

Emergency Department Approach to the Patient with Suspected Central Nervous System Infection



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KEYWORDS

- Central nervous system infection • Meningitis • Encephalitis • Brain abscess
- Shunt infection • Lumbar puncture • Cerebrospinal fluid

KEY POINTS

- The emergency physician (EP) should have a structured approach to the clinical evaluation of patients with suspected central nervous system (CNS) infection, directed toward early initiation of antimicrobial agents.
- In certain patients who are at high risk of herniation, head computed tomographic scan must first be obtained to evaluate for mass lesions or cerebral edema before a lumbar puncture is performed.
- As critically ill patients with suspected CNS infections board in the emergency department for a long period of time, the EP should be familiar with managing systemic and neurologic complications of CNS infection.

INTRODUCTION

Infections in the central nervous system (CNS) can be sudden, catastrophic, and potentially lethal. In some cases, the CNS is the main target. In others, the CNS is a secondary target. Infections in the CNS can be caused by bacteria, viruses, fungi, and parasites. The main CNS infections that are covered in this article are meningitis, encephalitis, brain abscess, and ventricular shunt infections.

The following 4-question approach to the clinical evaluation of a patient with suspected CNS infection can aid the emergency physician (EP) in identifying the likely infection and tailoring further diagnostic and therapeutic strategies (**Fig. 1**).

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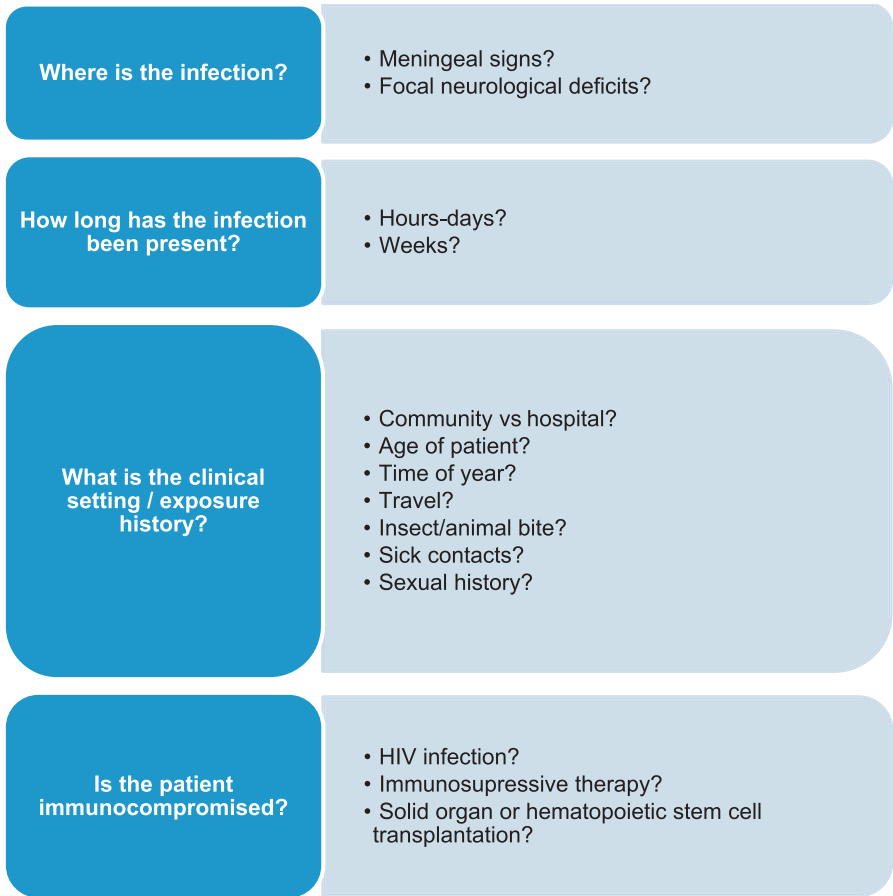


Fig. 1. Approach to the evaluation of patients with suspected CNS infection.

Where Is the Infection?

It is often impossible to distinguish between meningitis, encephalitis, and brain abscess with absolute certainty based on clinical presentation. Theoretic teaching relies on classic clinical triads. The classic triad of meningitis is fever, altered mental status, and neck stiffness. The classic triad of encephalitis is fever, altered mental status, and headache. The classic triad of brain abscess is fever, headache, and focal neurologic deficit. There is significant clinical overlap between these prototypical triads, making classic presentations unreliable. In a patient with suspected CNS infection, the clinical signs and symptoms may suggest whether the infection involves the meninges (meningitis), parenchyma (encephalitis, brain abscess), or both (meningoencephalitis). In meningitis, an increase of inflammatory cells within the cerebrospinal fluid (CSF) and resultant irritation of the meninges elicit a protective reflex to prevent stretching of the inflamed and hypersensitive nerve roots. This reflex is detectable clinically as nuchal rigidity (resistance to passive neck flexion), Kernig sign (contraction of hamstrings in response to knee extension while the hip is flexed), or Brudzinski sign (flexion of hips and knees in response to passive

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