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CASE REPORT

Rare case of multifocal extradural and intramedullary neurosarcoidosis without pulmonary involvement: a case report and literature review

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INTRODUCTION: Sarcoidosis is a multisystem disease characterized histologically by noncaseating granulomas. Localization of sarcoidosis to the CNS is termed neurosarcoidosis, a complex and rare neuroinflammatory form of sarcoidosis. When the spinal cord is involved, lesions are often intradural. Here, we present a rare case of progressive myelopathy secondary to multifocal spinal extradural neurosarcoidosis with spinal cord compression and without pulmonary involvement.

CASE PRESENTATION: A 29-year-old African American female presented to the emergency department with numbness and paresthesia of 2-month duration in her left lower extremity and 2-week duration in her right lower extremity. The patient reported difficulty ambulating, paresthesia below the umbilicus, and back pain radiating to bilateral lower extremities. She endorsed 9-month history of cough, subjective fevers, night sweats, and unintentional 15 kg weight loss. Examination revealed 4/5 strength in the left lower extremity. MRI of the brain and spinal cord revealed enhancing extradural lesions, with spinal cord compression at T8 measuring 1.3 × 1.9 cm. Lumbar puncture demonstrated oligoclonal bands and increased CSF neutrophils, lymphocytes, monocytes, and protein. T8 laminectomy with resection of the epidural lesion was performed. Histology showed granulomas, consistent with neurosarcoidosis. At follow-up, repeat spinal MRI revealed disease progression with intramedullary involvement. Long-term immunosuppressive treatment was eventually initiated with satisfactory response.

DISCUSSION: This is a rare case of myelopathy secondary to spinal extradural neurosarcoidosis. Spinal neurosarcoidosis is predominantly an intradural process. Our review of the literature identified only seven cases of extradural neurosarcoidosis presenting with compressive myelopathy. Additional insight into management and rehabilitation following pathological diagnosis is of clinical significance.

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INTRODUCTION

Sarcoidosis is a multisystem disease of unknown etiology characterized histologically by noncaseating granulomas [1]. Diagnosis is clinical, based on histological evidence as well as characteristic radiologic imaging [2]. While traditionally associated with pulmonary disease, sarcoidosis may impact the central nervous system (CNS). Localization of sarcoidosis to the CNS affects only 1% of patients [3], and is termed neurosarcoidosis (NS), a complex and rare neuroinflammatory form of sarcoidosis. The granulomatous inflammation in NS presents ubiquitously throughout the nervous system leading to a wide variety of symptoms that present a challenge in diagnosis and treatment. When the spinal cord is involved in NS, lesions are typically intradural. Here, we present a rare case of progressive myelopathy secondary to spinal extradural NS with spinal cord compression without pulmonary localization of the disease.

CASE PRESENTATION

A 29-year-old African American female presented to the emergency department of a tertiary care hospital with a 2-month history of numbness and paresthesia that initially started in the left lower extremity but 2 weeks prior to presentation had begun to involve the right lower extremity. At the time of presentation, the patient also noted gait difficulty, lower back pain radiating down her legs bilaterally, and associated symptoms of constipation and urinary urgency. Prior to this encounter, the patient had not received a thorough neurologic workup, however she was prescribed gabapentin, lidocaine patches, and ibuprofen with no response. In addition, she revealed a 9-month history of cough, subjective fever, night sweats, and unexpected weight loss of 14–16 kg. The patient denied recent travel or sick contacts but endorsed a history of hyperthyroidism and asthma, as well as a 10-year history of tobacco use. Family history was significant for rheumatoid arthritis and fibromyalgia in her mother and sickle cell disease in her maternal grandmother. Physical examination revealed 4/5 strength in the left lower extremity but intact sensation, normal tone, and deep tendon reflexes throughout. Magnetic resonance imaging of the brain and spinal cord were obtained and revealed multiple enhancing extradural lesions with spinal cord compression, the largest at T8 measuring 1.3 × 1.9 cm

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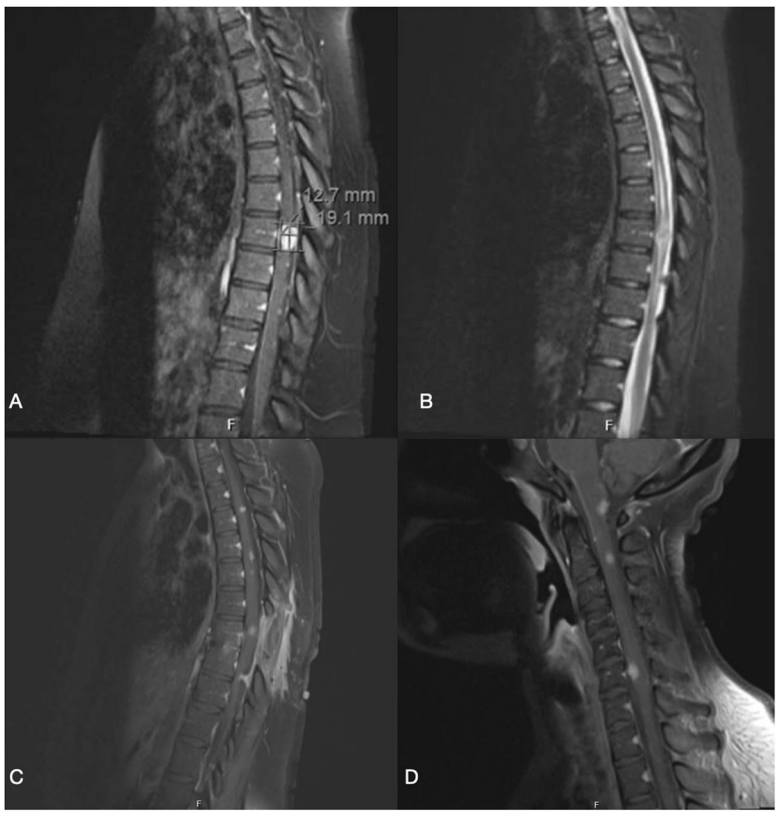

Fig. 1 29-year old female with intramedullary and extradural spinal neurosarcoidosis. A Sagittal thoracic MRI of enhancing extradural lesion measuring 1.3 × 1.9 cm with compression of the left T8 nerve root on T1 imaging. **B** Sagittal thoracic MRI of a small anterior extradural enhancing lesions measuring 0.7 × 0.6 cm at the T1-T2 level and 1.3 × 1.9 cm with compression of the left T8 nerve root seen on STIR imaging. **C** Sagittal thoracic MRI of abnormal intramedullary T1 SAG postcontrast signal and enhancement T3-T4, T5-T6, T7-T9, and T12. This is new at all levels except the T7-T9. **D** Sagittal cervical MRI of abnormal intramedullary T1 SAG postcontrast enhancement at the level of the cervicomedullary junction, C2-C6 levels, and in the region of the superior cerebellum adjacent to the quadrigeminal plate cistern.

with resultant edema (Fig. 1A, B). CT scan of the chest, abdomen, and pelvis was negative. Lumbar puncture revealed increased CSF neutrophils, lymphocytes, mono/macrocytes, and protein, with oligoclonal bands/IgG also present. All other labs were unremarkable (Table 1). Patient underwent T8 decompression laminectomy with resection of the epidural lesion. Histology of the lesion showed granulomatous inflammation (Fig. 2A, B). After consultation with infectious disease and rheumatology, it was determined that the patient met the Neurosarcoidosis Consortium Consensus diagnostic criteria, and she was diagnosed with probable NS. She received postoperative oral dexamethasone and was eventually admitted to inpatient rehabilitation. She performed well and was discharged home at a modified independent level requiring assistance from a wheeled walker for ambulation. At follow-up, a repeat spinal MRI revealed progression of her infiltrative CNS disease with evidence of multifocal intramedullary involvement (Fig. 1C, D). She was readmitted to the hospital where she underwent further evaluation and management including extensive negative infectious disease workup (Table 1). After a 5-day course of high-dose intravenous steroids was completed, the patient was discharged. She was prescribed a prednisone burst and taper starting at 60 mg and decreasing by 10 mg every 2 weeks. After which, the patient was started on long-term immunosuppressive treatment with methotrexate and infliximab with satisfactory response.

Table 1. An assortment of pertinent negative laboratory tests obtained during both the patient's initial hospitalization and second hospitalization.

Pertinent negative laboratory tests	
Initial hospitalization	**Second hospitalization**
Acid-fast bacilli and fungal stains of removed lesion	Anticardiolipin antibodies
ANA	Anticentromere antibodies
Anaerobic, fungal, and AFB cultures of removed lesion	ANA
Anticentromere antibodies	Beta-2-glycoprotein antibodies
ANCA	CCP antibodies
APQ4	CRP
CRP	Dilute Russell's viper venom time (dRVVT)
Blastomyces antibodies	ESR
Coccidiomyces	Extractable nuclear antigen (ENA) panel
Cryptococcus antigen	HIV1 and 2 AB/AG
Anti-dsDNA	Hepatitis panel
EBV	IgG subclasses
ERP	Mycobacterium TB by Quantiferon Gold
Histoplasma antigen	SARS-CoV2 by PCR
HIV1 and 2 AB/AG	
Meningitis panel	
Mycobacterium TB by Quantiferon Gold	
Paraneoplastic panel	
Rheumatoid factor	
SARS-CoV2 by PCR	
Spinal fluid culture	
Syphilis	

DISCUSSION

Our case was unique, as sarcoidosis is classically associated with pulmonary disease. Occasionally, CNS involvement, known as NS,

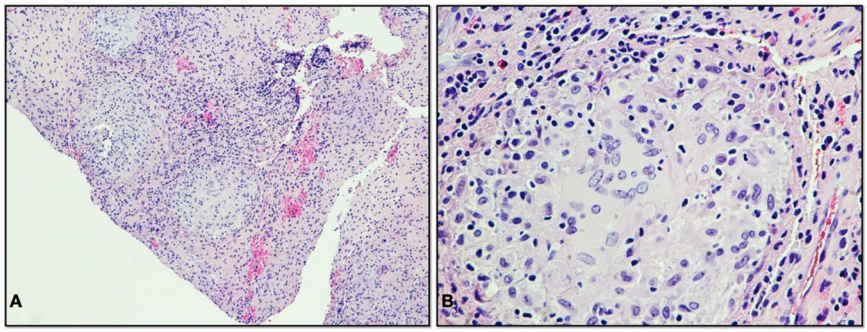

Fig. 2 Histology of non-necrotizing granuloma from spinal neurosarcoidosis. A 100× H&E slide images demonstrating non-necrotizing granuloma with tightly packed activated macrophages and epithelioid histiocytes with few surrounding lymphocytes, so called "naked granuloma." **B** 400× H&E slide images demonstrating non-necrotizing granuloma with tightly packed activated macrophages and epithelioid histiocytes with few surrounding lymphocytes, so called "naked granuloma".

may present as the initial feature of the disease in 5–10% of cases [4, 5]. However, NS may also exist in isolation as the sole manifestation of sarcoidosis or may occur as a feature of multisystem sarcoidosis in 5–17% of cases [5].

Moreover, this case represents a rare manifestation of subacute progressive myelopathy secondary to spinal extradural NS with subsequent development of intramedullary lesions. Spinal NS is often solely an intramedullary intradural process, with one prior review reporting intradural lesions in 81% of cases of NS [6]. In fact, extradural spinal lesions identified with MRI causing neurological deficits, as was the case with our patient, are often presumed neoplastic until proven otherwise [7]. Our review of the literature identified only seven cases of extradural NS presenting with compressive myelopathy [3, 4, 7–11].

Surgical resection and spinal decompression is the treatment of choice for patients with significant neurological deficits [12]. This is contrary to conventional intradural NS treatment where glucocorticoids are first-line management, with surgical decompression only if unresponsive to medical therapy [4]. Longo et al. previously described a case of multifocal epidural NS with spinal cord compression lacking major neurological deficits, which was medically managed successfully with full clinical resolution. Contrary to that case, our patient required surgical intervention with adjuvant corticosteroids before clinical improvement was noted. Surgical intervention with decompression or debulking was required in three of the seven cases of extradural NS with spinal cord compression that we identified in the literature [3, 8, 11]. Given the rarity and the progressive nature of this severe disease manifestation, additional insight into management following pathological diagnosis is of clinical significance. This case also highlights the importance of a detailed history and pragmatic workup of an undifferentiated patient with progressive neurologic deficits.

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AUTHOR CONTRIBUTIONS

RS proposed the concept for this article. Material preparation and literature search were performed by RS, OS and LR. The first draft of the manuscript was written by RS, OS and LR. Editing and proofreading were performed by SS and JVM. GC and DI supplied the histology slides and interpretation. SN guided the revisions of the subsequent versions of the manuscript. All authors read and approved the final article.

COMPETING INTERESTS

The authors declare no competing interests.

ADDITIONAL INFORMATION

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