

moderately increased risk for meningococcal disease compared with other persons their age. There appear to be some seasonal variations with the organisms. Pneumococcal and meningococcal infections can occur at any time but are more common in later winter and early spring.

Pathophysiology

The most common route of infection is vascular dissemination from a focus of infection elsewhere. For example, organisms from the nasopharynx invade the underlying blood vessels cross the blood brain barrier, and multiply in the CSF. Invasion by direct extension from infections in the paranasal and mastoid sinuses is less common. Organisms also gain entry by direct implantation after penetrating wounds, skull fractures that provide an opening into the skin or sinuses, lumbar puncture or surgical procedures, anatomic abnormalities such as spina bifida, or foreign bodies such as an internal ventricular shunt or an external ventricular device. Once implanted, the organisms spread into the CSF, by which the infection spreads throughout the subarachnoid space.

The infective process is similar to that seen in any bacterial infection and includes inflammation, exudation, white blood cell accumulation, and varying degrees of tissue damage. The brain becomes hyperemic and edematous, and the entire surface of the brain is covered by a layer of purulent exudate that varies with the type of organism. For example, meningococcal exudate is most marked over the parietal, occipital, and cerebellar regions; the thick, fibrinous exudate of pneumococcal infection is confined chiefly to the surface of the brain, particularly the anterior lobes; and the exudate of streptococcal infections is similar to that of pneumococcal infections but thinner. As infection extends to the ventricles, thick pus, fibrin, or adhesions may occlude the narrow passages and obstruct the flow of CSF.

Clinical Manifestations

The onset of illness may be abrupt and rapid, or develop progressively over 1 day or several days, and may be preceded by a febrile illness. Most children with meningitis are seen with fever, chills, headache, and vomiting that are quickly followed by