

Review began 10/05/2026

Review ended 10/21/2026

Published 10/24/2026

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DOI: 10.7759/cureus.118532

Sequential Bilateral Facial Nerve Palsy With Right Abducens Nerve Palsy in Possible Neurosarcoidosis

Srinivas Nalabothula¹, Haripriya Jyothula², Sree Sritha Nagubandi³, Sujana Gogineni², Vamsi Krishna Kotagiri²

1. Medicine and Surgery, Dr Pinnamaneni Siddhartha Institute of Medical Sciences and Research Foundation, Vijayawada, IND 2. Neurology, Dr Pinnamaneni Siddhartha Institute of Medical Sciences and Research Foundation, Vijayawada, IND 3. Internal Medicine, Dr Pinnamaneni Siddhartha Institute of Medical Sciences and Research Foundation, Vijayawada, IND

Corresponding author: Srinivas Nalabothula, snalabotu42@gmail.com

Abstract

Neurosarcoidosis is an uncommon manifestation of sarcoidosis that can present with cranial neuropathies. Facial nerve involvement is well recognized, but the sequential development of bilateral facial nerve palsy with right abducens nerve palsy, together with a focal cavernous sinus-orbital apex lesion, presents a diagnostic and localizing challenge. We report a case of possible neurosarcoidosis with this clinicoradiological presentation. A 40-year-old man presented with right abducens nerve palsy and right lower motor neuron facial weakness. The following day, left facial weakness was also evident, resulting in sequential bilateral facial nerve palsy. Ophthalmological examination demonstrated bilateral grade I papilledema. Contrast-enhanced MRI showed asymmetric soft-tissue thickening and enhancement of the right cavernous sinus extending to the right orbital apex. Systemic evaluation revealed prominent bilateral hilar and mediastinal lymphadenopathy, including a 3.4-cm subcarinal lymph node, and an elevated serum angiotensin-converting enzyme level. CSF and available infectious investigations did not identify an alternative infectious etiology. A clinical diagnosis of possible neurosarcoidosis was made. Tissue confirmation was recommended but was not obtained. The patient received IV methylprednisolone followed by oral corticosteroids and weekly methotrexate, with subsequent clinical improvement. This case highlights the importance of correlating the distribution of cranial nerve involvement with neuroimaging findings. When neurological examination demonstrates cranial nerve involvement extending beyond the apparent territory of a focal lesion, consideration of a broader inflammatory or granulomatous process and appropriate systemic evaluation may be warranted.

Categories: Neurology, Radiology, Internal Medicine

Keywords: abducens nerve palsy, bilateral facial palsy, cavernous sinus, cranial neuropathy, neurosarcoidosis, orbital apex

Introduction

Sarcoidosis is a multisystem granulomatous disorder that most commonly affects the lungs and intrathoracic lymph nodes but may also involve the skin, eyes, nervous system, heart, and other organs [1]. Neurological involvement, termed neurosarcoidosis, occurs in approximately 5-15% of patients with sarcoidosis [2]. Clinically manifest cardiac involvement occurs in approximately 5-8% of patients with sarcoidosis [3]. Cranial neuropathies are among the most recognized neurological manifestations of neurosarcoidosis, with facial nerve involvement being particularly well described. In a retrospective cohort of 218 patients with neurosarcoidosis, facial neuropathy occurred in 23 patients (10.6%), was the initial manifestation in 73.9%, and was accompanied by multiple cranial neuropathies in 34.8% [4].

Bilateral facial nerve palsy is uncommon and has a broad differential that includes infectious, autoimmune, inflammatory, granulomatous, and neoplastic disorders [5]. Although facial nerve involvement is well recognized in neurosarcoidosis, the coexistence of sequential bilateral facial nerve palsy and right abducens nerve palsy presents a diagnostic and localizing challenge, particularly when neuroimaging demonstrates a focal cavernous sinus-orbital apex lesion. The abducens nerve traverses the cavernous sinus, making a lesion in this region a plausible explanation for the right abducens nerve palsy. In contrast, the facial nerve follows a different anatomical course, and its bilateral involvement is not readily explained by a unilateral cavernous sinus-orbital apex lesion.

The diagnosis of neurosarcoidosis remains challenging because no single clinical, radiological, or laboratory finding is diagnostic. The Neurosarcoidosis Consortium Consensus Group proposed categories of possible, probable, and definite neurosarcoidosis, emphasizing exclusion of alternative causes and pathological confirmation when feasible [6].

We present a case of possible neurosarcoidosis with sequential bilateral facial nerve palsy and right

How to cite this article

Nalabothula S, Jyothula H, Nagubandi S, et al. (October 24, 2026) Sequential Bilateral Facial Nerve Palsy With Right Abducens Nerve Palsy in Possible Neurosarcoidosis. *Cureus* 18(10): e118532. DOI 10.7759/cureus.118532

abducens nerve palsy associated with right cavernous sinus-orbital apex enhancement and bilateral hilar and mediastinal lymphadenopathy.

Case Presentation

A 40-year-old man presented in August 2026 with right abducens nerve palsy and right-sided lower motor neuron facial weakness. The remainder of the neurological examination, including higher mental functions, motor and sensory examination, coordination, and gait, was normal. On repeat neurological examination the following day, left facial weakness was also evident, resulting in bilateral facial nerve involvement. He was unable to completely close either eye on forceful eye closure, with bilateral scleral show consistent with lagophthalmos. No other cranial nerve deficits were documented. Ophthalmological evaluation demonstrated bilateral grade I papilledema with no other significant ophthalmological abnormalities.

Contrast-enhanced MRI demonstrated asymmetric soft-tissue thickening and abnormal enhancement involving the right cavernous sinus with extension to the right orbital apex (Figure 1).

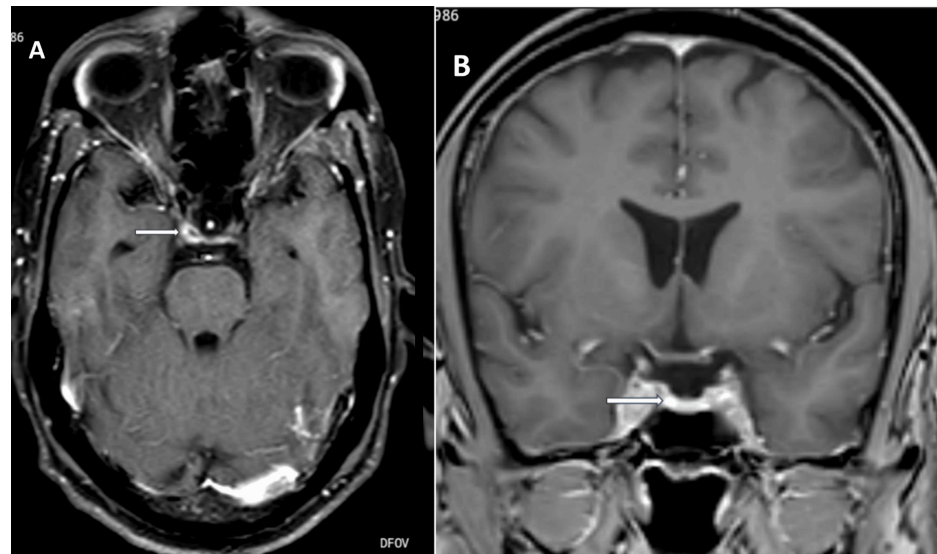


FIGURE 1: Contrast-enhanced MRI demonstrating right cavernous sinus-orbital apex enhancement.

(A) Axial and (B) coronal contrast-enhanced MRI images demonstrate asymmetric soft-tissue thickening and enhancement involving the right cavernous sinus with extension toward the right orbital apex (arrows).

Systemic evaluation demonstrated prominent bilateral hilar and mediastinal lymphadenopathy, including a subcarinal lymph node measuring approximately 3.4 cm, on high-resolution CT of the chest without significant pulmonary parenchymal abnormality (Figure 2).

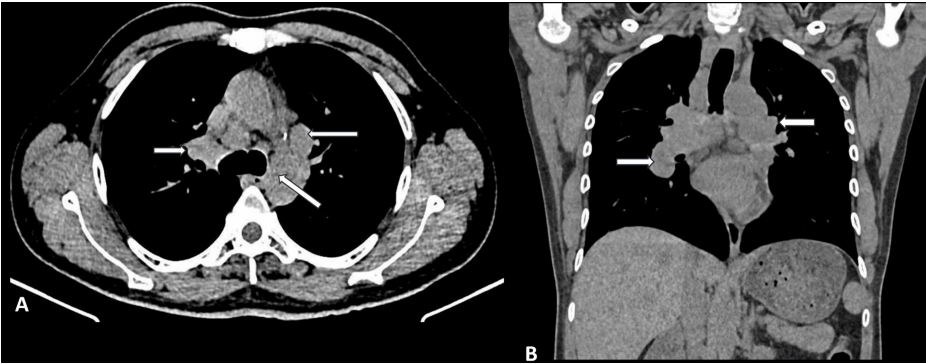


FIGURE 2: HRCT chest demonstrating bilateral hilar and mediastinal lymphadenopathy.

(A) Axial and (B) coronal HRCT images demonstrate prominent bilateral hilar and mediastinal lymphadenopathy, including a subcarinal lymph node measuring approximately 3.4 cm.

HRCT, high-resolution CT

Further laboratory and CSF evaluation was performed, and the relevant findings are summarized in Table 1.

Parameter	Patient value	Reference value
Angiotensin-converting enzyme	85.1 U/L	12-68 U/L
Erythrocyte sedimentation rate	41 mm/hour	0-15 mm/hour
Calcium	8.0 mg/dL	8.6-10.2 mg/dL
Total serum protein	6.8 g/dL	6.2-10.2 g/dL
Albumin	3.7 g/dL	3.5-5.5 g/dL
Antinuclear antibody screening profile	Negative	Negative
Syphilis serology	Nonreactive	Nonreactive
Hepatitis B surface antigen	Negative	Negative
Hepatitis C antibody	Negative	Negative
HIV type 1 and type 2 antibodies	Negative	Negative
CSF cell count	4 cells/mm ³	0-5 cells/mm ³
CSF cytology	Negative for malignant cells	Nil
CSF acid-fast bacilli smear	Negative	Negative
CSF microscopy	No organisms seen	Nil
CSF bacterial culture	No bacterial growth after 24 hours of aerobic incubation	Negative
CSF protein	43.05 mg/dL	10-50 mg/dL
CSF glucose	59 mg/dL	40-70 mg/dL

TABLE 1: Laboratory and CSF findings.

Serum angiotensin-converting enzyme (ACE) was elevated at 85.1 U/L (reference range, 12-68 U/L), and erythrocyte sedimentation rate was 41 mm/hour. The antinuclear antibody screening profile was negative. CSF was clear and colorless, with 4 cells/mm³, protein of 43.05 mg/dL (reference range, 10-50 mg/dL), and glucose of 59 mg/dL (reference range, 40-70 mg/dL). Cytology showed no malignant cells, acid-fast bacilli smear was negative, and bacterial culture showed no growth.

The patient had a history of symptomatic monomorphic ventricular tachycardia in March 2026, associated with palpitations, dizziness, and syncope, requiring direct-current cardioversion. Subsequent evaluation showed preserved left ventricular systolic function (ejection fraction approximately 60%), normal epicardial coronary arteries, and no inducible ventricular tachycardia on electrophysiological study. In the context of the subsequent findings suggestive of sarcoidosis, the previous ventricular arrhythmia was considered potentially related to cardiac involvement. However, dedicated cardiac imaging with cardiac MRI or fluorodeoxyglucose positron emission tomography was not performed, and cardiac sarcoidosis could not be confirmed.

In view of the multiple cranial neuropathies, right cavernous sinus-orbital apex involvement, bilateral hilar and mediastinal lymphadenopathy, and elevated serum ACE, a clinical diagnosis of possible neurosarcoidosis was made. Tissue confirmation was recommended but was not obtained.

The patient received IV methylprednisolone pulse therapy for five days, followed by oral corticosteroids at approximately 1 mg/kg/day with a planned gradual taper. Methotrexate 10 mg once weekly was initiated as a steroid-sparing agent, along with folic acid 5 mg once weekly. Vaccination was recommended in anticipation of ongoing immunosuppressive therapy. Following treatment, the patient reported clinical improvement and was discharged. Further clinical improvement was noted during outpatient follow-up.

Discussion

The most notable feature of this case was the sequential development of bilateral facial nerve palsy in association with right abducens nerve involvement. Facial nerve involvement is a recognized manifestation of neurosarcoidosis, while bilateral or sequential facial palsy is an uncommon presentation that warrants consideration of an underlying systemic disorder [7]. In this patient, the additional right abducens nerve involvement and thoracic lymphadenopathy broadened the clinical picture beyond an isolated cranial neuropathy.

The sequential appearance of the contralateral facial palsy also illustrates the value of serial neurological examination in patients with evolving cranial neuropathies. The initial examination suggested a more focal process, whereas repeat examination demonstrated additional cranial nerve involvement and broadened the diagnostic considerations.

The right cavernous sinus-orbital apex lesion provides a plausible anatomical substrate for the right abducens nerve palsy, as the sixth cranial nerve traverses the cavernous sinus. The lesion may itself represent focal neurosarcoid involvement. However, the unilateral cavernous sinus lesion does not readily account for the subsequent bilateral facial nerve involvement. This clinicoradiological relationship highlights the importance of correlating the neurological examination with the distribution of abnormalities on neuroimaging. Cavernous sinus involvement has been described in neurosarcoidosis and may present as an enhancing skull-base lesion with a broad differential diagnosis [8].

Tolosa-Hunt syndrome was considered in view of the enhancing cavernous sinus-orbital apex lesion and ocular motor cranial neuropathy. However, the prominent bilateral hilar and mediastinal lymphadenopathy provided an important systemic clue favoring a granulomatous disorder. Other inflammatory, infectious, and neoplastic causes were also considered in the differential diagnosis.

The thoracic lymphadenopathy provided an extracranial correlate to the neurological presentation, while the elevated serum ACE offered additional supportive but nonspecific evidence [9]. Neither finding is diagnostic in isolation. The CSF showed no significant cellular or microbiological abnormality, while the available infectious investigations did not identify an alternative infectious etiology.

The mediastinal and hilar lymphadenopathy provided an extracranial site for potential tissue confirmation. Based on the clinical, radiological, and systemic findings, the case was categorized as possible neurosarcoidosis under the Neurosarcoidosis Consortium Consensus Group framework [6].

The previous episode of symptomatic monomorphic ventricular tachycardia is also notable in the context of the subsequent findings suggestive of sarcoidosis. Ventricular arrhythmias are recognized manifestations of cardiac sarcoidosis [3], raising the possibility that the earlier arrhythmia represented another manifestation of multisystem sarcoidosis.

High-dose corticosteroids are commonly used as initial therapy for clinically significant neurosarcoidosis, with steroid-sparing immunosuppression considered when prolonged treatment is required [2,10]. In this patient, IV methylprednisolone followed by oral corticosteroids and weekly methotrexate was associated with clinical improvement.

Conclusions

This case highlights an unusual cranial neuropathy pattern in possible neurosarcoidosis, characterized by

sequential bilateral facial nerve palsy with right abducens nerve involvement, associated with right cavernous sinus-orbital apex enhancement and bilateral hilar and mediastinal lymphadenopathy. It emphasizes the importance of correlating serial neurological examinations with neuroimaging and pursuing systemic evaluation when cranial nerve involvement extends beyond the apparent territory of a focal radiological abnormality. Recognition of this clinicoradiological pattern may facilitate earlier consideration of a systemic granulomatous disorder.

Additional Information

Author Contributions

All authors have reviewed the final version to be published and agreed to be accountable for all aspects of the work.

Concept and design: Srinivas Nalabothula, Sujana Gogineni, Vamsi Krishna Kotagiri

Acquisition, analysis, or interpretation of data: Srinivas Nalabothula, Sree Sritha Nagubandi, Haripriya Jyothula

Drafting of the manuscript: Srinivas Nalabothula, Sree Sritha Nagubandi

Critical review of the manuscript for important intellectual content: Srinivas Nalabothula, Sujana Gogineni, Haripriya Jyothula, Vamsi Krishna Kotagiri

Supervision: Sujana Gogineni, Vamsi Krishna Kotagiri

Disclosures

Human subjects: Informed consent for treatment and open access publication was obtained or waived by all participants in this study. **Conflicts of interest:** In compliance with the ICMJE uniform disclosure form, all authors declare the following: **Payment/services info:** All authors have declared that no financial support was received from any organization for the submitted work. **Financial relationships:** All authors have declared that they have no financial relationships at present or within the previous three years with any organizations that might have an interest in the submitted work. **Other relationships:** All authors have declared that there are no other relationships or activities that could appear to have influenced the submitted work.

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