underlying conditions (e.g., diabetes mellitus, cardiopulmonary disease), may have disease that manifests insidiously with lethargy or obtundation, no fever, and various signs of meningeal inflammation. Older adult patients may have an antecedent or concurrent bronchitis, pneumonia, or paranasal sinusitis.

Viral meningitis is typically a self-limited illness. The clinical manifestations of enteroviral meningitis depend on the host's age and immune status. In adolescents and adults, more than one half of the patients have nuchal rigidity. Adults usually have headache, which often is severe and frontal. Photophobia is also common in older patients. Nonspecific symptoms and signs include vomiting, anorexia, rash, diarrhea, cough, upper respiratory findings (especially pharyngitis), and myalgias. Other clues to the diagnosis of enteroviral disease are the time of year (more prevalent in summer and autumn months) and known epidemic disease in the community. The duration of illness of enteroviral meningitis is usually less than 1 week, and many patients report improvement after lumbar puncture, presumably from the reduction in intracranial pressure.

Meningitis associated with HSV-2 infections is usually characterized by stiff neck, headache, and fever. Patients with recurrent benign lymphocytic meningitis characteristically develop a few to 10 episodes of meningitis lasting 2 to 5 days, followed by spontaneous recovery. These patients have acute onset of headache, fever, photophobia, and meningism; about 50% of patients have transient neurologic manifestations, including seizures, hallucinations, diplopia, cranial nerve palsies, or altered consciousness.

Subacute or Chronic Meningitis

Subacute or chronic meningitis caused by spirochetes, mycobacteria, or fungi in the adult patient can linger for weeks to years before clinical presentation. The patient may initially have no overt symptoms, suffer from low-grade headaches and fever, or experience gradual mental status and other neurologic changes.

Syphilitic meningitis usually manifests in a manner similar to that of other forms of aseptic meningitis. Patients complain of headache, nausea, and vomiting. Other findings include stiff neck (60%), fever, seizures, cranial nerve palsies, and less commonly, other focal neurologic abnormalities.

Meningitis is the most important neurologic abnormality of acute disseminated Lyme disease, usually following erythema migrans by 2 to 10 weeks. Patients with Lyme meningitis have headache as the single most common symptom. Other findings include photophobia, nausea, vomiting, and stiff neck. About one half of patients with Lyme meningitis have mild cerebral symptoms consisting most commonly of somnolence, emotional lability, depression, impaired memory and concentration, and behavioral symptoms. Approximately 50% of patients also have cranial neuropathies, with facial nerve palsy occurring in 80% to 90% of cases.

In the usual patient with tuberculous meningitis, an insidious prodrome characterized by malaise, lassitude, low-grade fever, intermittent headache, and changing personality ensues. Within 2 to 3 weeks, the meningitic phase manifests as protracted headache, meningismus, vomiting, and confusion. In some adults, the initial prodromal stage may take the form of a slowly progressive dementia, whereas others may have a rapidly progressive meningitis syndrome indistinguishable from pyogenic bacterial meningitis. Fever is an inconstant finding on physical examination (50% to 98% of cases). Meningismus and signs of meningeal irritation are not uniform findings (absent in 25% to 80% of children and adults). Focal neurologic signs frequently consist of unilateral or, less commonly, bilateral cranial nerve palsies; cranial nerve VI is most commonly affected.

The time course of fungal meningitis depends on the clinical setting. Cases may manifest acutely, subacutely, or chronically; some of the fungal meningitides may cause symptoms that persist for years in the absence of antifungal treatment. In contrast, the same organisms can produce severe symptoms and signs within a few days and without clinical signs of meningeal irritation in the immunocompromised patient. In patients without acquired immunodeficiency syndrome (AIDS), cryptococcal meningitis typically manifests as a subacute process after days to weeks of symptoms. Headache is the most frequent complaint. Fever, meningismus, and personality changes also may occur; confusion, irritability, and other personality changes reflecting meningoencephalitis occur in about one half of patients. Ocular abnormalities occur in about 40% of patients and include papilledema and cranial nerve palsies.

In AIDS patients, manifestation of cryptococcal meningitis can be subtle, with minimal or no symptoms. AIDS patients may have only headache and lethargy. Although fever is common, meningeal signs occur in a minority of these patients.

Patients with meningeal coccidioidomycosis usually complain of headache, low-grade fever, weight loss, and mental status changes. About one half of patients develop disorientation, lethargy, confusion, or memory loss. Meningeal signs are uncommon. The presenting symptoms of *Histoplasma* meningitis are nonspecific. Symptoms usually include headache and fever. Only about one half of patients have focal neurologic mental status symptoms. Candidal meningitis also manifests with nonspecific findings.

Diagnosis

Clinically suspected meningitis is diagnosed by analysis of CSF obtained by lumbar puncture (Table 90-2). Table 90-3 illustrates general findings for patients with meningitis based on cause, and the following sections detail specific methods for establishing an etiologic diagnosis.

Bacterial Meningitis

Gram stain examination of CSF permits rapid, accurate identification of the causative microorganism in 60% to 90% of patients with bacterial meningitis, and it has a specificity of nearly 100%. CSF culture is the gold standard in diagnosis and is positive in 80% to 90% of patients with community-acquired bacterial meningitis if CSF is obtained before the start of antimicrobial therapy. The probability of identifying the organism decreases for patients who have received prior antimicrobial therapy. It has been suggested that CSF sterilization may occur more rapidly after initiation of parenteral antimicrobial therapy than previously suggested, with complete sterilization of CSF containing meningococcus within 2 hours and the beginning of sterilization of pneumococcus by 4 hours into therapy.