

Assessment

The assessment of an individual with a history of polio who is experiencing new health problems, presents a challenge to the health professional. This is due to the number, complexity and diversity of symptoms, the absence of special diagnostic tests, the uncertainty of the underlying cause and the lack of curative medications or treatments. In this section, the diagnosis of PPS, including differential diagnosis of the primary symptoms will be reviewed.

Diagnosis of Post-Polio Syndrome

The diagnosis of PPS is one of exclusion and is clinically based. There are no serologic, enzymatic, electrodiagnostic or muscle biopsy tests that can diagnose PPS. Therefore, it is essential that each patient receives a careful history and physical examination along with appropriate laboratory, radiological and diagnostic studies to rule out other medical, neurological or orthopaedic conditions that may be producing or aggravating the symptoms the patient may be experiencing.

Halstead (1991)⁸⁶ has developed the following criteria for the diagnosis of PPS:

1. A prior episode of paralytic polio with residual motor neuron loss confirmed by history, physical examination, and typical findings on electromyography (EMG).

The diagnosis of paralytic polio usually can be confirmed by:

- Eliciting a credible history of an acute, febrile illness resulting in motor loss and not sensory deficit. Memory is often not a reliable tool when determining the location and extent of the original paralysis. Although most patients appear to remember the location of severe weakness, they may not have any recollection of extremities that incurred only mild weakness;¹¹⁴
- Noting whether other members of the patient's family or neighbours had a similar illness;
- Observing the presence of focal, asymmetric weakness and/or atrophy on examination;
- Examining whenever possible the original medical records; and
- Changes on EMG of chronic denervation with reinnervation compatible with prior anterior horn cell disease.

Non-Paralytic Polio

There is significant debate in the literature whether people with a history of non-paralytic polio (NPP) are at risk of the development of PPS. Several studies have shown that individuals with non-paralytic polio do have late onset symptoms.^{47,115} Falconer and Bollenbach (2000)¹³ have suggested a number of reasons why people with a history of NPP should not be automatically excluded from a diagnosis of PPS. These include:

- The person had non-paralytic (or abortive) polio. At the time of the acute illness there was no obvious damage to the nervous system although unobserved damage was likely. There are no established figures for the minimum amount of neuronal damage which can result in PPS symptoms. Several studies have shown that neuronal damage occurred in all non-paralytic cases of polio. For neuronal damage to be visible, at least 50-60 percent of the motor neurons must be damaged or destroyed.¹¹⁶ When fewer motor neurons are involved the patient will present with no specific muscle weakness, although neuronal damage can be present.
- The person had paralytic polio during their initial illness, but was misdiagnosed. Symptoms of paralysis and/or weakness may have been missed or the symptoms may have manifested for a short period of time. The patient recovered (apparently) fully within a matter of weeks. This type of polio often was labelled as "non-paralytic". PPS will occur in these individuals with the same frequency as in paralytic polio cases. Diagnosis of PPS on the same basis as for a patient with a history of paralytic polio is merited.
- The person did not have polio but had another disease with clinical symptoms similar or identical to polio and currently presents with PPS symptoms. Some evidence supports the hypothesis that non-polio enteroviruses can have late, post-viral effects.
- The person may have had undiagnosed polio. PPS should not be excluded and further tests may be required.

4. The gradual or abrupt onset of new neurogenic, non-disuse weakness in previously affected and/or unaffected muscles; this may or may not be accompanied by other new health problems such as excessive fatigue, muscle pain, joint pain, decreased endurance, decreased function and atrophy.

New neurogenic weakness is considered essential in the diagnosis of PPS, as it reflects new or continuing dysfunction of motor units injured during the initial illness. It is inferred by the onset of diminished function despite maintaining the usual level and intensity of activity.⁵

5. Exclusion of medical, orthopaedic, and/or neurological conditions that may cause the health problems listed above (Criteria 4) – i.e. Differential diagnosis.

Differential Diagnosis

One of the challenges facing health professionals attempting to evaluate and manage post-polio individuals with new health problems is the general nature of many of the symptoms.¹¹⁸ The differential diagnosis of PPS is complex, as there are many conditions that could be responsible for the primary symptoms of fatigue, weakness and pain that a patient may experience.

In developing a differential diagnosis, the Post-Polio Task Force (1999)¹¹⁹ suggest defining each presenting complex (i.e. fatigue, weakness and pain), in terms of:

- Characteristics;
- Onset/duration;
- Location; and
- Activities that increase or decrease symptoms.

Fatigue

Fatigue is often a non-specific complaint with a variety of possible aetiologies. As a result, before a diagnosis of PPS fatigue is made, it is necessary to exclude other conditions that can cause this symptom.

Some of the conditions that need to be considered in the differential diagnosis of fatigue include:¹¹⁹

Systemic metabolic disease:

- Hypothyroidism
- Cancer / chemotherapy
- Anaemia
- Cardiac conditions – coronary heart disease, heart failure
- Diabetes mellitus
- Chronic infection
- Renal disease
- Lupus
- Thyroid disease
- Hepatic disease

Ventilatory dysfunction:

- Sleep apnoea
- Chronic alveolar hypoventilation
- Hypoxaemia

Mood disorders:

- Depression
- Anxiety / stress

For any patient presenting with potential PPS, it is important that the characteristics, time of fatigue and the activities that produce fatigue are recorded. This information assists in determining the cause of the problem. Fatigue that is reported upon awakening usually reflects sleep disturbances that may be caused by various factors (Refer to section on sleep disturbances). Fatigue that lasts throughout the day is not typical of PPS and may indicate other conditions, e.g. chronic fatigue syndrome.

Other evaluation tests that should be considered when diagnosing the cause of fatigue include:

- Physical examination of the individual;
- Blood chemistries – complete blood count;
- Arterial blood gas;
- Thyroid function;
- Chest X-ray;
- Electrocardiogram;
- Pulmonary function test;
- Overnight oximetry and sleep studies; and
- Psychological assessment.

Weakness

Weakness is the cardinal sign of motor neuron dysfunction in PPS. Therefore, the exclusion of other causes of new weakness is essential. For many of the conditions that result in weakness, specific assessment procedures and tests are available and accurate diagnosis can usually be made. While determining the cause of weakness, it is important to remember that these conditions can occur in addition to PPS.

Some of the conditions that need to be considered in the differential diagnosis of weakness include:¹¹⁹

Superimposed neurological conditions:

- Inflammatory demyelinating disease
- Late onset genetic dystrophies
- Adult spinal muscular atrophy
- Inflammatory myopathies
- Amyotrophic lateral sclerosis
- Cerebrovascular disease
- Multiple sclerosis
- Parkinson's disease
- Spinal stenosis
- Myasthenia gravis
- Radiculopathies
- Neuropathies
- Entrapment neuropathies
- Cauda equina syndromes
- Spinal cord tumours and infarctions
- Diabetic amyotrophy

Overuse or chronic strain:

- Joint / spine deformities
- Weight gain
- Lifestyle activity patterns

Systemic comorbid medical conditions:

- Thyroid disease
- Uraemia
- Toxins

Disuse atrophy:

- Injury
- Weight gain
- Surgery

An individual with neurogenic weakness caused by PPS often experiences a pattern of diminished strength, endurance and function at a time when there have been no obvious changes in their usual level or intensity of activity. By contrast, individuals with disuse weakness often describe a clear change in the usual pace and intensity of their activity levels or in the way that individual muscles are used. This may occur due to a period of immobility due to hospitalisation, pain or illness. If disuse weakness is expected, a trial of monitored exercise should be prescribed to determine if this new weakness can be reversed.¹¹⁸

It is also important to differentiate between muscle weakness (loss of strength and endurance) and other synonymous terms the patient may be referring to, such as fatigue and lack of energy.⁵

Recommended procedures for the assessment of muscle weakness include:

- Physical examination of the individual – manual muscle assessment, range of motion, trials of strengthening exercise (as prescribed by a Physiotherapist);
- History – current and past muscle function and weakness;
- Analysis of current performance compared to performance in past;
- Blood chemistries – complete blood count, creatine kinase analysis;
- Thyroid function;
- Toxic metal screens;
- EMG / nerve conduction studies; and
- Specific neurological and medical assessments to assist in the diagnosis of other conditions which result in muscle weakness.

Pain

The number of disorders that produce pain is extensive. Assessment should commence with the identification of other conditions that could be producing pain which are commonly associated with chronic musculoskeletal wear and tear and disorders that have significant muscle and/or joint manifestations. The major areas of consideration include spinal orthopaedic conditions, fibromyalgia, muscle pain, musculotendinous conditions and limb joint conditions. Some of these conditions include:¹¹⁹

Spinal orthopaedic conditions:

- Myofascial pain syndromes
- Degenerative disc disease
- Radiculopathies
- Spondylolisthesis
- Spinal stenosis
- Scoliosis
- Chronic strain associated with leg length and gait abnormalities

Muscle pain:

- Overuse strain myalgia

Limb joint conditions:

- Internal derangements
 - Ligamentous laxity/hypermobility
 - Strain syndrome
- Degenerative arthritis
- Traumatic arthritis

Musculotendinous conditions:

- Tendonitis
- Bursitis
- Entrapment syndrome
- Repetitive strain/overuse

Fibromyalgia

Assessment of the Late Effects of Polio

Due to the complexity and nature of many of these patients' problems, it is at the health professional's discretion to select the most appropriate method of evaluation. Currently there is no definitive diagnostic test for PPS. Investigations should be problem orientated and exclude other potential causes for the patient's problems.

The most appropriate method of providing a comprehensive and coordinated evaluation that addresses the client's medical, functional, psychosocial and vocational issues is through the use of an interdisciplinary team, including physician, physiotherapist, occupational therapist and social worker. Referral to other health professionals including speech pathologists, orthotists, podiatrists, psychologists, respiratory physicians, orthopaedic specialists and neurologists is often required.

Medical Assessment

In regard to the medical assessment of the post-polio patient, Dr Pesí Katrak has written the following:

Symptoms such as fatigue and pain can be caused by a very large number of medical conditions. It is neither practicable nor cost effective to carry out investigations for all of the conditions that can cause these symptoms. One has to be guided by pointers derived from a thorough clinical assessment including a detailed history and a complete physical examination. Some clinics in North America recommend routine blood test in all patients including a complete blood count, serum electrolytes, glucose, urea, creatinine, calcium, phosphates, total protein, protein electrophoresis, albumin, magnesium, AST, ALT, LDH alkaline phosphatase, creatine kinase and thyroid function tests.

My practice is to order blood tests and other investigations only when there is some clinical indication pointing to a particular disorder which needs to be excluded. Some of the common disorders found in older adults, such as diabetes, anaemia, cardiac dysfunction, depression, sleep apnoea and fibromyalgia, should be looked for in the clinical assessment and, if necessary, excluded with additional laboratory tests or appropriate referrals. Other neurological disorders causing muscle weakness, such as spinal muscular atrophy, amyotrophic lateral sclerosis, spinal canal stenosis, diabetic/other neuropathies, entrapment neuropathy and radiculopathy, can generally be excluded on clinical assessment. Electromyography (EMG) and nerve conduction studies may sometimes be required for this purpose. Sometimes electromyography may be required to confirm a diagnosis of prior polio if the residual clinical features are unclear. EMG however does not help to differentiate between patients with new symptoms from post-polio syndrome and asymptomatic polio survivors, as similar changes of chronic denervation are seen in both groups. Sleep apnoea, which is being increasingly recognised in the general population, can lead to daytime sleepiness and fatigue, and is very similar to that seen in patients with post-polio syndrome. If the patient has a history of an irregular breathing pattern at night and tiredness or headaches on waking in the morning, I often recommend referral to a respiratory physician for consideration of sleep apnoea. Treatment of this disorder can result in significant improvement in daytime tiredness.