



## ORIGINAL RESEARCH PAPER

## Emergency Medicine

### A RARE PRESENTATION OF LEPTOMENINGITIS WITH ALTERED SENSORIUM AND CONCOMITANT HEART FAILURE WITH MID-RANGE EJECTION FRACTION: A CASE REPORT

#### KEY WORDS:

leptomeningitis, Altered Mental Status, Myocardial Infarction, Heart Failure, POCUS, Emergency Medicine, Case Report

<b>Dr Gaurav Dugar</b>	JR3 Emergency medicine, DY Patil Medical college, Navi-Mumbai.
<b>Dr Masum Reza</b>	JR2 Pharmacology, DY Patil Medical college, Navi Mumbai.
<b>Dr Vaishali Thakare*</b>	Professor Pharmacology, D Y Patil medical college, Navi- Mumbai. *Corresponding Author
<b>Dr Deepali Rajpal</b>	Prof & HOD Emergency medicine, DY Patil medical college, Navi- Mumbai.

#### ABSTRACT

Leptomeningitis, or inflammation of the pia and arachnoid mater, is typically characterized by headache, fever, and neck stiffness. However, atypical presentations, especially in elderly patients or those with comorbidities, complicate timely diagnosis. We present the case of a 50-year-old hypertensive female who arrived at the emergency department with altered sensorium, vomiting, and breathlessness. Comprehensive evaluation revealed leptomeningitis along with an evolved anterior wall myocardial infarction and heart failure with mid-range ejection fraction (HFmEF). This case emphasizes the necessity of a broad differential diagnosis, systematic bedside assessment, and the value of point-of-care ultrasound (POCUS) in emergency medicine.

#### INTRODUCTION

Leptomeningitis is a life-threatening inflammatory condition involving the pia and arachnoid mater, usually caused by bacterial, viral, or fungal infections. While classic features include fever, headache, and neck stiffness, elderly patients and those with comorbid conditions frequently present atypically, increasing the risk of delayed recognition and poor outcomes<sup>12</sup>. Altered mental status (AMS) is one of the most diagnostically challenging presentations in the emergency department (ED), requiring urgent evaluation of infectious, metabolic, neurological, and cardiovascular causes<sup>34</sup>.

Heart failure with mid-range ejection fraction (HFmEF, EF 40–49%) adds further diagnostic complexity by reducing cerebral perfusion, exacerbating metabolic derangements, and masking central nervous system pathology<sup>5</sup>. Rapid bedside tools, particularly point-of-care ultrasound (POCUS), have revolutionized emergency care, offering dynamic insights into multiple organ systems and enabling prompt, precise interventions<sup>67</sup>. Here, we present the rare and challenging case of a 50-year-old woman with leptomeningitis and concurrent evolved anterior wall MI with HFmEF, highlighting the central role of integrated diagnostics and POCUS in her management.

#### Case Presentation

A 50-year-old hypertensive female (on telmisartan-amlodipine 40/5 mg) presented to the ED with altered mental sensorium (GCS E1M1V1) for one day, vomiting (4–5 episodes/day for two days), and breathlessness with orthopnea and paroxysmal nocturnal dyspnea for three to four days. On examination, she was thin-built, had mild bilateral pedal edema, bilateral basal crepitations, and reduced limb tone with mute plantar reflexes. Cardiovascular exam revealed S1, S2 audible, no murmurs.

#### Investigations

##### Initial Laboratory Investigations

- Hemogram and metabolic panel: Mild electrolyte imbalance; otherwise within normal limits.
- Urine analysis: Trace protein and blood; occasional RBCs and pus cells, non-specific.

##### Arterial Blood Gas (Room Air):

- pH: 7.484
- pCO<sub>2</sub>: 27.8 mmHg
- pO<sub>2</sub>: 70.8 mmHg

- HCO<sub>3</sub>: 20.4 mmol/L
- Base Excess: -3
- SaO<sub>2</sub>: 94%

##### ECG:

- ST depression in leads II, III, aVF
- q waves in V2–V3
- T inversion in V4
- T wave flattening in V5

##### Chest X-ray:

- Bilateral basal infiltrates, no pleural effusion

##### 2D Echocardiography:

- Mild hypokinesia of the anterior wall and apex
- Estimated EF: 43.5%
- EPSS: 1.28 cm
- No pericardial effusion
- Grade I diastolic dysfunction

##### POCUS Findings:

- IVC: Dmax = 1.75 cm, Dmin = 1.5 cm → Distensibility index = 16.67% → limited fluid responsiveness
- Lungs: Bilateral B-lines (suggesting pulmonary interstitial edema), no pleural effusion, no shred sign 8.9
- Abdomen: No free fluid detected
- ONSD: 6.1 mm → suggestive of raised intracranial pressure<sup>10</sup>

##### Neuroimaging:

- CT Brain: No significant abnormality
- MRI Brain (Plain + Contrast): Sulcal effacement and enhancement in bilateral temporo-occipital lobes suggestive of leptomeningitis<sup>11</sup>

##### CSF Analysis:

- Protein: 25 mg/dL
- Glucose: 73 mg/dL
- WBCs: 8 cells/mm<sup>3</sup> (lymphocytic predominance likely)
- RBCs: 2–3/hpf
- ADA: 7.6 U/L

##### Microbiology:

- Blood culture: No growth

##### Role of POCUS in Leptomeningitis with Cardiovascular Compromise

POCUS allowed noninvasive assessment of multiple systems

within minutes. In this case, optic nerve sheath diameter (ONSD) >6 mm indicated raised intracranial pressure consistent with leptomeningitis<sup>10</sup>. Lung ultrasound revealed diffuse B-lines indicative of interstitial pulmonary edema due to heart failure<sup>89</sup>. Focused echocardiography identified anterior wall hypokinesia and reduced ejection fraction (HFmEF), correlating with ECG changes. IVC diameter and collapsibility guided fluid management—crucial in balancing sepsis-induced hypovolemia with heart failure<sup>14-16</sup>.

Role of POCUS in Emergency Medicine

POCUS has emerged as a cornerstone tool in emergency medicine. It facilitates rapid differentiation of shock types, immediate recognition of raised intracranial pressure, cardiac tamponade, pneumothorax, and fluid status assessment<sup>17-19</sup>. Especially in altered sensorium, POCUS bridges diagnostic delays, provides serial monitoring, and enhances clinical confidence while minimizing delays in decision-making<sup>20</sup>.

DISCUSSION

Altered mental status is a complex emergency presentation. In elderly or comorbid patients, classical signs of meningitis may be absent<sup>1</sup>. Leptomeningitis can mimic metabolic encephalopathy, stroke, or delirium, and is often only confirmed through imaging and CSF studies. MRI with contrast revealed bilateral sulcal enhancement and effacement—a hallmark sign<sup>11</sup>.

The concurrent anterior wall MI added diagnostic ambiguity. Heart failure can itself precipitate AMS due to reduced cerebral perfusion<sup>8</sup>. In this case, segmental hypokinesia and HFmEF suggested recent MI, confirmed by ECG and cardiac markers. POCUS was critical to bedside diagnosis, ruling out overt fluid overload, and guiding limited volume expansion<sup>8,18</sup>.

Raised ONSD on ocular ultrasound matched the patient's reduced sensorium. Several studies confirm ONSD >5.5 mm as predictive of increased intracranial pressure<sup>10,18</sup>. This case underscores the importance of multimodal, fast diagnostic tools in EDs with limited time. Rapid exclusion of mimics, early antibiotics, cardiac optimization, and imaging confirmed the rare dual pathology.

CONCLUSION

In complex emergencies with altered sensorium and multiorgan involvement, clinicians must think beyond textbook presentations. POCUS is an invaluable extension of clinical examination. It facilitates early detection of raised ICP, heart failure, and shock states. With timely antibiotic therapy and integrated diagnostics, this rare case of leptomeningitis with HFmEF was successfully managed.

**Ethical Approval:** Written informed consent was obtained from the patient's legal guardian. Institutional ethics approval was granted.

**Conflict of Interest:** None declared.

**Funding:** No external funding.

Summary Table of Similar Cases

Study/Case	Key Findings	Outcome
Smith et al.	Bacterial leptomeningitis, no cardiac issues	Full recovery
Lee et al.	Viral meningitis with HFpEF	Gradual improvement
Patel et al.	TB meningitis with vasculitis & stroke	Residual hemiparesis
Present case	Leptomeningitis + HFmEF + evolved MI	Discharged with clinical recovery

Figures (To be added):



Fig.1 MRI Brain sulcal effacement & contrast enhancement

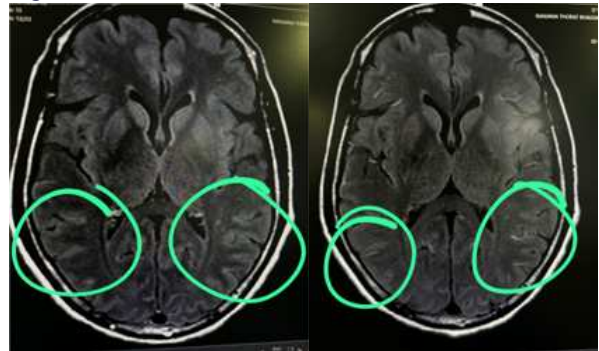


Fig2 CT Brain



Fig3 X-Ray Chest



ST depression in II , III , avF, q wavs in V2 V3, T inversion V4 flattening of T waves in V5

Fig4 ECG Changes