

# DIAGNOSIS AND MANAGEMENT OF ELEVATED INTRACRANIAL PRESSURE

Julie E. Hammack, MD

Elevated intracranial pressure in patients with cancer is usually due to mass effect resulting from intracranial tumor (metastatic or primary) and the associated vasogenic edema. Other mechanisms of elevated ICP include tumor obstructing CSF pathways resulting in hydrocephalus, and cerebral vein thrombosis occurring in cancer patients with hypercoagulability. I will discuss management of elevated intracranial pressure and the resulting neurologic deficit.

Tumor vessels typically lack the tight junctions between endothelial cells that characterize the blood brain barrier and are therefore far more leakage prone than normal brain blood vessels. Tumors produce factors (i.e. VEGF and glutamate) that increase vascular permeability. Glucocorticoids are the cornerstone of therapy in these patients and act by stabilizing the blood-brain barrier in tumor capillaries and increasing the clearance of peritumoral edema. Dexamethasone is the preferred agent because of its reduced mineralocorticoid effect and reduced potential for fluid retention. Headache and other symptoms of raised intracranial pressure respond better than the symptoms of focal neurologic deficit. The standard dose has been 10-12 mg IV or PO initially and then 4 mg QID. The half-life of dexamethasone is sufficiently long to allow BID dosing and smaller doses (i.e. 4 mg BID) may be as effective as higher doses although the question of steroid dose has never been subjected to a randomized controlled trial. The full effect of dexamethasone occurs at 48-72 hours, although patients often begin to improve within 6 hours of the initial dose. Treatment with dexamethasone is sufficient therapy for the vast majority of patients with symptoms of elevated intracranial pressure. Only patients with symptoms of acute herniation (obtundation with brainstem reflex abnormalities) require IV mannitol or hypertonic saline and hyperventilation in addition to dexamethasone.

Once the desired effect of reducing symptoms of elevated intracranial pressure has been achieved, it is best to slowly taper the dexamethasone to the lowest effective dose in order to reduce the risk of steroid side effects. Adverse effects of corticosteroids include acute psychosis, insomnia, hyperglycemia, osteoporosis, avascular necrosis, weight gain, GI hemorrhage, bowel perforation, opportunistic infection, myopathy, hiccoughs, and tremor among others. Dexamethasone affects the metabolism and protein binding of phenytoin, usually lowering the anticonvulsant drug levels and rendering phenytoin less effective. Phenytoin accelerates the metabolism of dexamethasone by the liver, reducing the effectiveness of the corticosteroid.

## References

1. Galicich JH, French LA, Melby JC. Use of dexamethasone in treatment of cerebral edema associated with brain tumors. *J Lancet.* 1961;81:46.
2. Kaal EC, Vecht CJ. The management of brain edema in brain tumors. *Curr Opin Oncol.* 2004;16(6):593.
3. Stummer W. Mechanisms of tumor-related brain edema. *Neurosurg Focus* 2007 22(5):E8, 1-7.