

A Rare Case of Invasive *Neisseria meningitidis* Presenting with Severe Stridor and Negative CSF Findings

**Mostafa Eisa¹, Reda Sherif², Mohamed H. Badawy², Mohamed Javid²,
 Engy Abdallah³, Anas Hamadelneil³, Khaled Aldebese³**

1: ICU Specialist, Kuwait Hospital, Sharjah

2: ICU Consultant, Kuwait Hospital, Sharjah

3: Intensivist, Kuwait Hospital, Sharjah

Corresponding author:

Mostafa Eisa, Mostafa.eisa@ehs.gov.ae, ICU Specialist, Kuwait Hospital, Sharjah

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ABSTRACT

Background: *Neisseria meningitidis* is a gram-negative diplococcus that causes bacterial meningitis and sepsis. However, invasive meningococcal disease (IMD) can present in unexpected ways, making early identification and treatment challenging. We report a rare case of invasive *N. meningitidis* infection with significant upper airway obstruction and negative cerebrospinal fluid (CSF) findings.

Case Presentation: A 55-year-old man with a history of type 2 diabetes mellitus arrived with severe respiratory distress, high temperature, and increasing stridors. The first examination indicated tachypnea, inspiratory stridor, and oropharyngeal erythema without meningismus. Despite the suspicion of bacterial meningitis, CSF examination revealed no pleocytosis or recognizable pathogens on Gram stain and culture. However, blood cultures revealed *N. meningitidis*, indicating an invasive infection. The condition quickly worsened, necessitating intubation and critical care assistance. Empirical intravenous ceftriaxone and corticosteroids were administered, resulting in clinical improvement. The patient was successfully extubated after 7 days and released with no neurological complications.

Conclusion: This case underscores an unusual presentation of invasive *N. meningitidis* with airway compromise and negative CSF findings. Clinicians should maintain a high index of suspicion for atypical Invasive meningococcal disease presentations to facilitate early diagnosis and treatment.

Introduction

Neisseria meningitidis is a gram-negative diplococcus responsible for invasive meningococcal disease (IMD), which primarily manifests as bacterial meningitis and septicemia. However, IMD can present atypically, affecting various organ systems, including the respiratory tract, joints, and cardiovascular system ⁽¹⁾. While meningococcal meningitis is a well-recognized clinical entity, cases without meningeal involvement pose a diagnostic challenge, especially when presenting with uncommon symptoms such as upper airway obstruction. ⁽²⁾

Stridor, a high-pitched sound caused by upper airway narrowing, is not a typical presentation of IMD. When present, it is more commonly associated with viral croup, bacterial tracheitis, or epiglottitis ⁽³⁾. However, meningococcal disease can involve the upper airway through direct invasion, leading to supraglottic inflammation, epiglottitis, or airway edema, which can cause life-threatening obstruction ⁽⁴⁾. Given the rarity of this presentation, clinicians may not initially suspect IMD, leading to potential delays in treatment.

Furthermore, cerebrospinal fluid (CSF) analysis is a cornerstone in diagnosing bacterial meningitis. However, IMD can occur without pleocytosis or detectable organisms in CSF, particularly in cases dominated by bacteremia or localized non-meningitic infection ⁽⁴⁾. The

absence of CSF abnormalities may contribute to diagnostic uncertainty, delaying appropriate antimicrobial therapy.

Here, we present a rare case of invasive *N. meningitidis* infection in a previously healthy individual, manifesting with severe stridor and negative CSF findings. This case underscores the need for clinicians to consider meningococcal disease in patients with unexplained upper airway obstruction and highlights the importance of early recognition and treatment to prevent severe complications.

Case Presentation

A 55-year-old male with a history of type 2 diabetes mellitus (on Glucophage) presented to the emergency department with acute stridor and severe shortness of breath. His initial vital signs were:

- Temperature: 37.6°C
- Heart rate: 121 bpm
- Respiratory rate: 34 breaths/min
- Blood pressure: 98/69 mmHg
- SpO₂: 98% on a simple face mask

The patient was awake and attentive, but he was experiencing significant respiratory distress. He had significant neck edema and was prepared for intubation and tracheostomy. The anesthesia and ENT teams were present. During intubation, a gliding scope revealed increased aryepiglottic folds, which formed a small chink through which a size 6 ETT was inserted. No emergency surgical airway intervention was required.

Laboratory and Imaging Findings

- Arterial Blood Gas: pH 7.10, pCO₂ 28 mmHg, HCO₃ 8.7 mmol/L (metabolic acidosis)
- WBC count: 14.6 × 10³/uL (Neutrophils: 13.4 × 10³/uL)
- C-reactive protein: 263 mg/L
- Procalcitonin: 119 ng/mL
- Troponin I: 1890 ng/L
- Serum creatinine: 161 mmol/L
- CT Soft Tissue Neck: Bilateral posterior cervical reactive lymphadenopathy, right thyroid lobe small nodules (TRAD 1)
- Echocardiogram: Left ventricular ejection fraction (LVEF) of 45–50%, no vegetations

Microbiological Results

- Blood cultures: *Neisseria meningitidis* (Gram-negative diplococci)
- Sputum culture: *Neisseria meningitidis*
- CSF analysis: Negative for meningitis

Management and Hospital Course

The patient was hospitalized to the ICU and began on intravenous Amoxicillin clavulanate (later changed to ceftriaxone and vancomycin). Hydrocortisone was started; however, it was subsequently switched to dexamethasone in the ICU. He was kept on ventilator support in PCAC mode. Given his positive blood cultures, the infectious disease team recommended ceftriaxone (2 g IV every 12 hours) for confirmed meningococcal illness. Despite a negative CSF testing, meningitis was experimentally treated while he was intubated. A follow-up airway evaluation was scheduled after 5–7 days.

Over the course of five to seven hospital days, the patient was weaned off vasopressor support and safely extubated in the ICU with no stridor, wheezing, laryngospasm, or other problems. His neurological state was normal. Ceftriaxone 2 gm intravenously was administered every day

for a total of 10 days. Corticosteroids were switched to prednisone 40 mg orally daily. Repeat blood cultures were negative. On day 10, the patient was moved from the ICU to the medical ward with the aforementioned antibiotic medication and a steroid taper (30 mg orally daily at discharge, tapering to 10 mg orally daily).

Discussion

Meningococcal disease commonly manifests as meningitis or septicemia, but rare cases of respiratory involvement have been reported. This patient's presentation with severe stridor and neck swelling without neurological symptoms is an uncommon finding in *N. meningitidis* infections^(5,7)

Airway Involvement in *Neisseria meningitidis*

Severe airway edema leading to stridor is unusual in meningococcal disease. Possible mechanisms include:

1. Direct invasion – *N. meningitidis* colonizes the nasopharynx and may cause localized infection leading to laryngeal or supraglottic inflammation⁽⁷⁾
2. Systemic inflammatory response – Meningococcal septicemia can cause endothelial dysfunction, increased vascular permeability, and airway swelling⁽⁶⁾
3. Immune-mediated reaction – Inflammatory cytokines and immune activation may contribute to upper airway edema.⁽²⁾

Comparison with Reported Cases

Previous cases have documented *N. meningitidis* presenting as supraglottitis or epiglottitis, which resulted in airway blockage and required emergency intubation. Similar patients described rapid airway deterioration, demanding prompt airway treatment. In contrast to normal bacterial epiglottitis (e.g., *Haemophilus influenzae* type B), meningococcal involvement frequently manifests with systemic inflammatory markers, as demonstrated in our case^(4,5).

Diagnostic Challenges

A negative CSF test does not rule out invasive meningococcal illness, especially if airway involvement is the major presentation. The detection of *N. meningitidis* in blood and sputum cultures suggests a systemic infection with respiratory tract involvement^(2,3).

Management Considerations

- Early airway protection is crucial in suspected supraglottitis or airway edema⁽⁷⁾
- Empiric antibiotics should cover *N. meningitidis*, with ceftriaxone being the preferred treatment⁽²⁾
- Steroids may help reduce inflammation and airway swelling.
- Close airway reassessment (e.g., glide scope) is necessary to determine extubation readiness⁽⁵⁾

Conclusion

This case demonstrates an uncommon presentation of invasive *Neisseria meningitidis*, with airway obstruction and negative CSF results. In situations of acute stridor with systemic inflammatory symptoms, physicians should evaluate *N. meningitidis* and begin early airway care and targeted antibiotic treatment.

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