

RES MEDICA

Journal of the Royal Medical Society



Some Aspects of Poliomyelitis

Allan Milne

M.B., Ch.B.

Abstract

This article is an attempt to present a few of the interesting facets of poliomyelitis. It certainly does not include all the important aspects; these can be found in any standard text-book. There is evidence that poliomyelitis occurred in very early times; indeed, Osier in his Textbook of Medicine in the 1890's believes the first recorded case to be in the Bible—2 Samuel, ch. 4, verse 4—"And Jonathan, Saul's son, had a son that was lame on his feet. He was five years old when the tidings came of Saul and Jonathan out of Jezreel, and his nurse took him up and fled: and it came to pass, as she made haste to flee, that he fell, and became lame. And his name was Mephibosheth." It was common belief that this paralysis followed a minor accident, and that it was cause and effect; this belief persisted until well into the nineteenth century. Thus Mephibosheth fell and became lame at the age of five. Was he the first recorded case of poliomyelitis? Osier believes so.

Copyright Royal Medical Society. All rights reserved. The copyright is retained by the author and the Royal Medical Society, except where explicitly otherwise stated. Scans have been produced by the Digital Imaging Unit at Edinburgh University Library. Res Medica is supported by the University of Edinburgh's Journal Hosting Service: <http://journals.ed.ac.uk>

ISSN: 2051-7580 (Online) ISSN: 0482-3206 (Print)

Res Medica is published by the Royal Medical Society, 5/5 Bristo Square, Edinburgh, EH8 9AL

Res Medica, Autumn 1958, 1(3): 25-28

[doi:10.2218/resmedica.v1i3.322](https://doi.org/10.2218/resmedica.v1i3.322)

SOME ASPECTS OF POLIOMYELITIS

Based on a Dissertation read before the Royal
Medical Society on Friday, 14th February 1958.

By ALLAN MILNE

M.B., Ch.B.

This article is an attempt to present a few of the interesting facets of poliomyelitis. It certainly does not include all the important aspects; these can be found in any standard text-book.

There is evidence that poliomyelitis occurred in very early times; indeed, Osler in his Textbook of Medicine in the 1890's believes the first recorded case to be in the Bible—2 Samuel, ch. 4, verse 4—"And Jonathan, Saul's son, had a son that was lame on his feet. He was five years old when the tidings came of Saul and Jonathan out of Jezreel, and his nurse took him up and fled: and it came to pass, as she made haste to flee, that he fell, and became lame. And his name was Mephibosheth." It was common belief that this paralysis followed a minor accident, and that it was cause and effect; this belief persisted until well into the nineteenth century. Thus Mephibosheth fell and became lame at the age of five. Was he the first recorded case of poliomyelitis? Osler believes so.

The first description of poliomyelitis as a distinct clinical entity was in 1789, by Michael Underwood in "A Treatise on the Diseases of Children." The first epidemic was reported by Sir Charles Bell from St. Helena in 1836. In the first half of the nineteenth century, clinical cases of poliomyelitis were rare, and largely confined to infants, whilst epidemics were conspicuous by their absence. In the second half of the nineteenth century, epidemics began to appear, as in Stockholm in 1887 and 1895. These were studied by Médin, and his name is contained in one of the synonyms of poliomyelitis—Heine-Médin's disease—Heine being an orthopaedic surgeon in Germany in 1840. Médin, on an epidemiological basis, showed the probability of poliomyelitis being an infectious disease, but it was Landsteiner who, in 1908, proved its infective nature conclusively by transmitting the disease to monkeys. In the past forty years, vast amounts of research have led to considerable increase in our knowledge of poliomyelitis.

The actual virus is minute, 15-20 millimicrons in diameter, and is thus one of the smallest viruses known. It can be grown by tissue culture from human specimens. Immunological typing resulted in a total of 600 distinct serological types, but fortunately, they fall into three major immunological groups:

Type 1 or Brunhilde

Type 2 or Lansing

Type 3 or Leon

Types 1 and 3 are responsible for most epidemics, Type 2 but rarely.

The virus is world-wide; poliomyelitis as a disease is world-wide too. In an outbreak of poliomyelitis, a large proportion of the population is infected with the virus, but only a few develop poliomyelitis as a clinical disease. This concept of high proportion of infection with very small proportion of clinical disease is fundamental.

The virus can be recovered during epidemics from a large proportion of "contacts"—especially from their faeces and nasopharyngeal secretions.

Spread of infection is probably by carrier contamination of food, and by food contamination by flies.

The incidence of infection is best studied from serum antibody levels. The following facts stand out:

1. Newly born infants have some degree of immunity transmitted across the placenta.
2. Approximately 150 latent cases of poliomyelitis—though some authorities quote 1000—occur for every case of paralytic poliomyelitis.
3. In countries with poor standards of hygiene, infection occurs early in life, in a great proportion of the population, but the incidence of clinical poliomyelitis is low; i.e. the higher the standards of hygiene and civilisation, the higher the incidence of poliomyelitis. The explanation of this is that in less hygienic areas, early infection results in a good, lasting, immunity.
4. The relationship with age: (a) incidence of infection increases with age; (b) incidence of paralysis increases with age; (c) the mortality rises with the age at the time of the infection.

The virus is presented to the person to be infected, either in food, or in "droplets." Spread in the body *via* the axons of peripheral nerves is not now believed to be the avenue of invasion. The present day opinion is that the virus enters the alimentary tract, passing from there to the blood stream; this phase of viraemia occurs prior to the clinical signs of poliomyelitis. Neutralising antibodies develop rapidly and become maximal at the time of the "major" illness. This must bring the viraemia to a close, and also explains why the virus is so infrequently isolated after the paralysis has set in. The virus is regularly found in the central nervous system soon after the onset of symptoms, and there must take place in the central nervous system, the gravest battle between host and virus, a few hours or days after the viraemia has ended. The outcome of this battle determines the degree of paralysis.

Typically the illness is biphasic, the phases by custom termed the "minor" and "major" illnesses.

The minor illness is a slight catarrhal upset, occurring in about 40% of paralytic cases a few days before the major illness. It is often only recognised in retrospect. The minor phase is believed to coincide with the invasion of the blood stream by the virus. The variety of clinical pictures of the minor illness is tremendous, and no uniform diagnostic syndrome is recognised.

There is often an interval of a few days between the major and minor illnesses in which the patient feels well.

The major illness is usually easily recognised. It is abrupt in onset. The major illness may not lead to paralysis, and the term non-paralytic major poliomyelitis avoids ambiguity. Neither the severity of the symptoms at the beginning of the major illness, nor the changes in the cerebro-spinal fluid, make it possible to say which case will develop paralysis.

The physical examination should be planned to give the maximum information with the minimum disturbance and fatigue to the patient. The patient should be observed carefully, noting the level of consciousness, the presence or absence of a squint, the respiratory rate, etc. The mental state is important: poliomyelitis patients are usually fully conscious, and adult patients may become hysterical with the onset of respiratory difficulty. By looking at the airway, listening to the breath sounds, and observing the irregular and embarrassed efforts to breathe through a pool of mucus, respiratory distress may be discovered.

Respiratory failure may be recognised, provided the larynx is not affected, by getting the patient to count rapidly, observing how far he can count in one breath; 20 or more is normal, but with paralysis and respiratory failure it may be less than 10.

There are certain factors which affect the vulnerability of the motor nerve cells. The first of these is physical activity, and this must be considered from two angles, before the onset, and after the onset of the major illness. Exercise before the onset of the major illness does not have any clear-cut association with the degree of damage to the anterior horn cells. Exercise after the onset of the major illness, however, is extremely dangerous. The type of physical activity is closely related to the site of paralysis; e.g. running—lower limbs; piano playing—fingers and hands. The second factor is tonsillectomy; it was found in 1947 that many cases of bulbar poliomyelitis occurred 7-30 days after the patient's tonsils and adenoids had been removed. The virus was probably present at the time of the operation. The third factor is that of inoculations. It was shown in 1950 that poliomyelitis following within one month of a prophylactic inoculation is liable to take the form of a paralysis of the limb injected. Alum in the diphtheria inoculations was especially incriminated; probably any intra-muscular injection has a similar effect. The conclusion reached is that such factors may affect the segmental blood supply to the cord, interfering with the blood brain barrier, with the preferential settling of the virus in those segments.

Treatment of the minor illness is symptomatic. It is most improbable that the label "polio" can be attached at this stage, and all that is required is for the patient to be protected from undue fatigue.

Treatment of the major illness can give rise to many problems. Physical activity is dangerous, and psychological rest must be ensured at the earliest possible moment. Should the patient be kept at home or sent to hospital? There is no doubt that a journey to hospital may be frightening and exhausting just at the time when rest is essential. Under epidemic conditions the indiscriminate transfer of all suspected cases of poliomyelitis to hospital is probably undesirable, seriously overburdening the hospital staff. The decision to move the patient to hospital should be based on the patient's interests alone; the other members of the family have probably already been exposed to the virus, so that from that aspect, transfer is of no added value.

Isolation is generally practised, although the effectiveness of it in this disease has never been proved.

In considering the care of a patient with poliomyelitis, it should be appreciated that 80% of patients with acute poliomyelitis survive the acute phase however they are treated; their lives are never in danger. Unfortunately, however, an expert degree of supervision is required to recognise early the cases needing special measures. The prevention of dangerous complications should be the aim of every unit admitting patients suffering from poliomyelitis, while the other aspects of treatment such as care of limb muscles is of secondary importance in the acute phase.

In clear-cut cases, "lumbar puncture" gains very little, but if there is the slightest doubt in the diagnosis, it is an essential.

Nursing care plays a tremendous part in the management of a case of poliomyelitis. The confidence and reassurance of an efficient nurse can go a long way to acquire the relaxation, both physical and mental, so valuable to the patient.

Passive movements of the limbs, with the muscles and joints being put through their full range, are the keystone in the management of the paralysed parts. This is to obviate the tendency of paralysed muscles to shorten.

After the full extent of the paralysis becomes evident, the value of bed rest is slight. Muscle recovery takes place for at least six months, and this recovery is believed to be a hypertrophy and increased efficiency of the non-affected muscle fibres.

All the time, the patient must be led along, perhaps at times driven, by the physiotherapist, the doctor, the orthopaedic surgeon, and by his family and friends, all of whom have their part to play. The psychological make-up of the patient needs as much attention as the physical state.

Education of the patient is very important, for with the defect in "brawn," "brain" becomes of even greater importance; the prolonged treatment of hopeless muscles should be avoided, if it is going to interfere with much more important matters concerning the patient's future.

Much is now known about poliomyelitis, but there is still a great deal to be learned before we can feel we know all about it. It will always be one of the most fascinating conditions a doctor can meet.

Book Review

CLINICAL CHEMISTRY IN PRACTICAL MEDICINE

By C. P. Stewart and D. M. Dunlop. Fifth edition, 1958. E. & S. Livingstone Ltd., 27s 6d.

To the casual observer, this new edition would seem to differ from its predecessors only in a somewhat more logical order, an additional 22 pages and an increase in price. Closer examination reveals, however, that a far more extensive revision has been undertaken, and that as many sections, notably the gastric and renal tests, have been reduced, the amount of new material included is greater than the additional pages might suggest. Large increases are to be found in those sections devoted to water and electrolyte balance, to the steroid hormones, and to the metabolic abnormalities, while the accounts of such subjects as electrophoretic fractionation, the histamine stimulation of gastric function and the intravenous glucose tolerance curves are much expanded.

In the methods appendix there have also been extensive changes, much of the more recondite material having been replaced by more modern and more simple alternatives. Of especial interest is the appearance of the Clinitest, Ictotest and other similar proprietary methods now fully established, and the inclusion of paper chromatography for the identification of specific sugars.

This is a book of which one's seniors speak well, and to one about to embark upon his clinical work there can be little doubt that this new edition is a most desirable pre-requisite.