would be prohibited.

It is advisable to keep the schools open since the opinion is well sus-

tained that it affords a means of daily inspection and prompt medical attention when required. An exception to this plan might be a country school where the pupils come from widely separated localities.

Management. All diagnosed or presumptive cases and those suspected of having poliomyelitis should be isolated and reported to the local health officer. A committee for the National Foundation for Infantile Paralysis has announced that such patients are admissible to general hospitals if proper isolation is provided. The same committee also concluded that there is no practical danger in taking a poliomyelitis patient to a hospital in a community where there is no poliomyelitis.

It is advisable to have every poliomyelitis patient in a hospital for a few days at least, since it is not possible to tell at the onset what course the disease may follow.

No drugs or sera have received general acceptance for specific treatment. Rosenow's poliomyelitis antistreptococcus serum is used to a limited extent, and a few still have faith in human convalescent serum although it seems to be of no special value. The application of therapeutic measures will depend upon the form of the disease to be treated.

With few exceptions all patients should have a lumbar puncture in order to obtain an examination of the spinal fluid for verification of the diagnosis. However, some clinicians are opposed to lumbar punctures for bulbar patients and occasionally a spinal tap is not done because of the desperate condition of the patient.

The chief requirement for patients without paralysis is bed rest for about one week. A mild laxative or an enema may be needed. If there is fever a salicylate may be prescribed. Pain is not likely to be a symptom and sedatives are rarely required. Morphine in any form should not be used. During the past year aureomycin has been prescribed for a number of patients but, notwithstanding some apparently favorable results, its worth is very doubtful. There need be no restrictions in diet.

For patients with paralysis of one or more extremities there should be a bedboard to keep the mattress from sagging and to maintain the body on a level surface. Unless this is done the possibility of a scoliosis developing later is increased in those cases which had an undetected paresis of lumbar muscles at the beginning of the attack. There should also be a footboard to keep bedding from resting on the toes and, still more important, to support the feet in a perpendicular position if there is paralysis of the lower extremities.

If there is paralysis of the upper extremities the deltoid muscle is generally involved. Therefore the arm or arms affected should not be allowed to remain at the patient's sides. Early in the attack the upper arm should be kept at right angles to the body. During the isolation period this can often be accomplished satisfactorily by means of sandbags

or by a bandage from the wrist to the head of the bed. The question of proper splints may have to be decided later by the orthopedist. If such measures are not adopted severe contractures may occur which will make it difficult to raise the patient's arm without producing severe pain. And it should be kept in mind that the pain is not in the paralyzed muscles but in the normal muscles which resent the stretching from their contracted condition. A similar situation can be observed in regard to the lower extremities. On the first or second day of paralysis of an entire leg it can generally be lifted by the foot into a position almost perpendicular to the body without causing pain. However, if there has been no physical therapy intense pain may be caused a few days later by merely raising the foot and leg a few inches above the bed. The pain is in the flexor muscles which are "in spasm" and it often extends along the back of the leg as far as the lumbar region.

If physical therapy is instituted early muscle contractures are greatly diminished. It has been our aim for patients to begin passive movements almost from the day of admission. Actually the time set for instituting physical therapy was as soon as the temperature had been normal for twenty-four hours. Most patients with the spinal form of the disease do not have pyrexia for more than a day or two after paralysis becomes evident.

Respiratory Paralysis. Respiratory paralysis presents more difficulties than almost anything else that can happen in poliomyelitis. Patients of this description generally have a paralysis of the lower extremities as well as of the intercostal muscles and also often of the diaphragm. It is not uncommon for all four extremities to be paralyzed in respiratory cases. Sometimes it is a test of judgment whether or not to place immediately a patient with only slight involvement of the intercostal muscles in a mechanical respirator. With experienced nurses and close and constant attention some of these patients can be practically "talked-out" of going in a respirator. Others, after being placed in respirator, make no further effort to use their muscles and become terrified when the motor is stopped for a few moments.

The nursing care of respirator patients is an arduous undertaking. Moreover, in the past physical therapy in any form was extremely difficult. Now there is an excellent portable respirator with an air chamber which fits over the chest and is held in place by two bands of tape across the back. The machine operates for one or two patients at a time and all extremities are accessible for any special care.

The respirator is contraindicated for a patient with bulbar paralysis unless a tracheotomy has been performed.

A very rare complication which has occurred in respirator cases is rupture of the esophagus. One explanation for such an accident has been

that the intermittent pressure exerted on the abdomen caused stomach contents to be forced back into the esophagus, and the gastric juices led to an ulcer which perforated.

Bulbar Form. The most outstanding advance that has been made in the treatment of poliomyelitis during the acute stage applies to this form. Without any doubt the operation of tracheotomy for bulbar poliomyelitis will save many lives which otherwise would be lost. Nevertheless, numerous bulbar patients have recovered without tracheotomies. Some ten years ago it seemed that about 90 per cent of bulbar patients died. Later the percentage of bulbar cases in Chicago and elsewhere increased but at the same time the case fatality rate declined. This may have been due partly to better treatment and partly to the possibility that more cases with slight bulbar involvement were being recognized.

With continuous nasal suction by means of a siphon attached to a water faucet some good recoveries have been observed. One year there was in Chicago a recovery rate in excess of 70 per cent. For very severe cases life may depend on the promptness with which a tracheotomy is performed. Galloway has given an excellent discussion of this subject. At times it is a problem to decide whether or not a tracheotomy should be done, yet one might be justified in assuming that a tracheotomy is indicated for all bulbar cases.

The first action to be taken in every case of this kind pertains to posture. The head must be lowered by elevating the foot of bed. Otherwise the patient may drown in his own secretions which seep in or are drawn into the trachea from the nose and throat. In the latter case there is an anoxia, the patient becomes comatose and at death an atelectasis is usually present.

Mixed Forms. Several different forms of poliomyelitis may occur in the same patient. If the spinal and bulbar forms are present together and there is paralysis of respiratory muscles a tracheotomy should certainly be done before resorting to mechanical respiration. Oxygen should always be administered. Occasionally the patient dies suddenly as a result, presumably, of paralysis of the respiratory center. Myocarditis also may be a factor in fatal cases.

Drug Therapy. Many different drugs have been used but there are only a few which seem to be of some value for poliomyelitis patients. For respirator and bulbar patients penicillin may be prescribed as a prophylactic for pneumonia. Many patients, particularly males, have paralysis of the bladder resulting in urinary retention. Prostigmine is administered sometimes to relieve this condition but furmathide is much more effective. The dose of the latter is 1 cc., injected in the muscle. If drugs fail to act, catheterization is necessary. Urinary retention usually

does not persist for more than a week or ten days. The inactivity of the bladder is the one form of paralysis in poliomyelitis which is almost certain to clear up.

There are also several antispasmodic drugs which have been used for the purpose of relieving muscular spasm. Among these tolsuroil sometimes seems to be helpful. Curare preparations are still regarded as dangerous.

Hot Packs. Thus far no mention has been made of hot packs. Nevertheless hot packs are accepted almost as standard treatment. Are they essential for proper care? After a year's experience with a large number of patients attended by specially trained nurses and physical therapists, the author abandoned the use of hot packs in favor of early physical therapy procedures and the use of fever cabinets in selected cases. Heat applied to tense muscles may undoubtedly cause some degree of relaxation but it can scarcely be expected to have any effect on pathologic changes which have taken place in the spinal cord. Some patients like hot packs merely because they feel that something is being done for them, others object to being disturbed by the application of cumbersome woolen bandages. How long the hot packs are hot and how long they are cold will of course depend on the frequency with which they are changed. In some hospitals the "routine" hot pack technic has not been carried out on Sundays, holidays or at other special times when the nursing force was depleted. During the first two weeks an experienced physical therapist can accomplish quite as much without hot packs. Moreover, the cost of the patient's care should be less. Expensive hot pack machines would not be needed. Without hot packs more physical therapists should be provided but a smaller number of nurses could be assigned to the patients.

Many like to forget the days when the application of plaster casts during the acute stage and prolonged immobilization of extremities was demanded by the orthopedic surgeons. Perhaps the time will come when the hot pack regimen will also be a memory.

At the end of the acute stage or isolation period every poliomyelitis patient, whether paralytic or nonparalytic, should be referred to an orthopedic surgeon. Periodic examinations should also be made for several months in order that necessary means may be adopted to prevent the development of a pending deformity.

Isolation Period. On June 20, 1950 Dr. Roland R. Cross, Director of the Department of Public Health, State of Illinois issued some excellent recommendations and regulations pertaining to the control of poliomyelitis. The isolation period required is "one week from the date of onset and thereafter until temperature is normal for twenty-four hours."

There are no restrictions for contacts but it is recommended that they be kept under medical surveillance for two weeks from date of last exposure.

There is little to indicate that isolation has been a controlling influence in the spread of the disease during epidemics. In this respect poliomyelitis is similar to epidemic meningitis. However, isolation regulations tend to insure more prompt and accurate diagnosis and therefore early treatment.

Patients should be cared for according to medical aseptic methods. Since the virus may be found in the intestinal tract for thirty-five days or possibly longer after onset of the disease it would seem logical to disinfect all body discharges before their disposal. However, in the Cook County Contagious Disease Hospital where the latter procedure has not been used there has never been a doctor, intern, nurse or any other member of the personnel who contracted poliomyelitis within a period of at least thirty-five years, nor has any patient ever developed poliomyelitis after admission to the hospital.

A SUMMARY OF PROBLEMS

1. Still unknown etiologic agent.
2. Warm weather prevalence, unusual for a communicable disease.
3. Undetermined manner of transmission.
4. Susceptibility in the exceptionally well nourished.
5. Variability of symptoms.
6. Lack of a practicable laboratory diagnostic test.
7. Diagnostic difficulties added by the "new virus."
8. Reliable measures for prevention.
9. Dependable methods for treatment.
10. Question whether isolation of poliomyelitis patients is an effective means of controlling the disease.