A 40-year-old man experienced the sudden onset of diplopia one month before admission. At that time, he was evaluated for his ophthalmoplegia in an outside hospital with brain magnetic resonance imaging (MRI), which demonstrated right sphenoid and left posterior ethmoid sinusitis. One month after the onset of diplopia, he still suffered from diplopia. He also developed a new onset of right facial pain and headache. The follow-up MRI revealed an enhancing mass lesion in the right cavernous sinus region. He was referred to our neurosurgical unit with the presumptive diagnosis of a cavernous sinus tumor.

He had a history of syphilis of unknown stage, which had been treated 20 years earlier. At admission, he was alert and fully oriented. He presented with diplopia, headache, right facial pain, and mild dysarthria. The neurological examination was notable for the complete palsy of abduction in his right eye, paresthesia in all divisions of the right trigeminal nerve and right facial palsy with mild dysarthria. There was no tinnitus, uvula deviation, or tongue deviation. In serum laboratory examination, his venereal disease research laboratory (VDRL) titer was 1 : 16. Treponema pallidum hemagglutination and fluoro-

INTRODUCTION

Sarcoidosis is a granulomatous multisystem disorder with an unknown etiology. Sarcoidosis mainly involves the lungs and thoracic lymph nodes but can affect almost any organs including the central nervous system (CNS) and leptomeninges. Nevertheless, a solitary neurosarcoidosis is rare and is estimated to occur in approximately 5-15% of all patients affected by sarcoidosis.

A definitive diagnosis of neurosarcoidosis requires the exclusion of alternative diseases. Neurological diseases (multiple sclerosis, acute demyelinating encephalomyelitis), infectious diseases (tuberculosis, cryptococcosis, neurosyphilis), neoplasms (lymphoma, en plaque meningioma, metastatic carcinoma, primary CNS tumor), and vasculitis (Wegener’s granulomatosis, Churg-strauss syndrome) can be included in differential diagnosis. A differential diagnosis between neurosarcoidosis and neurosyphilis is particularly problematic in patients with a history of syphilis.

We report the case of a patient with a solitary cavernous sinus sarcoidosis who had a history of syphilis and showed rapidly progressing cavernous sinus syndrome.

Key Words: Neurosarcoidosis · Neurosyphilis · Sarcoidosis · Cavernous sinus.

CASE REPORT

A 40-year-old man experienced the sudden onset of diplopia one month before admission. At that time, he was evaluated for his ophthalmoplegia in an outside hospital with brain magnetic resonance imaging (MRI), which demonstrated right sphenoid and left posterior ethmoid sinusitis. One month after the onset of diplopia, he still suffered from diplopia. He also developed a new onset of right facial pain and headache. The follow-up MRI revealed an enhancing mass lesion in the right cavernous sinus region. He was referred to our neurosurgical unit with the presumptive diagnosis of a cavernous sinus tumor.

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tion revealed a non-caseating granuloma with an asteroid body and minimal invasive technique. A histopathological examination based on the protrusion of pathology in the sphenoidal sinus tissue showed strong enhancement after gadolinium administration. The mass appeared isointense on T1-weighted images and slightly hyperintense posteriorly with a compression of the brain stem. This tumor also extended to the cerebellopontine angle.

**Fig. 1.** Gadolinium-enhanced magnetic resonance (MR) images. A : Preoperative MR image revealing the mass extended toward the middle fossa laterally and to the sphenoid sinus anteriorly. This lesion also extended to the cerebellopontine angle posteriorly with a compression of the brain stem. B : Postoperative MR image revealing resolution of the mass over the cavernous sinus region sinus.

A biopsy was performed via the transsphenoidal approach to establish a confident diagnosis of neurosarcoidosis and resumed the steroid therapy. The facial pain disappeared again after steroid therapy. The steroid dose was tapered down and shifted to oral prednisolone in the outpatient department for one year and the abducens nerve palsy was improved. A follow-up MRI of the brain revealed resolution of the mass over the cavernous sinus region (Fig. 1B).

**DISCUSSION**

Sarcoidosis is an idiopathic systemic disorder with an unknown origin that can affect almost every organ in the body, including the CNS. The lung and reticuloendothelial system are typically involved, but any organs can be affected. Sarcoidosis involving the CNS is relatively uncommon, occurring in about 5-15% of patients with sarcoidosis. The disease is characterized by non-caseating granulomas, which are typically present in the central nervous system, particularly the meninges, optic nerves, and leptomeninges. The histopathology of sarcoidosis is characteristic. A pathological specimen normally reveals the presence of non-caseating granulomas (Fig. 2). Special stains including periodic acid-Schiff, Ziehl-Neelsen stain for acid-fast bacilli and Gomori’s methenamine silver stain for fungal organisms were negative. Chest and abdomen computed tomography were performed to exclude systemic sarcoidosis, but unremarkable.

After administration of corticosteroid, the headache and facial paresthesia was improved but the diplopia has remained. The pathologic findings were consistent with a diagnosis of sarcoidosis, but the neurosyphilis could not be ruled out in the differential diagnosis due to the positive serologic result for syphilis. The patient received the treatment with intravenous penicillin G for 2 weeks and the steroid was tapered and discontinued. After 4 days of penicillin administration, the right side facial pain and paresthesia became aggravated. Therefore, we were confident in a diagnosis of neurosarcoidosis and resumed the steroid treatment. The facial pain disappeared again after steroid therapy. The steroid dose was tapered down and shifted to oral prednisolone in the third week. He was discharged with isolated right abduces nerve palsy. He received oral prednisolone at the outpatient department for one year and the abduces nerve palsy was improved. A follow-up MRI of the brain revealed resolution of the mass over the cavernous sinus region (Fig. 1B).
granulomas observed in the absence of a foreign body reaction or tuberculous infection, giant multinucleated (epitheloid) cells and macrophages surrounded by an inflammatory reaction\(^3\). In addition, an asteroid body can be observed, particularly in sarcoidosis\(^1\).

Minimally aggressive biopsy is desirable, because neurosurgical resection of intracranial granulomas is only indicated in life-threatening situation or when medical treatment is insufficient. The optimal treatment for all sarcoidosis is the chronic administration of corticosteroid. In spite of significant side-effect, corticosteroids are mostly effective in neurosarcoidosis\(^1,2,3\).

The diagnosis of neurosyphilis is also difficult because of the lack of a perfect gold standard. The non-treponemal CSF VDRL test is a mainstay for diagnosis of neurosyphilis\(^4,5\). Although the estimated specificity of the test is high, the sensitivity is lower, which is a major limitation of this test\(^6\). Furthermore, the CSF VDRL test is negative in 50% of neurosyphilis cases. Moreover, a negative CSF treponemal-specific antibody test may not exclude a diagnosis of neurosyphilis in cases where the clinical suspicion is high\(^7\).

Neurosyphilis has similar histopathologic and etiologic features to neurosarcoidosis. Neurosyphilis include gummas, meningovascular inflammation, inflammation of the cerebral vessels, and general paresis (dementia paralytica)\(^8\). In particular, a gumma is a form of granuloma\(^9\). The presence of necrosis and plasma cells differentiates gummas from sarcoidosis\(^2\). But, tertiary syphilis containing few plasma cells and necrotizing sarcoid granulomas are occasionally reported\(^1,10,11\).

In literature review, there are several reports of cases of secondary or tertiary syphilis mimicking sarcoidosis including non-intracranial lesion\(^7,12,13\). Although there are various diseases included in differential diagnosis of neurosarcoidosis, neurosyphilis should be included in a differential diagnosis of neurosarcoidosis, particularly in patients with a history of syphilis.

**CONCLUSION**

We report a case of isolated cavernous sinus neurosarcoidosis mimicking neurosyphilis with the review of literatures.

**References**