

## Rapidly Progressive Dementia in a Patient with a Prior History of Yaws Disease, Could this be Neuroyaws?

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### Abstract

Whether non-venereal treponematoses infection can cause neurological complications remains uncertain. We present a case of an elderly man with a childhood history of yaws infection and positive syphilis serology presenting with rapidly progressive dementia and neuropsychiatric symptoms consistent with neurosyphilis. The patient passed away one year from the onset of symptoms following a rapid downhill course. Given the effectiveness of antibiotic treatment, clinicians should be highly suspicious of the possibility of central nervous system involvement in patients with a prior history of non-venereal treponematoses.

**Keywords:** Neurosyphilis; Dementia; Neuropsychiatry; Endemic Treponematoses; Yaws; Neuroyaws

### Introduction

Venereal syphilis is caused by *T. pallidum pallidum*, while non-venereal treponematoses or endemic treponematoses (ET) are classified by different subspecies of *T. pallidum*: yaws by *T. p. pertenue*, bejel by *T. p. endemicum*, and pinta by *T. p. carateum*. The non-venereal treponematoses are so genetically similar to *T. p. pallidum* that they are indistinguishable in commonly used serology tests for syphilis and respond equally well to penicillin treatment [1]. These spirochetes are thought to affect at least 2.5 million people worldwide [2]. Since 1980, there has been an upsurge in new ET infections in West Africa, South America, Southeast Asia, the South Pacific islands, and the Middle East [3-20], which has caused the World Health Organization to push for new eradication strategies [21]. When comparing syphilis and ETs symptoms, the familiar syphilis finding of gummatous bone and cartilage destruction is well-established in yaws and bejel; however, only syphilis has proven findings of central nervous system involvement. We present a case of an elderly patient with a history of childhood yaws infection and a late-life presentation of rapidly progressive neuropsychiatric abnormalities.

### Case Report

A 79-year-old Jamaican male with a recent diagnosis of dementia and no past psychiatric history was referred to a geriatric psychiatry unit from his nursing home for management of agitation and combative paranoid behavior. Communication from the nursing home indicated that over the past few months the patient's confusion and paranoia had worsened, and he had begun to express concerns that the staff intended to hurt him. The patient's daughter was able to establish that the onset of the dementia was one year prior to the admission and appeared to have rapidly worsened with impairment in recent and remote memory. The daughter stated that the patient was legally blind, having gradually lost most of his sight over a two-year period. She recalled a few episodes of visual hallucinations in which the patient reported seeing nits and shadows. Upon admission, the patient had a positive syphilis IgG and a rapid plasmin reagin (RPR) titer of 1:8 compared to 1:4 noted three months earlier. Medical work up failed to identify any other correctable causes for the patient's confusion and agitation.

Review of past medical history found the patient had a history of yaws, as he was born in Jamaica at a time when yaws was endemic; proof of adequate antibiotic treatment could not be confirmed. In addition, whether the patient had ever developed syphilis or if his

lifestyle placed him at risk for syphilis could not be established. Physical examination showed slurred speech, generalized weakness, and limited lateral eye movement. Reflexes were globally absent, sensation testing was unreliable, and Romberg's sign was positive. The patient was mostly confused and disoriented during the admission. Agitation, restlessness, and insomnia were prominent features. Detailed cognitive testing was not possible due to patient's inability to cooperate.

Three months prior to contact with the patient, he had been admitted to a medical unit with generalized weakness, slurred speech, and facial droop. The symptoms were attributed to a possible transient ischemic attack (TIA). During that admission, the patient was described as confused and agitated. He was seen by neurology and infectious disease services for a mildly elevated RPR titer at 1:4. Numerous attempts to perform lumbar puncture (LP) for a CSF-VDRL test were unsuccessful due to dry taps. Brain MRI appreciated parenchymal volume loss and noticeable atrophy compared to a brain MRI obtained 3 years earlier. EEG demonstrated diffuse slowing compatible with encephalopathy, and MRI of the lumbar spine revealed moderate to severe spinal stenosis at the L3-L4 level.

### Discussion

Over the course of one year, the patient went from a new diagnosis of dementia to rapidly progressive symptoms that resulted in his death. While rapidly progressive dementia occurs rarely in patients suffering from neurodegenerative disorders, it is far more commonly associated with infectious diseases of the central nervous system (CNS). The patient presented with rapidly progressive dementia associated with neuropsychiatric symptoms, which is the most common form of presentation of general paresis. Symptoms of general paresis include personality changes, amnesia, delirium, delusions, and hallucinations with less frequent presentation of stroke, cranial nerve, and brainstem dysfunction. The patient presented with hypotonia, loss of reflexes, rapid

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impairment of vision, urinary incontinence, generalized weakness, and positive Romberg's sign. Such a clinical presentation is commonly seen in patients with tabes dorsalis [22,23]. Taboparesis describes the simultaneous occurrence of both tabes dorsalis and general paresis and suggests widespread parenchymal damage that occurs in patients with parenchymatous neurosyphilis. Furthermore, patients with neurosyphilis can present with stroke or TIA symptoms, as a result of meningovascular involvement. Although meningovascular disease more commonly precedes general paresis and tabes dorsalis, overlap is not unheard of in the literature [23,24].

Literature has described neurologic and ophthalmologic abnormalities possibly caused by yaws and bejel but without firm evidence of a causal relationship [1,25-27]. It is generally believed that non-venereal treponematoses do not affect the CNS; however, case reports of optic atrophy [1] and cerebrospinal fluid abnormalities [28] suggest otherwise. Roman and Roman looked at associations between myelopathies and late yaws and proposed that all potential complications of venereal syphilis are possible including neurologic pathology [29].

In the case of this patient, if the patient did suffer from a CNS infection, the patient's positive serology did not allow the clinician to decipher between yaws and syphilis [30]. Nevertheless, the treatment is similar [1,31] and it would be incumbent on clinicians to treat the patient to prevent further disease progression. Moreover, given the difficulties of performing a LP in this patient due to spinal stenosis, we believe a risk-benefit analysis might well have concluded that proceeding with antibiotic treatment on an empirical basis was warranted. The literature shows that patients who have dementia due to neurosyphilis often have only a partial recovery after antibiotic treatment [32]. Psychosis and behavioral manifestations show a particularly variable response with some authors reporting an improvement of psychotic symptoms with penicillin treatment; however, the overall benefit of antibiotics therapy is limited in advanced neuronal damage [33,34]. While treatment of late stage neurosyphilis is not likely to eliminate all associated symptoms [22,32], the treatment has a reasonable chance of improving the patient's quality of life.

Of special note, low or negative serum RPR titers can occur in patients with symptoms consistent with neurosyphilis [35] and should not discourage clinicians from pursuing diagnosis and treatment. As per CDC guidelines, LP is indicated in patients with syphilis who have clinical evidence of neurological symptoms including motor or sensory deficits, ophthalmic or auditory symptoms, cranial nerve palsies, and symptoms or signs of meningitis [36]. Furthermore, the establishment of laboratory tests specific for *Treponema* sub-species is critical and overdue [31].

In conclusion, neurosyphilis is a treatable condition that is worthy of vigorous approaches to diagnosis and treatment and should not be overlooked in any patient presenting with deteriorating cognitive function accompanied by psychiatric, behavioral, and neurological symptoms, especially in those at high risk for syphilis. Likewise, considering the possible neurological complications that could be associated with late yaws as described in the literature, special attention should be paid to geriatric patients born when non-venereal treponematosis was endemic or those who have a prior history of the infection.

## Conflict of Interest

The authors declare no conflict of interests.

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