Leptomeningeal Metastases

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Leptomeningeal metastases typically have been a rare complication of systemic cancers. The incidence is increasing for cancers of the breast and lung, primarily because of more effective treatment modalities and longer survival. Presentation consists of multiple symptoms related to areas in the central nervous system, including the brain, cranial nerves, and spinal nerve roots. Diagnosis is made by magnetic resonance imaging with contrast enhancement and cerebral spinal fluid pathology. Treatment frequently involves combination therapy with radiation and intrathecal chemotherapy. Outcomes are poor, with short survival of six weeks to six months. Nurses play a key role in the care of patients with leptomeningeal metastases. Nursing care for this patient population includes baseline assessment and monitoring for changes in central nervous system function, symptom management, chemotherapy administration, education about the disease and treatment, identification of psychosocial issues, and assessment of coping strategies of patients and families.

Key Words: meninges; neoplasm seeding; radiotherapy; injections, intraventricular

Leptomeningeal metastases are the seeding of the meninges, either diffusely or multifocally, with cancer cells. These tumors may be visible grossly or only by microscopic examination (Posner, 1995). The incidence of leptomeningeal metastases in patients with lung and breast cancer has increased because of more effective treatment of the primary malignancy, which contributes to longer survival rates and leads to an increase in metastases in the central nervous system (CNS) (Chamberlain & Friedman, 1996). About 5% of patients with breast cancer develop leptomeningeal metastases (Moots, Harrison, & Vandenberg, 1995). Melanoma, leukemia, and lymphoma are other common primary cancers that may metastasize to the meninges, but any systemic cancer can seed to this area. Leptomeningeal metastases usually are a late manifestation of systemic cancer and often accompany a relapse of the primary disease elsewhere in the body that is not recognized at the time that leptomeningeal cancer is diagnosed. However, "a relatively high percentage of patients with leptomeningeal metastasis after breast cancer have no evidence of systemic metastases (15%–30%) or have stable disease (45%)" (Moots et al., p. 362).

Leptomeningeal metastases also are referred to as leptomeningeal carcinomatosis and carcinomatosis meningitis. Few nursing articles have been published on this topic. The focus of this article is to review the disease process and present a case study that illustrates the typical course of the disease.

Complications

In patients with leptomeningeal metastases, hydrocephalus can occur from an accumulation of cancer cells at the base of the fourth ventricle of the brain, causing a blockage in the flow of cerebral spinal fluid (CSF). A decreased level of consciousness may be associated with hydrocephalus. Tumors may develop along the vascular supply to the brain tissue and cause ischemic changes. As a result, patients may have transient ischemic attacks or a cerebral vascular accident.

This disease affects the CNS in many different areas and, therefore, causes a variety of symptoms. Leptomeningeal metastases should be suspected when CNS symptoms indicate problems occurring in more than one area of the CNS. Symptoms occur from involvement of the brain, cranial nerves, or spinal nerve roots or from irritation of the meninges (see Figure 1).

Diagnostic Tests

Lumbar puncture (LP) is performed to obtain CSF for cell count, protein and glucose concentration, and cytology examination for malignant cells and, occasionally, biochemical markers such as specific antibodies and immunotyping of lymphocytes. CSF glucose usually is reduced when leptomeningeal metastases are present (Compston, 1993; Posner, 1995). Protein frequently is elevated on initial LP, but fluctuations in protein may occur because of a breakdown of blood, tumor, and white blood cells during therapy (Lauby, 2001; Posner). LP will reveal increased opening pressure and elevated white blood cell counts in more than half of patients with leptomeningeal metastases (Posner). If malignant cells are present, the leptomeningeal tumor is confirmed (Posner). According to Stockhammer et al. (2000),

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