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"Navigating Diagnostic Pitfalls In Isolated Neurosarcoidosis: A Case Of Simulated Meningioma".

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Abstract
Background: *Sarcoidosis, a systemic inflammatory condition, can involve the central nervous system (CNS) in approximately 10% of cases, with isolated neurosarcoidosis occurring in 10-20%.*
Case Presentation*: We present a case of a 55-year-old female with three months of headaches and swaying episodes. Imaging revealed a left-sided hypodense lesion, confirmed by MRI as a thickening of the dura and pachymeninges. Biopsy led to an unexpected diagnosis of non-necrotizing granulomatous inflammation consistent with sarcoidosis.*
Discussion*: This case illustrates the diagnostic challenges of neurosarcoidosis, which can mimic other conditions like meningioma. Accurate diagnosis requires a multidisciplinary approach, especially due to the nonspecific nature of clinical and imaging findings.*
Conclusion*: Neurosarcoidosis should be a key differential diagnosis for ambiguous CNS lesions, emphasizing the need for tissue sampling and awareness of its varied presentations.*
Keywords: *Neurosarcoidosis, meningioma, non specific.*

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I. Introduction

Sarcoidosis, a systemic inflammatory condition, can affect the central nervous system (CNS) in around 10% of cases. However, CNS involvement often remains undetected, affecting as many as 15-25% of patients (1). While rare, isolated neurosarcoidosis (NS), affecting only the CNS, occurs in 10-20% of cases (2).The wide range of clinical presentations and imaging findings earned sarcoidosis the nickname "the great mimicker" (3). Contrast-enhanced magnetic resonance imaging (MRI) of the brain is the preferred imaging technique for investigating NS. The hallmark finding, seen in 40% of cases, is thickened and nodular leptomeningeal enhancement concentrated in the basilar cisterns (4). However, NS can present in diverse forms, including parenchymal, infundibular, or, as in this specific case, pachy meningeal or Dural-based disease.

II. Materials And Methods

A single case report of the patient treated in Department of Neurosurgery, King George Hospital, Andhra Medical College, Visakhapatnam, Andhra Pradesh.
Study Design: case report

III. Case Report:

A 55-year-old female with no significant past medical history presented with a three month history of persistent headaches and a one-month history of episodes of swaying. She denied any fever, chills, visual disturbances, or other systemic symptoms. On clinical examination, the patient was conscious, coherent, and oriented to time, place, and person, with no neurological deficits noted and no meningeal signs. A comprehensive ophthalmological assessment revealed no strabismus or lesions, and dermatological examination showed no related skin findings.

Initial imaging studies, including a CT scan of the brain, demonstrated a left-sided hypo dense lesion located on the left frontal convexity, along with accompanying hypo density in the frontal lobe. An MRI of the brain with contrast subsequently revealed a thick enhancing lesion involving the Dura and pachymeninges. Given these findings, a burr hole procedure for biopsy was planned.

During surgery, the lesion was found to be easily separable from the underlying Dura, and intraoperative squash preparation showed features consistent with meningioma. Hence accordingly intra operative plan was changed to craniotomy and total excision of the Dura along with the lesion was excised in its entirety. Following the operation, the patient's recovery was uneventful. However, subsequent biopsy results unexpectedly revealed nonnecrotizing granulomatous inflammation consistent with sarcoidosis. Further investigations, including a chest CT scan and abdomen, did not reveal any additional lesions.

All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee(s) and with the Helsinki Declaration (as revised in 2013). Written informed consent was obtained from the patient for publication of this case report and accompanying images.

IV. Discussion

Sarcoidosis is characterized by a granulomatous inflammatory reaction that can affect various organs, including the central nervous system (CNS). Neurosarcoidosis may present with extra neural involvement or, less commonly, in an isolated form. The clinical manifestations are often nonspecific and depend on the location of the granuloma involvement within the CNS (5,6). Gadolinium-enhanced MRI is considered the gold standard for imaging neurosarcoidosis. Although 18F-FDG-PET/CT is limited due to intense physiological uptake in the brain, it can assist in staging, detecting extra neural lesions, and identifying optimal biopsy sites (7).

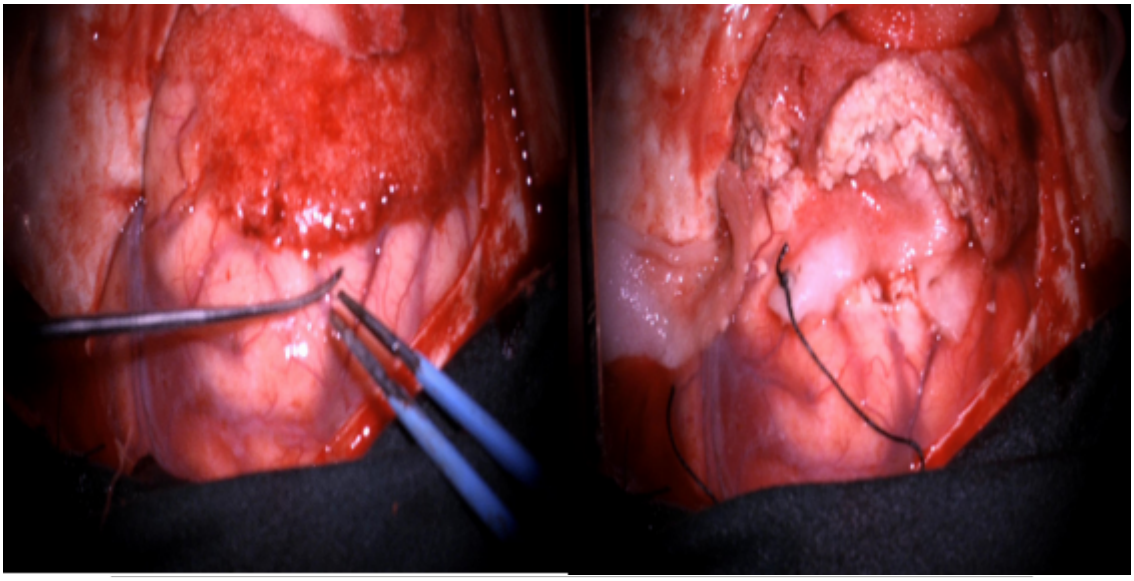
Neurosarcoidosis can affect nearly any part of the nervous system, including the brain parenchyma, spinal cord, nerve roots, and leptomeninges (8). Its broad spectrum of imaging findings can mimic various inflammatory, infectious, autoimmune, and neoplastic diseases. Differential diagnoses to consider in cases of leptomeningeal involvement include meningioma, solitary fibrous tumour, hemangiopericytoma, Dural metastases, lymphoma, leukemia, and granulomatous infections (6,9).

Among these, meningioma is the principal diagnosis considered for slow-growing dural lesions. Potential MRI findings in neurosarcoidosis may include non-enhancing or enhancing intra parenchymal lesions, leptomeningeal thickening, cranial nerve involvement, and vasculitis-like lesions. Leptomeningeal involvement occurs in approximately 40% of cases and typically presents as diffuse or nodular enhancement on MRI; however, these findings are nonspecific, complicating differentiation from other types of meningitis (5,8).

In our patient, significant leptomeningeal involvement was observed, highlighting the importance of recognizing this combination. The presence of the arachnoid barrier may limit the extent of disease spread. Meningeal lesions associated with isolated neurosarcoidosis often exhibit low T2 signals on MRI, likely due to fibro collagenous buildup; however, T2 hyper intensity, suggesting inflammation, may also be observed. Given that contrast MRI findings can resemble those of solid tumours, tissue sampling for histological confirmation remains crucial. The nonspecific clinical features of neurosarcoidosis and the potential for misinterpretation in imaging studies can contribute to delays in diagnosis(10).

V. Conclusion

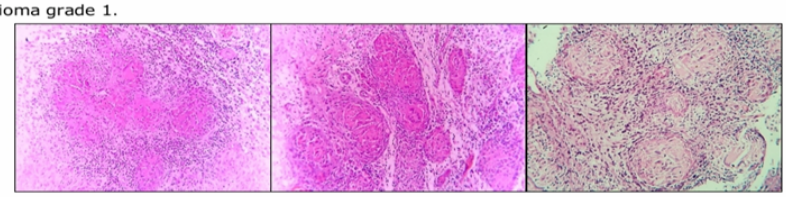
Our case illustrates an unusual and misleading presentation of isolated neurosarcoidosis with noteworthy leptomeningeal involvement. The lesions remained stable over time and closely mimicked meningioma based on morphological and contrast MRI findings. In conclusion, an accurate diagnosis of neurosarcoidosis necessitates collaborative efforts among clinicians, neuro radiologists, and neuro pathologists. Although uncommon, neurosarcoidosis should be an important differential diagnosis for ambiguous meningeal lesions, warranting a low threshold for tissue sampling. Familiarity with the diverse spectrum of imaging findings associated with neurosarcoidosis is crucial for timely and effective diagnosis and management.



HISTOPATHOLOGY REPORT

Lab ID No : HP 1658/24

Clinical history : Headache and reeling of head since 1yr. MRI- Hypointense lesion seen in left frontal lobe involving the meninges. Left frontal lobe hypertrophic, pachy meningitis. Enplaque yellowish white soft to firm avascular mass involving dura and infiltrating frontal lobe. Impression: Meningioma. Squash : Meningioma grade 1.



Specimens : 1) Bone from frontal region, 2) Excised tumor for Biopsy study.

Gross : Received two containers labelled as 1 and 2. Container 1 has bone tissue pieces measuring 2.0 x 1.5 x 0.5 cm. Container 2, has multiple tiny grey-tan firm to focal nodular tissue together measuring 8.0 x 4.0 x 1.0 cm.

Sections : A to E- Tissue from frontal lobe (P/E), F- Bone from frontal region (E/E).

Microscopy : Multiple sections studied from left frontal lobe biopsy show multiple well formed epitheloid granulomas comprising of epithelioid histiocytes, multinucleated giant cells and lymphocytes along with fibrosis, surrounding normal brain parenchyma.

AFB stain is non-contributory.

Serial sections studied from frontal region bone show bone fragments with intertrabecular spaces showing fibroconnective tissue.

Features are suggestive of chronic non-necrotizing granulomatous inflammation- possibly Sarcoidosis.

Impression :

Frontal lobe, left : s/o Inflammation, chronic, non-necrotizing granulomatous

Frontal region, bone : Descriptive, see above

(Biopsy)

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