Cerebral Syphilitic Gumma: Case Report of a Brainstem Mass Lesion and Brief Review of the Literature

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Neurosyphilis is a syphilitic infection of the central nervous system caused by the spirochete Treponema pallidum, and is often divided into meningeal, meningo-vascular, and parenchymatous forms (1). Definitive diagnosis can be difficult as neurosyphilis can present with a variety of central nervous system manifestations that sometimes mimic other diseases, such as neoplasms (2,3).

The present case shows that neurosyphilis continues to be the "great imitator" and should be included in the differential diagnosis for at-risk patients with cerebral mass lesions. Our findings reveal that syphilitic brainstem gumma can mimic a brainstem glioma.

A 41-year-old heterosexual man was referred to our hospital for acute onset of headache, swallowing difficulties, and dysarthria for four months, and vomiting for one-and-a-half months before admission. The patient had developed progressive right facial and neck numbness over 2 years.

Neurological examination revealed dysarthria, and right Babinski sign was positive. Blood biochemistry and complete blood laboratory investigation were normal. FTA-Abs IgG (EIA) and T. pallidum hemagglutination assay tests were positive. Human immunodeficiency virus (HIV) serological testing was negative. On day 5 of admission, cerebrospinal fluid (CSF) analysis revealed 50 cells/µL (80 lymphocytes and 20 monocytes), a total protein level of 0.29 g/L, and a chloride concentration of 126.1 mmol/L. CSF rapid plasma reagin (RPR) and venereal disease research laboratory (VDRL) tests were negative. Magnetic resonance imaging demonstrated hyperintense gadolinium-enhanced T1-weighted regions in the brainstem (Fig. 1).

Despite negative VDRL and RPR test results for CSF, neurosyphilis could not be excluded. The patient’s symptoms did not progress very rapidly; therefore, intravenous treatment with penicillin G (24 million units per day) was initiated as tying treatment. The patient’s symptoms appeared to resolve within one week, with almost complete recovery after 2 months. These improvements coincided with magnetic resonance imaging results after 2 months’ treatment (Fig. 1). The patient was diagnosed with tertiary syphilis.

Neurosyphilis is a syphilitic infection of the central nervous system that closely mimics brainstem glioma and is hence difficult to definitively diagnose (1). To our knowledge, there are only a few reports describing cerebral gumma mimicking a brainstem glioma (1,4,5). Cerebral syphilitic gumma is a rare, late manifestation, and is easily misdiagnosed as other diseases. Syphilis patients with HIV infection may have an increased risk for developing cerebral syphilitic gumma (6). In a previous report, CSF abnormalities were detected in only 65% of confirmed cases of cerebral syphilitic gumma, and CSF VDRL was positive in only 62% (1). Although the RPR test is effective for detecting syphilis...
in people without symptoms, the CSF RPR test was not positive in our HIV-negative patient. Diagnosis of cerebral syphilitic gumma is normally based on CSF testing and pathological examination (7). However, neurosyphilis cannot be excluded in either HIV-positive or HIV-negative patients with normal CSF results. Moreover, intracerebral mass lesions may easily lead to misdiagnosis of treatable causes, and modern imaging combined with laboratory examination remains unhelpful in assessing mass lesions. Solitary intracranial gummas mimicking malignant tumors, such as glioma, have also been reported (1,8,9).

Syphilitic gumma usually shows low signal on T1-weighted imaging and high signal on T2 and enhancement (1). However, radiological imaging of mass lesions is neither specific nor sensitive (Fig. 1). Our computed tomography and magnetic resonance imaging findings were suggestive of lymphoma, and we could not exclude glioblastoma multiforme or bacterial and fungal infections (10). Regression of the isolated lesion under penicillin treatment without corticosteroids or radiation therapy favors the diagnosis of syphilitic gumma and excludes the possibility of lymphoma. Although gumma may respond to steroid treatment (11), we do not expose patients to steroids alone at the beginning of the treatment course. Therefore, we suggest that serological tests be routinely applied in all patients whose imaging results reveal a cerebral mass lesion.

We could not exclude neurosyphilis in this case despite the negative CSF VDRL results because this test is negative in approximately one-half of neurosyphilis patients (1). Initial treatment with penicillin followed by close observation is a better choice. Currently, the standard of therapy for syphilis is high-dose penicillin treatment (1,12).

We initially treated this patient with penicillin for 2 weeks, and disease progression appeared to abate. Definitive diagnosis of cerebral syphilitic gumma, however, usually occurs during or after surgery. If a patient’s condition does not show a rapid worsening trend in a short period of time, attempting intravenous penicillin first and then carefully observing changes in radiological imaging may be a better therapeutic strategy that may avoid unnecessary invasive interventions. It is therefore important to consider cerebral syphilitic gumma in both HIV-positive and HIV-negative patients. This patient was initially treated with penicillin alone after appropriate tying treatment and dramatically recovered after 2 weeks. Our case report suggests that cerebral syphilitic gumma should be also considered in HIV-negative and -positive patients presenting with mass lesions of the central nervous system, despite negative CSF VDRL results. Owing to the elusive nature of the disease, clinical suspicion of syphilitic gumma and appropriate antibiotic tying treatment before invasive interventions are vital. This strategy may result in clinical improvement and avoid unnecessary brain biopsy or surgery.

**Ethical statement** The patient has consented to submission of this case report to the journal.

**Conflict of interest** None to declare.

**REFERENCES**