Diagnosis of cavernous sinus thrombosis is usually made by MRI with a venogram. Radiologic evaluation includes imaging of the sphenoidal and ethmoidal sinuses, which may require drainage if infected. Empirical antimicrobial therapy should include an antistaphylococcal agent. An empirical combination therapy with parenteral metronidazole, vancomycin, and ceftriaxone can achieve reasonable CSF and brain penetration and is likely to be active against *S. aureus* and the usual sinus pathogens. Parenteral nafcillin can be added for identified or suspected methicillin-sensitive *S. aureus*.

Lateral Sinus Thrombosis

Septic thrombosis of the lateral sinus results from acute or chronic infections of the middle ear. The infection spreads through emissary veins that connect the mastoid with the lateral venous sinus. It may spread to involve the sigmoid sinus. The symptoms include ear pain followed over several weeks by fever, headache, nausea, vomiting, and vertigo. Mastoid swelling may be seen. Sixth cranial nerve palsies and papilledema can occur, but other focal neurologic signs are rare.

The diagnosis can be established by magnetic resonance angiography. Treatment includes an empirical regimen of broad-spectrum intravenous antibiotics to cover staphylococci and anaerobes (i.e., nafcillin or oxacillin with penicillin or metronidazole), but surgical drainage (i.e., mastoidectomy) may be required.

Septic Sagittal Sinus Thrombosis

Septic sagittal sinus thrombosis is uncommon and occurs as a consequence of purulent meningitis, infections of the ethmoidal or maxillary sinuses spreading through venous channels, infected compound skull fractures, or neurosurgical wound infections (rare). Symptoms include manifestations of elevated intracranial pressure (i.e., headache, nausea, and vomiting) that evolve rapidly to stupor and coma. Diagnosis and treatment is similar to the lateral venous sinus thrombosis described earlier.

NEUROLOGIC COMPLICATIONS OF INFECTIVE ENDOCARDITIS

Epidemiology

Neurologic complications occur in one third of patients with bacterial endocarditis, and they triple the mortality rate of the disease. Most complications are related to valvular vegetations. Cerebral (but not systemic) emboli from mitral valve endocarditis are increasingly common. Most emboli, regardless of the bacterial cause of the infection, occur before or early in the course of treatment. By 2 weeks of therapy, the risk of embolization decreases dramatically. Mycotic aneurysms in the brain complicate endocarditis in 2% to 10% of patients and are more common in acute than subacute disease.

Pathophysiology and Clinical Manifestations

Cerebral emboli are distributed in the brain in proportion to cerebral blood flow. Most emboli lodge in the branches of the middle cerebral artery peripherally, with resultant hemiparesis. Focal seizures may result. Multiple microabscesses, however, can result in a diffuse encephalopathy similar to that seen in sepsis.

Mycotic aneurysms occur most commonly in the middle cerebral artery, with the aneurysms located distally in the vessel. This differentiates them from congenital berry aneurysms.

Clinical Manifestations

Patients often develop strokes, impaired consciousness, meningitis, focal seizures, and new-onset severe headaches. Strokes may manifest as ischemic lesions or hemorrhagic lesions in the brain parenchyma or subarachnoid space. Patients may have other signs of systemic microembolisms or retinal lesions, splinter hemorrhages in the nail bed, or microscopic hematuria.

Diagnosis

The diagnosis of neurologic involvement from endocarditis is best made with CT or MRI. MRI findings in endocarditis include ischemic lesions, hemorrhagic lesions, subarachnoid hemorrhage, brain abscess, mycotic aneurysm, and cerebral microbleeds. The CSF is abnormal in 70% of patients and simulates purulent meningitis (i.e., polymorphonuclear predominance, elevated protein level, and low glucose level) or a parameningeal infection (i.e., lymphocytic predominance, modest protein elevation, and normal glucose level). Multiple blood cultures may be needed to identify the organisms.

Multidetector CT angiography may be necessary to diagnose aneurysms. Small brain abscesses may complicate the course of endocarditis, but macroscopic abscesses are rare, with most occurring in the setting of acute rather than subacute endocarditis. Multiple microabscesses may escape detection on CT and are not amenable to surgical drainage.

Treatment

Antibiotic treatment of the primary disease is indicated. Stroke is usually treated conservatively. There are no controlled trials for the management of unruptured mycotic aneurysms. The aneurysms may decrease in size with antibiotic therapy, but the risk of rupture is high, and most clinicians advocate surgical management with clipping of the aneurysm or endovascular coiling. However, endovascular coiling may not prevent hemorrhage associated with rupture of a new aneurysm. Patients with infective endocarditis who do not respond to conservative medical therapy can have prompt valve replacement despite intracerebral hemorrhage.

PRION DISEASES

Etiology

Several human diseases have been attributed to a unique infectious protein, the prion. The infectious form of the prion protein is rich in β-sheets, detergent insoluble, multimeric, and resistant to proteinase K treatment.

Prion illnesses (i.e., transmissible spongiform encephalopathies) can be classified as sporadic, hereditary, or acquired. The most common form is sporadic Creutzfeldt-Jakob disease (sCJD). Familial forms include Gerstmann-Sträussler-Scheinker syndrome and familial fatal insomnia.

Acquired forms are caused by the transmission of an abnormal prion protein (PrP) from human to human or from cattle to humans. Accidental transmission of CJD between humans