

Seizures in People With Cancer

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Case Study: Ms. S is a 52-year-old woman who was diagnosed with infiltrating ductal breast carcinoma two years prior. She was treated with mastectomy followed by focal radiation and FAC (5-fluorouracil, adriamycin, and cyclophosphamide). One year ago, she began experiencing headaches. A magnetic resonance imaging scan with gadolinium revealed a 2 cm enhancing mass in the left temporal lobe, and she received whole-brain irradiation.

Ms. S presents to the clinic and reports that she has been experiencing brief episodes of confusion. At the onset of each episode, she smells an unusual “electrical” odor, followed by several seconds of being awake and aware of her surroundings but unable to respond. She first experienced one of the episodes a week ago; since then, she has had at least one similar episode per day. Following each episode, she has trouble thinking of the words she wants to say for about one hour. She denies any headache, weakness, or sensory changes.

Any new neurologic symptoms in patients with cancer warrant investigation. Ms. S. already is known to have a brain metastasis, which occurs in as many as 170,000 people each year in the United States (Chidel, Suh, & Barnett, 2000; Wen, Black, & Loeffler, 2001). The most common neurologic symptoms associated with brain metastases are headache, cognitive dysfunction, motor weakness, and seizures (Armstrong & Gilbert, 2000; Taillibert & Delattre, 2005).

The types of symptoms experienced by patients and the time courses in which they occur often are helpful in determining etiology. Symptoms that are fixed or gradually progressing may indicate structural abnormality (e.g., growing metastases, hemorrhage, infection) or metabolic disturbance (e.g., encephalopathy associated with hypoxia or hyponatremia). The most likely diagnosis in

patients presenting with brief, self-limiting episodes of neurologic dysfunction is seizure activity.

Pathophysiology

Seizures are defined as sudden changes in behavior caused by the abnormal firing of nerve cells in the brain and characterized by changes in sensory perception or motor activity (Armstrong, Kanusky, & Gilbert, 2003). The term is used synonymously with epilepsy, which is defined as a condition caused by recurrent seizures. The exact cellular mechanism associated with seizures is unknown. Seizures are believed to start from an area of hyperactive neuronal activity (the epileptic focus) or from alterations in the brain microenvironment. Seizures can start from a nidus of activity (termed simple partial or complex partial seizures) or can occur as consequences of generalized neuronal dysfunction (termed generalized seizures). Partial seizures are characterized by focal neurologic activity (such as tonic-clonic movement in the arm or leg) with consciousness main-

tained. Generalized seizures involve loss of consciousness and may be accompanied by bilateral tonic-clonic movements and incontinence. Most tumor-related seizures initially are focal in origin, occurring as consequences of a lesion in the brain. However, they can progress quickly to generalized seizures; the focal phase may go unrecognized (Sperling & Ko, 2006).

Risk Factors

In patients with cancer, spread of disease to the central nervous system (CNS) is the factor most commonly associated with seizures (Sperling & Ko, 2006). This includes parenchymal lesions and leptomeningeal disease. Seizures are among the most common symptoms associated with CNS tumors, whether primary or metastatic (Posner, 1995). The incidence of seizures is highest in patients with primary low-grade brain tumors; seizures are less common in those with higher-grade tumors and metastatic disease (Beaumont & Whittle, 2000; Hildebrand, Lecaillon, Perennes, &

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