

FAST FACTS AND CONCEPTS #135 NEOPLASTIC MENINGITIS

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Background Neoplastic meningitis (NM) – also known as *leptomeningeal metastases*, *meningeal carcinomatosis*, or *leukemic meningitis*, is a common oncologic complication representing spread of tumor cells to the subarachnoid space (SAS). It is a complication which often portends a very short prognosis.

Epidemiology NM is found in 20% of cancer patients at autopsy. Among solid tumors, NM is common in breast cancer, small cell lung cancer, and melanoma while rare in gastrointestinal and gynecologic cancers. 90% of solid tumor patients with NM have widespread metastatic disease. NM is found in 40-50% of patients with hematological malignancies, mostly commonly the acute leukemias and high-grade lymphomas (such as large cell and Burkitt lymphomas).

Signs/Symptoms Tumor reaches the SAS by hematogenous spread via arachnoid vessels or direct invasion along nerve roots. Cancer cells in the subarachnoid space have the potential to: a) settle in dependent portions of the neuraxis (base of brain/cranial nerves or lower spinal canal), b) grow into the surface of the brain and fill the sulci, and c) block normal paths of cerebral spinal fluid (CSF) flow. Thus, the hallmark of diagnosis is neurological signs/symptoms at more than one level of the neuraxis:

- Brain – headaches, nausea/vomiting, seizure, hydrocephalus.
- Cranial Nerves – diplopia, hearing loss, facial numbness, dysphagia, dysphonia.
- Spinal – radicular pain, weakness (usually legs), incontinence, bladder and bowel dysfunction.

Diagnosis Lumbar puncture typically reveals a CSF profile of high opening pressure, low glucose, high protein, and lymphocytic pleocytosis. Sensitivity for finding malignant cells is 50- 70% for one sample, increasing to 80-90% with three samples. MRI can identify nodular/bulky areas of disease, hydrocephalus, and/or enhancement of the cortex/tentorium if tumor growth along the sulci leads to neovascularization. NM commonly causes abnormal CSF flow; this can be demonstrated by a radionuclide cisternogram.

Prognosis and Treatment Patients with breast cancer or hematological malignancies that have not been extensively treated with chemotherapy, have a reasonable chance at remission of their CNS disease if their systemic cancer can also be controlled. In contrast, patients with other cancers (e.g. lung, melanoma) typically have a dismal prognosis (1-4 months) with or without treatment. In fact, the median survival of patients who underwent placement of an implanted intraventricular reservoir (Ommaya reservoir) for intrathecal chemotherapy administration was only 72 days in a multicenter retrospective analysis. Unlike spinal cord compression or brain metastases, there is no accepted role for corticosteroids except in lymphoid malignancies. Treatment options include chemotherapy and/or radiation.

- Radiation: Either cranio-spinal irradiation (entire spinal column) or focused radiation therapy to sites of bulky or symptomatic areas (e.g. cauda equina for radicular leg pain).
- Chemotherapy: Options include systemic high-dose chemotherapy (Ara-C or Methotrexate) intrathecal chemotherapy (1-2 times per week) administered either by repeated lumbar puncture or via repeated puncture of an Ommaya reservoir. Commonly used intrathecal drugs include methotrexate or Ara-C.

Summary For many patients, NM represents a pre-terminal diagnosis and no anti-neoplastic therapy is warranted. Establishing the diagnosis in such patients may be important to help prognosticate and to anticipate future neurological problems (e.g. seizures, headache, radicular pain). The decision whether or not to begin anti-neoplastic treatment should be made in consultation with a medical, radiation, or neurooncologist.

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