

Poliomyelitis in Mashonaland

A REVIEW OF A RECENT EPIDEMIC IN THE SALISBURY INFECTIOUS DISEASES HOSPITALS*

BY
DEREK M. KOTZE, M.B., CH.B., D.P.H.
(Cape Town),
*Assistant Medical Officer of Health,
City of Salisbury.*

During the five-month period from October, 1954, to February, 1955, the largest epidemic of acute poliomyelitis yet known occurred in Mashonaland, when a total of 99 cases (75 Europeans and 24 Africans) were admitted to the Salisbury City Council's European and Native Infectious Diseases Hospitals. Twenty European and four African subjects were admitted from the Salisbury Municipal area; the remainder came from the surrounding suburbs and country districts of Mashonaland, including the towns of Gatooma in the west, Enkeldoorn to the south, Rusape in the east and Bindura to the north.

During the same period one Asiatic adult with non-paralytic poliomyelitis, and two non-paralytic and one paralytic case in Coloured infants were notified. These patients are not included in the total number of cases as they were treated in the Government Non-European Hospital. The epidemic was not confined to this part of Southern Rhodesia, as Bulawayo and Matabeleland reported at the same time a large number of cases, and some centres in South Africa, notably Durban and Johannesburg, experienced epidemics.

The purpose of this paper is to review briefly some of the salient features of the epidemic and to discuss the clinical manifestations of poliomyelitis.

SEASONAL INCIDENCE

The number of European cases admitted to hospital during each month was as follows:—

Month.	No. of Cases.	Average Age.
October	9	8 years 4 months
November	16	14 " 1 "
December	29	23 " 2 "
January	13	19 " "
February	8	15 " "
TOTAL	75	Average Age: 15 years 11 months

As has been our experience in previous years, the outbreak took place during the summer months of October to February. This is in

conformity with our findings in previous years, and it can be accepted now that the incidence of this disease in Mashonaland, as in other parts of the world, is maximal during the hot summer months, with a few cases preceding the major epidemic and a few sporadic ones following it in the autumn months of March, April and May.

POLIOMYELITIS IN EUROPEAN SUBJECTS

Age Incidence.—The average age of the 75 cases during the five months period was 15 years 11 months. As the epidemic reached its height the ages rose, the average of the 29 cases admitted to hospital during December being 23 years 2 months. However, the largest single number of cases (20) occurred in the 0.5 year age-group.

Age Groups:	0.5	5-10	10-20	20-30	30-50	Total.
No. of cases	20	14	12	14	15	75

The youngest case during the epidemic was a baby aged 8 months suffering from non-paralytic poliomyelitis, although the youngest person I saw with the disease in Salisbury four years ago was a baby of four months. The oldest patient in the present series was a man of 51 years, who also had non-paralytic poliomyelitis.

Sex.—The disease was more common in males, who numbered 43 out of 75 cases. Four of the seven deaths were in males.

Ratio of Paralytic to Non-Paralytic Cases Admitted to Hospital.—Of the 75 cases admitted to the European Hospital, 69% (52 cases) were of the paralytic type and 31% (23 cases) were non-paralytic.

Number and Cause of Deaths.—There were seven deaths, giving a mortality rate of 10.7%, five patients being adults, two of whom were women. The ages of the remaining two cases were 8 and 3½ years. The cause of death in five out of the seven cases could be attributed to involvement of the vital centres in the medulla.

One case, an adult male of 28 years, who had been treated in the tank respirator (iron lung) for respiratory failure due to paralysis of the diaphragm and intercostal muscles, and who had reached a stage where he was being "weaned" from the iron lung on the rocking bed, suddenly collapsed and died quite unexpectedly on the twenty-first day of his illness. A *post mortem* examination showed massive consolidation of the entire lower lobes of both lungs which resembled the stage of red hepatization described in lobar pneumonia. Histologically, however, an acute haemorrhagic condition of the lungs was found, all the alveoli being filled with blood. This is a rare complication of poliomyelitis and is thought to be caused by

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anoxia. Clinically, signs of consolidation are present and blood stained or even "prune juice" sputum may be produced.

Another fatal case was a woman of 29 years who, while being treated in the respirator, died on the twenty-third day after admission to hospital from acute dilatation of the stomach. Acute dilatation of the stomach is a complication which should be borne in mind, and the symptoms of vomiting with anorexia and nausea should, if at all persistent, call for the immediate passing of a Ryle's tube and the application of continuous suction.

In three of the fatal cases a definite history of physical exertion immediately preceding admission to hospital was elicited. One child had a tonsillectomy three months before she died from the bulbar form of the disease.

POLIOMYELITIS IN THE AFRICAN

Twenty-four (24) African patients, all suffering from paralytic poliomyelitis, were admitted to the Native Infectious Diseases Hospital during the same period. Twenty were admitted from the neighbouring Native reserves of Mashonaland, the remainder from the Municipal area. It is interesting to note that not one case of non-paralytic poliomyelitis was admitted to hospital, as this type of case is probably never seen by a doctor.

An adult woman, referred as a possible case of non-paralytic poliomyelitis, proved to have a sub-arachnoid haemorrhage, and two cases, one an adult and the other a teenage girl, had the features of a hysterical paralysis which cleared up very quickly when her domestic problems were sorted out.

The following figures, which by contrast with those mentioned above for Europeans, are interesting and illuminating. Again it must be stressed that 24 cases is an extremely small number from which any definite conclusions may be drawn, but the following facts have emerged and they are here recorded.

Age Incidence.—The average age for the 24 cases was four years as compared with 15 years 11 months in the Europeans. Eighty-three per cent. (twenty of the twenty-four cases) fell within the 0.5 year age-group. This is in striking contrast to the European cases, where only 26% of patients occurred within this period.

Further, of the twenty African children between the ages of 0 and 5 years, seventeen (17) were three years and under, and ten cases (50%) were under two years of age. Allowing for the relatively small number of cases in this

series, it does appear that poliomyelitis in the African may still be called "Infantile Paralysis."

In every case varying degrees of flaccid paralysis of one or more limbs was apparent on admission to hospital, and in only one patient, an infant of one year who died from an ascending Landry type of paralysis with respiratory failure, the weakness did not progress nor develop in those limbs not affected on admission. This is in contrast to the European cases, who are usually admitted in the early pre-paralytic stage.

The degree of paralysis of the limbs in the African children was of a severe form and most unfortunately will remain with a severe degree of disability. In two cases the limbs were so flail and devoid of even the slightest flicker of movement that no recovery was anticipated. The limbs were pathetically similar to those of a rag doll.

Bulbar Poliomyelitis.—There was one case of bulbar poliomyelitis in an African child aged 4 years, who made a splendid and complete recovery.

Deaths.—There were two deaths, both from respiratory failure. One was in an adult and the other was an infant of one year.

CLINICAL FEATURES OF THE EPIDEMIC

As is already well known, the symptomatology of poliomyelitis may be conveniently considered in several phases, some of which are not necessarily encountered in every case.

These phases are:—

(1) *The Initial or Systemic Phase (Abortive Stage).*—The symptoms in this phase—the Abortive Stage, which usually only lasts a few days—are general and non-specific in their nature, and may be referred to the respiratory and gastro-intestinal systems, e.g., coryza, sore throat, vomiting, constipation and general symptoms such as temperature, headache, drowsiness, restlessness and irritability. Sweating, which may be quite profuse, was a prominent feature of a large number of our cases. The temperature may then drop, the patient feeling better, and that may be all there is to the illness. Unfortunately for some, the illness does not end there, and after a few days of normal temperature, during which the patients are symptom-free, they enter the nervous stage, which may be either non-paralytic or paralytic in nature.

(2) *Nervous Stage.*—In this stage there is a recurrence of symptoms of the systemic phase and, for the first time, objective signs of involvement of the central nervous system appear, with

temperature, headache, sore throat, vomiting, dizziness, stiffness of the neck and back with possibly a lateral nystagmus, a fine intention tremor, normal, exaggerated or depressed deep tendon reflexes, absent or normal abdominal reflexes, usually plantar flexor responses, and usually characteristic changes in the cerebrospinal fluid. This is the stage of non-paralytic poliomyelitis and it is at this juncture in the patient's illness that he may first be seen in hospital. Some cases—in our series, 31%—do not progress further and make a complete recovery.

The remainder pass into the *Paralytic Stage* with the development of the classical, flaccid, asymmetrical lower motor neurone type of paralysis or paresis of the limbs of varying degrees of severity with, in addition, in some cases, paralysis of the major muscles of respiration, the diaphragm and intercostal muscles. This type of case with or without involvement of the respiratory muscles falls into the *Spinal Paralytic Group*. I have never seen a case presenting with only involvement of the respiratory muscles; in these cases there is as well, in my experience, some evidence of skeletal muscle paralysis or paresis.

Involvement of the shoulder-girdle muscles, of which the deltoid muscle is the commonest to be affected, should be regarded as serious in the early days of the disease, as they are supplied by the fifth to eighth cervical nerves; the phrenic nerve to the diaphragm arises chiefly from the fourth cervical nerve. If there is, therefore, the slightest upward extension of the pathological process, diaphragmatic paralysis develops.

In bulbar forms of the disease, which may be "pure" or associated with the spinal type, the manifestations follow involvement of the nuclei of the cranial nerves and/or the respiratory or vasomotor centres in the medulla. In our series about 6% were bulbar in type. Dyspnoea from involvement of the bulbar respiratory centre is more dangerous than that due to diaphragmatic and intercostal muscle paralysis, and death is the usual outcome.

As already mentioned, the cases when admitted to our hospitals are in either the pre-paralytic or paralytic phases. The average duration of symptoms before admission were about five to five and a half days.

PHYSICAL EXERTION

It was evident in many of our cases that severe physical exertion had taken place a few days before admission to hospital, and this materially affected the severity of their illness.

An example of this was the case of a police sergeant, who after a short influenza-like illness felt so well within three days that he played a first division game of soccer. Two days later he had a relapse with a recurrence of symptoms, developed a widespread rapidly ascending paralysis involving all four limbs, the intercostal muscles and diaphragm, and died thirty-six hours later from respiratory failure.

TONSILLECTOMY

The generally accepted view is that tonsillectomy is contraindicated six to eight weeks before or during an epidemic as, should an individual after this operation develop this disease, it will usually be of the bulbar type. In one of the 13 bulbar cases there was a possible relationship to the tonsillectomy done in September, the patient, a young girl of eight years, developing and dying from bulbar poliomyelitis in December. I can recall some three years previously two other cases where there was a similar relationship. Recently an American author claimed that a higher proportion of cases of bulbar involvement occurs in patients who have had a tonsillectomy regardless of the time that has elapsed since operation. One of our bulbar cases, an adult woman, had her tonsils removed thirty years ago, but I feel that it is difficult to prove any such connection.

PREGNANCY

Pregnancy and poliomyelitis, like pulmonary tuberculosis and heart disease, do not go well together. Some years ago we lost two multiparous women who developed poliomyelitis during their sixth and seventh months of pregnancy. In one a *post-mortem* Caesarean section was done, but the infant succumbed from prematurity six hours later. In the present outbreak a woman who was two months pregnant was admitted with non-paralytic poliomyelitis. Fortunately she did not progress beyond this stage and made a complete recovery. One other case in this series developed mild paralytic poliomyelitis on the fifth day of the puerperium.

COMMON SYMPTOMS ENCOUNTERED

Of the symptoms encountered during this series, the following were the commonest:—

- (1) Headache: present in practically every case.
- (2) Vomiting: present in 41% of cases.
- (3) Sore Throat: present in 40% of cases.
- (4) Backache and stiffness of neck: present in 25% of cases.
- (5) Constipation: present in 24% of cases.

Diarrhoea, often quoted in the text books as being a frequent complaint, was only found in three cases. Constipation, which may persist for many days, can present considerable difficulty in the management of these cases, particularly for those nursed in the tank respirator. One little boy developed impaction of faeces in the colon and presented one morning with a large mass in the hypogastrium, complaining of pain of such severity that it was thought that he may have developed a volvulus.

HEADACHE

This is almost a constant symptom, and in our experience is not typical in either its character or distribution. It is invariably generalised, often most severe and it is not affected as a rule by lumbar puncture. Fortunately it usually lasts for only a few days. Being associated as it is with a fever, sweating and backache, the clinical similarity to malaria and tick bite and other fevers is indeed close.

PAIN

Our impression is that *spontaneous* pain and *exquisite* tenderness of the muscles is not a striking feature of poliomyelitis. The patient complains of general aches and pains in the body and limbs, but as a rule these are not severe and the doctor is not likely to be called on their account. This point has assisted considerably in the differential diagnosis of a few cases, examples of which may be quoted:—

- (i) An African child, aged two and a half years, who was admitted as a suspected case of poliomyelitis with loss of power in the right lower limb, was found to have localised severe tenderness half-way down the thigh. An X-Ray revealed the presence of an oblique simple fracture of the midshaft of the femur without any displacement.
- (ii) A European boy seven years old who was admitted with inability to move either of his lower limbs and complained bitterly of pain in both knees and the left ankle joint was found to be suffering from his first attack of acute rheumatic fever.
- (iii) A European boy complained of severe pain in the region of the left hip, and the reason for the apparent paralysis of this limb was that he did not dare move it. He had an acute arthritis of the hip joint.

There are, however, exceptions to this general rule. In the present series a European boy suffering from acute paralytic poliomyelitis had such severe pain from an intense spasm of his abdominal muscles that he was considered to have "an acute abdomen." Again there was the case of a farmer from Bindura who on the first day of his illness was investigated for renal colic because of the distribution and type of pain and a previous bilharzial history. He later developed paralysis of one lower limb.

TEMPERATURE

With few exceptions, all the patients had pyrexia on admission varying from 99° to 104° F. The temperature usually dropped by lysis in four or five days. The characteristic "dromedary" type of temperature chart was not encountered in this series. From a prognostic point of view the temperature is a useful guide, for when it drops the paralytic process does not extend, although a few exceptions to this rule have been seen.

SENSORY SYMPTOMS

Over the past five years I can recall only one case who complained of paraesthesiae.

PHYSICAL SIGNS

(1) *Stiffness of the Neck and Spasm of the Lumbar Muscles.*—The commonest and perhaps the most important physical signs, especially in the diagnosis of the early case, are the presence of stiffness of the neck and spasm of the lumbar muscles. Stiffness of the neck in the early stages may only amount to a discomfort and resistance to terminal flexion of the neck. These are constant findings and, without spasm of the back in the early stages, I would hesitate to diagnose poliomyelitis. The muscular spasm, which is responsible for pain being provoked through movement and which responds well to the use of hot packs, lasted usually 10 to 13 days after admission to hospital. Again there is the exception, and in one case—of a two-year-old boy from Gatooma—the spasm of the back and limbs lasted eight weeks. The spasm of the back was so marked that an X-Ray of his spine was done to exclude Pott's disease.

The Kernig and Brudzinski signs are occasionally present, but are not helpful. The test in which the patient is asked to place his head between his knees when sitting up is more valuable. Another useful one is Amos' sign; the upper limbs are extended backwards with the palms of the hands placed flat on the bed to support the back. A further fairly constant

and helpful sign is to ask the patient to sit up from the lying supine position and noting whether there is a tendency to first roll on to one or other side.

CRANIAL NERVES

Involvement of the cranial nerves was present in 18.7% of our European patients and 4.2% of our African subjects. It is worth noting that a case of poliomyelitis may present with only a cranial nerve lesion, which usually involves the facial, glossopharyngeal or vagus nerves. Three of our cases had a facial nerve palsy as a solitary finding. One was a little girl of three years, who very early in the epidemic was taken to her doctor because of an alleged swelling of one side of the face. There was also a history of an attack of measles a few weeks before. The doctor found a unilateral facial nerve palsy of the lower motor neurone type and admitted the child to hospital as a suspected case of poliomyelitis. She was afebrile on admission and remained so for the rest of her stay. The cerebro-spinal fluid showed an increase of mono-nuclear cells with a raised protein and *Brunhilde type 1* poliomyelitis virus was isolated from the stools. Another patient had an isolated glossopharyngeal paralysis. He was a policeman, admitted from the country district of Shamva, and had a sore throat for a few days followed by difficulty in swallowing, and he remarked on the nasal intonation to his voice. During his stay in hospital he did not develop other signs and he made a complete recovery. In contrast to this, a young adult woman had a disseminated but selective lesion involving the cranial nerve nuclei in the mid-brain, the pons, the medulla and the anterior horn cells of the cervical cord.

It is perhaps not generally known that bulbar poliomyelitis presenting with cranial nerve involvement only does not necessarily indicate a serious prognosis; in fact, young children with such involvement as a rule do well. However, where there is in addition respiratory failure due to paralysis of the muscles of respiration, the prognosis is infinitely more serious.

In our experience the most common cranial nerves to be involved are the glossopharyngeal and vagus nerves, in which case there are varying degrees of difficulty in swallowing and a nasal speech from partial or complete paralysis of the pharyngeal muscles and the soft palate. About 13% of the European cases under review had these symptoms. The next most common single cranial nerve which may be involved is the facial nerve. Until now I have not seen both facial nerves involved simultaneously.

NYSTAGMUS

During the outbreak, 30.7% of our European cases showed nystagmus in the early stages of the disease. It usually lasted a few days, but in one case it persisted for many weeks. The nystagmus consists usually of a fine lateral movement to one or other side.

TREMOR

In the 1951-52 outbreak an intention tremor of the upper limbs, seen early, was a common finding, but in our present series this sign was uncommon and only four (4) cases showed it. My impression is that such a tremor in an early pre-paralytic case is an indication that a severe degree of paralysis or bulbar involvement is likely to develop and it is a useful prognostic sign.

APPREHENSION

There is no doubt that apprehension is a real symptom of poliomyelitis and every endeavour should be made to allay the patient's anxiety. That this apprehension is not entirely due to fear of the disease is borne out by the fact that this apprehension combined with irritability is not uncommonly seen even in young children.

THE MUSCLES COMMONLY INVOLVED

The muscles which show predilection of paralysis are:—

(a) *The Upper Limbs and Shoulder Girdle.*—The deltoid, biceps and triceps; the flexor muscles of the wrist and fingers, more commonly than the extensor muscles of the wrist and fingers; the serratus anterior. In only one African case were the small intrinsic muscles of the hand alone involved. The opponens pollicis muscle, an important muscle of the thenar group, is rarely affected.

(b) *The Neck Muscles.*—The sterno-mastoid and trapezius muscles were not frequently affected—these muscles seem to recover well

(c) *The Abdominal Muscles.*—Weakness of these muscles was occasionally encountered. Such weakness aggravates the tendency to constipation, and furthermore is a contributory factor to the troublesome retention of urine.

(d) *The Lower Limbs.*—The muscles frequently affected are the glutei, the quadriceps femoris, "hamstrings," the tensor fascia lata, peronei and the dorsiflexors of the feet.

The paralysed muscles of the lower limbs recover to a greater extent than those of the upper limbs. We have found that paralysis of different groups of muscles may continue to develop over a period of days rather than hours.

REFLEXES

In many of our cases the deep tendon reflexes are commonly exaggerated during the pre-paralytic stage, but as soon as a moderate degree of paralysis becomes evident these become depressed and within a few hours may be absent. The abdominal reflexes are frequently absent and their disappearance often appears to presage urinary retention.

The plantar reflexes are usually flexor, but in one or two cases during the early days of the disease we found them to be extensor.

SENSORY CHANGES

While many of the medical text books emphasise hyperaesthesia to be a common feature of early poliomyelitis, this has not been our experience, and sensory changes have been consistently absent. During an epidemic of poliomyelitis, when the occasional case of hysteria finds its way into hospital, the bizarre picture with "glove and stocking" or hemianaesthesia is most helpful in reaching a diagnosis.

BLADDER AND BOWELS

In 20% of cases with paralytic poliomyelitis, retention of urine occurred; this complication was generally found in cases with severe paralysis of the lower limbs. Fortunately the atony of the bladder wall and spasm of the sphincters usually passed off in about 10 days. The routine adopted in their management was to use an indwelling rubber catheter "covered" by sulphoamides and antibiotics. We have been singularly fortunate that our patients did not to any marked degree develop cystitis. It would appear that the process of continuous bladder irrigations so commonly used in the Middle East during the war has fallen into disfavour.

CONSTIPATION

Constipation is an extremely common symptom, being difficult to treat. At one time we prescribed a mixture of dried fruits and prunes, but this has been superseded in favour of a glycerin and milk enema.

ACUTE DILATATION OF THE STOMACH

A serious complication which I have encountered in three cases over the past 5½ years is acute dilatation of the stomach. This was the cause of death in a young woman who was progressing favourably when, after three weeks in the tank respirator, she suddenly developed it and died two days later.

THE CHANGES IN THE CEREBROSPINAL FLUID IN
POLIOMYELITIS

The decision as to whether a case of poliomyelitis requires a lumbar puncture must depend on the circumstances of the case. Towards the end of the epidemic the intention was not to do a lumbar puncture where the case was obviously one of paralytic poliomyelitis and admitted to the hospital about the third week of illness. Ten European and five African patients on admission to hospital required immediate and urgent treatment for respiratory failure, and therefore a lumbar puncture could not be done.

Examination of the cerebrospinal fluid has a definite place in the diagnosis of poliomyelitis, particularly in the pre-paralytic phase. It is, of course, well recognised that the changes in the cerebrospinal fluid are not pathognomonic nor do they differ from those found in the group of virus encephalitides and benign or aseptic meningitis.

A lumbar puncture is disturbing to the patient and it involves some degree of physical trauma. For this reason the decision to carry out this procedure should not be made lightly.

Changes in the Cerebrospinal Fluid.—In the first and second week of illness in most cases there is an increase in the leucocytes and slight increase in protein in the cerebrospinal fluid. We have found, in contrast to the usual polymorphonuclear leucocytosis in the peripheral blood, that the mononuclear white cells almost always outnumbered the polymorphonuclear cells, even in the first week of illness. The total white cell count varied from nil to 700 cells c.c.

With regard to changes in the total proteins, the average amount was about 70-80 mg. per cent. In three cases the protein rose to 100 mg. per cent. Associated with this increase in protein, a positive Nonne-Apelt Test will be found. The chloride and sugar were within normal limits. The sugar estimation is of some importance because of the similarity between early cases of non-paralytic poliomyelitis and tuberculous meningitis. In two of our cases this differentiation was necessary.

PROGNOSIS BASED ON CEREBROSPINAL FLUID
FINDINGS

It is unwise to offer a prognosis on poliomyelitis based purely on the chemical and cytological findings in the cerebrospinal fluid, as they depend on the stage in the disease the fluid is obtained. To state that a case with

a high cell count in the fluid is likely to be serious is risky. One child with non-paralytic poliomyelitis had a total white cell count in the fluid of 700 cells per c.mm., and in one of the most severely paralysed cases, with a total quadraplegia and respiratory failure from diaphragmatic paralysis, there was less than one white cell per cmm. in the cerebrospinal fluid taken on the fifth day of his illness.

It is said that the protein tends to increase in the third week of illness, but I have been unable to verify this, as a lumbar puncture was not done in cases with this length of illness. This late increased rise in protein when the cells are tending to disappear from the fluid is important from a practical point of view as, should one see a case of suspected paralytic poliomyelitis later in the course of the disease, the differentiation from infective polynuronitis (Guillain-Barre syndrome)—in which an albumino-cytological dissociation in the cerebrospinal fluid is an outstanding feature—may be difficult.

PERIPHERAL BLOOD PICTURE

In the few cases in which a blood count was done, a total white cell count of between 11,000 and 16,000 was found with a relative polymorphonuclear leucocytosis. These investigations were done within the first ten days of the patient's illness.

VIRUS STOOL INVESTIGATIONS

As a result of the arrangements made with Dr. D. M. Blair, Director of Medical Services, Southern Rhodesia, and with the co-operation of Dr. J. H. S. Gear, Director of the Poliomyelitis Virus Research Institute, Johannesburg, stools from all our cases were sent there by air. Of the results so far received, the Type I (Brunhilde) Poliomyelitis Virus was isolated in four cases. One was a child who presented with an isolated facial palsy. The virus may be present in the stools up to twelve weeks after the onset of illness, but the chances of recovering it diminish the later in the disease the specimen is examined. A negative virus stool result, therefore, does not exclude a diagnosis of poliomyelitis.

From a diagnostic point of view stool virus investigations are not as a rule helpful, because of the time that elapses before the results become known, but they are of great epidemiological interest.

DIAGNOSIS

In the presence of an asymmetrical, flaccid and motor paralysis of lower motor neurone type of one or more limbs the recognition of polio-

myelitis is easy, but in the early case before the paralysis develops this is often difficult and may be impossible without special virus investigations.

I have found the following points helpful in diagnosing the early doubtful case:—

- (i) A history of a previous mild febrile indisposition or illness, followed by a short period of a feeling of relative well-being and a recrudescence of symptoms.
- (ii) A distinct dislike of and resistance of neck flexion elicited in the early case only on terminal flexion of the neck.
- (iii) Spasm of the lumbar muscles and a positive Amos' sign.
- (iv) A fine lateral nystagmus.
- (v) Apprehension, irritability and a fine intention tremor.
- (vi) Exaggerated, depressed and above all *inequality* of response on the two sides in the deep tendon reflexes.

The following features of some of the more important symptoms and signs are worthy of special mention:—

The headache may be intense, generalised and not easily relieved by analgesics. A sore throat is a fairly frequent complaint, and sweating may be profuse. Vomiting and constipation are common. The temperature may reach 104° F. Moderate pain and body aches are more usual rather than severe spontaneous pain. A patient may present with involvement of only one or two cranial nerves, and in young children between the ages of three and six years, where no evidence of any weakness can be elicited whilst the child is in bed, it is always advisable to ask the child to walk about the room, for then only will a mild weakness of the gluteal, tibialis anterior or peroneal muscles become evident. Simple bedside tests for sensory changes are useful when differentiating it from hysteria.

In view of the increasing tendency on the part of the public to take out insurance policies against poliomyelitis, the accurate diagnosis of this disease is assuming greater importance.

PROGNOSIS

The more cases of poliomyelitis that one meets the more guarded one should be when offering an opinion as to what the end result will be. The age-old aphorism of Hippocrates that "no head injury is so trivial that it can be ignored, or so serious as to be despaired of," can be well applied to poliomyelitis. In the outbreaks of poliomyelitis over the past five years we have

had severe cases who from the outset have appeared to carry a hopeless prognosis and yet have made a comparatively good recovery. One boy with a bulbar paralysis regained consciousness after five days and recovered except for slight facial weakness; another young man from Northern Rhodesia, who had a severe paralysis of all four limbs and who had to be treated in the iron lung for a short while, walked out of hospital all but completely recovered eleven weeks after admission. Other cases again, who on admission appear to have only a mild weakness of one limb, later developed a severe permanent paralysis. The return of the temperature to normal is useful in that the paralytic process is unlikely to progress further, but occasional exceptions to this rule are encountered. I think it is best to wait for at least twenty-one days after the onset of the paralysis until most of the muscle spasm has passed off before attempting to assess the degree of recovery that may possibly be expected. This allows sufficient time for the associated inflam-

matory oedema in the central nervous system to resolve, thus permitting a truer assessment of the actual nerve cell damage to be made.

There is no doubt that the avoidance of strenuous physical exercise either before or during the "abortive" phase has a great bearing on the prognosis.

Age does not affect the prognosis to any large extent, with one important exception, namely, that of bulbar poliomyelitis. It is our impression that bulbar poliomyelitis in a young child up to about eight years carries a more favourable prognosis than in an older person.

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