Chapter 116

Intracranial Neoplasms

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HEADACHE ATTRIBUTED TO INTRACRANIAL NEOPLASM

International Headache Society (IHS) code and diagnosis: 7.4 Headache attributed to intracranial neoplasm

World Health Organization (WHO) code and diagnosis: G44.822 Headache attributed to intracranial neoplasm

INTRODUCTION

For most patients headache has a benign cause, but a few patients will be diagnosed with a brain tumor. In this chapter, we will discuss headache etiology by brain tumors, including primary and metastatic tumors. The pathogenesis, epidemiology, and clinical features will be reviewed as well as unusual headache syndromes sometimes associated with brain tumors. Further, headaches caused by the treatment of brain tumors will be described, and finally, the treatment of brain tumor–associated headache will be reviewed.

Epidemiology of Brain Tumor–Associated Headache

There are relatively few studies on headache associated with brain tumors despite the long-recognized association. The prevalence of headache reported in modern studies containing unselected types of brain tumors ranges from 48 to 72 % (Table 116-1). In one study (39) of patients with accidentally detected brain tumors, Kamiguchi et al. found that of 113 patients, 53 had complained of headache not typical of increased intracranial pressure.

Headaches are reported with all types of tumors but some seem more likely to cause headache (Table 116-2).

Isolated headache as the only symptom of a brain tumor is uncommon and usually short-lived. In a prospective study, only 8% of 183 adult patients presented with isolated headache and no patient had headache as their only symptom for longer than 10 weeks (88). Rossi and Vassella (68) studied 67 children with headache in whom a brain tumor was diagnosed and found that progressive neurologic signs and symptoms occurred in 70% within 1 month of the onset of headache and in 94% within 4 months. Less than 1% of 3291 children with brain tumors had headache as their only symptom and less than 3% had no neurologic abnormality on examination (12). Intracranial metastases were found in 32.4% of adult cancer patients presenting with new or changed headache (13). In contrast, only 12% of headaches in children with systemic cancer were caused by brain metastases (3).

The presence of headache is age dependent. In a cohort study of 714 patients, headache was the presenting symptom in 44% of patients 18 to 24 years of age and only in 8% of patients older than 75 years (49). Sixty-two percent of all children with brain tumors had chronic or frequent headaches, but at least 72% of children aged 4 to 20 had headache while only 8% of those under 1 year had headache (12).

Pathophysiology of Brain Tumor Headache

The etiology of headache in brain tumors is multifactorial. In a classic series of experiments on patients undergoing craniotomy, Ray and Wolff mapped the pain-sensitive structures of the head (66). The venous sinuses, dural arteries, some of the dura at the base of the brain, and the cerebral arteries at the base of the brain were pain sensitive. The brain parenchyma, lining of the ventricles, and most of the dura and pia-arachnoid were insensitive to pain.

These observations (66) led the authors to postulate six mechanisms of headache pain: (1) traction on the veins draining into the large venous sinuses with resulting displacement, (2) traction on the middle meningeal artery, (3) traction on the major arteries at the base of the brain, (4) direct pressure on cranial nerves with pain

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TABLE 116-1 Prevalence of Headache in Brain Tumor Patients

	Total (%) (n)	*Supra-tentorial (%)*	*Infra-tentorial (%)*
Rushton and Rooke, 1962 (69)	60 (221)	58	64
Sunwanwela et al., 1994 (84)	71 (171)	60	84
Forsyth and Posner, 1992 (61)	48 (111)	40	82
Pfund et al., 1999 (58)	59 (279)	55	76
Childhood Brain Tumor Consortium, 1991 (12)	62 (3291)	58	70

afferent fibers from the head, (5) distension and dilation of the intracranial and extracranial arteries, and (6) inflammation in or around the pain-sensitive structures of the head. Further extension of this work in 67 patients with brain tumors led to the conclusion that local and distant traction on pain-sensitive structures, mass effect, and hydrocephalus account for most of the headaches (46).

The role of increased intracranial pressure in the generation of headache is debated. In a study of migraineurs (76) it was found that headache induced by intravenous histamine could be abolished by increasing the cerebrospinal fluid (CSF) pressure. Other studies have found that increasing intracranial pressure using saline infusions caused headache (81). Northfield proposed that sudden variation in intracranial pressure caused headache rather than the absolute value of the pressure (56). For example, plateau waves are acute elevations in intracranial pressure due to a rapid increase in intracerebral blood volume in a patient with reduced intracranial compliance (e.g., from a tumor) and impaired autoregulation of cerebral perfusion pressure. Symptoms include headache associated with dizziness and alterations in consciousness and motor control that are triggered by standing (92).

Pituitary adenomas have been postulated to cause headache by raising intrasellar pressure (4) and by the expression of somatostatin receptors coupled to the pain pathways in growth hormone–secreting tumors (47).

TABLE 116-2 Frequency of Headache by Tumor Pathology

Pathology	*With Headaches (%)*	*References*
Metastatic tumors	40–80	15,22,61,62,84,88
Gliomas	46–90	61,84
Meningioma	32–83	28,61,71,84
Pituitary adenoma	16–63	2,61,84
Craniopharyngioma	34	93
Acoustic neuromas	88	84
Epidermoid and dermoid tumors	30 extradural 50 intradural	29
Ruptured dermoids	32	83
Colloid cysts	92	16

Clinical Features of Brain Tumor Headache

The IHS 2004 (36) clinical features of headache attributed to intracranial neoplasms, code 7.4, are listed as follows, with this chapter having emphasis on the first three subcodes:

7.4 Headache attributed to intracranial neoplasm

7.4.1 Headache attributed to increased intracranial pressure or hydrocephalus caused by neoplasm

Diagnostic criteria are as follows:

A. Diffuse nonpulsating headache with at least one of the following characteristics and fulfilling criteria C and D:
  1. Associated with nausea and/or vomiting
  2. Worsened by physical activity and/or maneuvers known to increase intracranial pressure (such as Valsalva maneuver, coughing, or sneezing)
  3. Occurring in attacklike episodes (see Notes, #1)

B. Space-occupying intracranial tumor demonstrated by computed tomography (CT) or magnetic resonance imaging (MRI) and causing hydrocephalus (see Notes, #2).

C. Headache develops and/or deteriorates in close temporal relation to the hydrocephalus.

D. Headache improves within 7 days after surgical removal or volume-reduction of tumor.

Notes:

1. Onset of headache can be sudden (thunderclap headache) and, in such cases, associated with loss of consciousness.

2. For example, colloid cyst of the III ventricle.

7.4.2 Headache attributed directly to neoplasm

Diagnostic criteria are follows:

A. Headache with at least one of the following characteristics and fulfilling criteria C and D:
  1. Progressive
  2. Localized
  3. Worse in the morning
  4. Aggravated by coughing or bending forward

B. Intracranial neoplasm shown by imaging.

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C. Headache develops in temporal (and usually spatial) relation to the neoplasm.
D. Headache resolves within 7 days after surgical removal or volume-reduction of neoplasm or treatment with corticosteroids.

7.4.3 Headache attributed to carcinomatous meningitis

Diagnostic criteria are as follows:

A. Diffuse or localized headache fulfilling criterion C.
B. Carcinomatous meningitis proven by (repeated) CSF examination and/or dural enhancement on MRI.
C. Headache develops and/or deteriorates with advancing disease.

Comment: Headache may improve temporarily with intrathecal chemotherapy or prednisone (prednisolone).

7.4.4 Headache attributed to hypothalamic or pituitary hyper- or hyposecretion

Diagnostic criteria are as follows:

A. Bilateral, frontotemporal, and/or retro-orbital headache fulfilling criteria C and D.
B. At least one of the following:
  1. Prolactin, growth hormone (GH), and adrenocorticotropic hormone (ACTH) hypersecretion associated with microadenomas <10 mm in diameter
  2. Disorder of temperature regulation, abnormal emotional state, altered thirst and appetite, and change in level of consciousness associated with hypothalamic tumor
C. Headache develops during endocrine abnormality.
D. Headache resolves within 3 months after surgical resection or specific and effective medical therapy.

The classical description of tumor headache is severe, progressive, morning headache associated with nausea and/or vomiting. While this headache pattern is always worrisome and deserves immediate investigation, it is relatively infrequent (22). Indeed, studies have shown tension-type–like dull ache in 58% or pressure headache in 77% of patients (22,69). Nausea and vomiting were present in 46% (69) and 48% (22) of patients. Another study demonstrated that only 16% of patients had tension-type headache and in the other patients, the pain was throbbing (63%) or shooting (38%) and usually associated with nausea and vomiting (60%) (61). A minority of patients (7 to 9%) have migraine-type headaches and usually there are atypical features (22,61). The pain is typically intermittent, not occurring daily in 62 to 88% of patients (22,46,61,69), moderate to severe in intensity, and progressive (61). Nocturnal and morning headaches are reported in 25 to 36% of patients and exacerbation of headache by the Valsalva maneuvers occurs in 23% (22,61,69).

In children, the most common features (79% of patients) in one study were nocturnal headache or headache present on arising associated with nausea and vomiting (68). Nausea and vomiting were associated with headache in 72% of children with supratentorial tumors and 86% with infratentorial tumors (12).

The site of headache may not reflect the tumor location. In one series, headache lateralization and tumor coincided in only one third of patients (61). Only 41% of patients with hemispheric tumors had isolated ipsilateral headache and 12% had only contralateral headaches. These results contrast with another study where all patients with unilateral headache had an ipsilateral tumor (22). Correct lateralization of headache in 80% of supratentorial tumors and 62% of infratentorial tumors (84) was present in another study, and it was noted that in patients without papilledema or other signs of increased intracranial pressure, correct lateralization was found in 100% of supratentorial tumors (84). Frontal headaches were poorly localizing and the frontal area was the most common site of headache (49 to 68%) (22,61). Bilateral headaches were present in 18 to 72% of patients (21,58). Infratentorial tumors usually present with supratentorial pain (73%), with nuchal and occipital pain in only 27% of patients (61). Headaches are more common with infratentorial (70 to 84%) than supratentorial tumors (55 to 60%) (12,61,84). Intraventricular and midline tumors are associated with headache in 92 to 95% of patients (61,84).

How often is headache the only symptom of a brain tumor? As previously noted in one series (84) of 183 adult patients with brain tumors, most patients had at least one other neurologic symptom besides headache at initial review, and only 15 patients (8%) exhibited headache as the only symptom. Age, sex, tumor localization, or tumor pathology did not correlate with headache presence; however, there was some suggestion that posterior fossa location of tumor and hydrocephalus were more common in patients who presented with headache. At diagnosis, 59 (31%) of the patients had headache, which rarely was an isolated symptom for longer than 10 weeks. The longest time any patient had headache as their only symptom was 77 days. Collectively, these observations indicate that a brain tumor does not cause chronic headache without any other major new symptoms.

Several factors may predict increased risk of headache in patients with brain tumors (22). Increased intracranial pressure, degree of midline shift, and amount of edema were associated with headache (22,61), as was location of the tumor. Forsyth and Posner found that increasing tumor size was associated with increasing likelihood of headache, but others (61) did not find a relationship between tumor size and progressive headache (22,61). A previous history of headache predicts headache with brain tumor. Seventy-eight percent of patients with prior headache also had

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headache with their brain tumor. Brain tumor headache may be similar to the patient's previous headache although more severe or frequent and often associated with other new symptoms (22).

Headache and Facial Pain Syndromes in Brain Tumors

Metastatic disease to the base of skull may present with five distinct clinical syndromes depending on the cranial nerves and other structures involved (30). The *orbital syndrome* presents with blurred binocular vision followed by diplopia and supraorbital pain, proptosis, and external ophthalmoplegia. In the *parasellar syndrome*, patients have unilateral frontal headache associated with diplopia and ocular paresis but no proptosis. The *middle fossa* (gasserian ganglion) *syndrome* usually presents with pain, numbness, or paresthesias in the distribution of the second or third division of the trigeminal nerve, and diplopia due to associated ocular muscle palsies. Headache was less common as was motor involvement of the mandibular branch. The *jugular foramen syndrome* presents with hoarseness due to vocal cord paresis, pain including glossopharyngeal neuralgia, and palatal, tongue, or ipsilateral sternocleidomastoid or trapezius weakness and/or atrophy. The fifth syndrome is the *occipital condyle syndrome,* which presents with severe localized unilateral occipital pain and tenderness associated with dysarthria or dysphagia due to a unilateral 12th nerve palsy.

Occlusion of the superior sagittal sinus by lymphoma or other tumors causing increased intracranial pressure and headache (26,51) has been reported. A patient with headache, unilateral visual loss, and weight loss had a temporal artery biopsy that showed metastatic lung carcinoma in the lumen of the artery (7).

Leptomeningeal metastases may present with headache in 40% of patients, often associated with pain in a spinal, radicular, or meningeal pattern and multifocal neurologic signs and symptoms (5,37,91). Breast and lung cancer, melanoma, leukemia, and lymphomas are the most common systemic tumors with leptomeningeal spread (37). Ependymomas, medulloblastomas, pineal region tumors, and primary central nervous system lymphomas frequently have leptomeningeal dissemination at diagnosis, while astrocytomas are less likely to present with disseminated disease.

Uncommon Headache Syndromes Caused by Brain Tumors

Trigeminal Autonomic Cephalgias (Table 116-3)

Secondary cases of SUNCT syndrome (short-lasting, unilateral, neuralgiform headache attacks with conjunctival injection and tearing) caused by pituitary macro- and microadenomas secreting prolactin have been reported. Interestingly, lisuride and bromocriptine, ergot-derived dopaminergic agonists, given to suppress prolactin secretion also caused similar headache (51). Levy et al. (48) also reported a case of SUNCT syndrome associated with a prolactin-secreting microadenoma exacerbated by dopamine agonists and relieved by resection of the tumor. A leiomyosarcoma involving the cavernous sinus also caused a SUNCT syndrome (40).

A pilocytic astrocytoma in the pontocerebellar angle caused an ipsilateral SUNCT-like headache, which responded partially to indomethacin (9). A trigeminal autonomic cephalgia-tic–like syndrome associated with a pilocytic astrocytoma in the pons and medulla

TABLE 116-3 Uncommon Headache Syndromes Caused by Tumors

Headache Type	*No. of Cases*	*Type of Tumor*	*Reference*
Cluster type	3	Pituitary adenoma, lung metastases	54,63,86
Chronic paroxysmal hemicrania	3	Ganglioglioma, pituitary microadenoma Malignant frontal lobe tumor	25,52,90
SUNCT syndrome	5	Pituitary adenoma, pilocytic astrocytoma, leiomyosarcoma	9,40,48,50
Hemicrania continua and idiopathic stabbing headache	1	Pituitary adenoma	48
Trigeminal autonomic cephalalgia-tic–like syndrome	1	Pilocytic astrocytoma	87
Migraine	4	Brainstem glioma, occipital lobe tumor, meningioma	57,75,89
Cough and/or exertional headache	4	Medulloblastoma, meningioma, acoustic neuroma	17,59,85

SUNCT, short-lasting, unilateral, neuralgiform headache attacks with conjunctival injection and tearing.

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oblongata resolved following surgery for the tumor (87).

A patient with chronic paroxysmal hemicrania responding to indomethacin was found to have a ganglioglioma in the sella turcica displacing the optic chiasm and floor of the third ventricle and encasing the carotid artery in the cavernous sinus. After partial resection and radiation therapy, the headache resolved (90). A case of chronic paroxysmal hemicrania–type headache unresponsive to indomethacin in a patient with a large frontal lobe tumor has been reported (52). An indomethacin-responsive chronic paroxysmal hemicrania–type headache occurred in a patient with a mixed pituitary microadenoma producing thyroid-stimulating hormone, prolactin, and ACTH (25). It resolved after the tumor was resected.

Cluster-type headache has been reported in patients with pituitary adenomas (54,63) and multiple parenchymal supratentorial brain metastases (86).

Migraine (Table 116-3)

Occipital lobe tumors may produce visual disturbances mimicking migraine auras (75,89) as well as migraine-type headache. Paroxysmal headache associated with nausea, vomiting, photophobia, and vertigo was the presenting symptom of a brainstem glioma (57).

Paroxysmal and Positional Headaches

Colloid cysts are uncommon brain tumors but are of particular interest as they may present with paroxysmal or positional headache not associated with other symptoms. Patients may have catastrophic deterioration and die due to blockage of the foramen of Monroe by the pedunculated tumor. The classical description is severe paroxysmal headache relieved by changes in head position (34), but it is now recognized that this pattern is the exception rather than the rule. In a series of 105 cases, generalized, intermittent headache was reported by 92% of patients and only two patients were affected by postural change (16). Seventy-six percent of patients had papilledema. Ataxia, diminished vision, and urinary incontinence were present in 18 to 27%. Despite better imaging techniques, patients still die from these benign, surgically curable tumors as they may go unrecognized until they present with catastrophic acute deterioration (16,21).

Pituitary apoplexy caused by sudden hemorrhage or infarction of a pituitary tumor is rare but life threatening. Patients present with headache, visual loss, ophthalmoplegia, and altered mental status (8). Often the tumor is previously unrecognized. Not all pituitary hemorrhages cause headache. In one series, only four of seven patients with hemorrhagic pituitary adenomas had headache (1).

Rupture of tumor cysts may cause headache due to the irritating effects of the cyst contents. This has been reported with craniopharyngiomas (74) and dermoid and epidermoid cysts (29,83). The rupture may occasionally be fatal because of the severe meningeal reaction (29).

Cough headaches are brief, severe headaches precipitated by coughing or other Valsalva maneuvers. Usually they have a benign etiology, but in a classical paper, Symonds reported two patients with symptomatic cough headache from a meningioma and following removal of an acoustic neuroma (85). A more recent review did not find any tumors causing cough headache but did report one patient with brief exertional headache due to brain metastases (59). A medulloblastoma causing symptomatic cough headache was reported by Edross (17).

Approach to Headache in Cancer Patients

In a patient with known malignancy, new or changed headache should always raise suspicion of intracranial metastases. In one study, 32% of cancer patients with headache had brain metastases (13). Significant predictors of tumors were identified and it was found that headache duration of 10 weeks or less, emesis, and pain not of tension type were significant but had low specificity. As a result, MRI of the brain was recommended in all patients with new or changed headache. Another study found a structural cause of headache in 38 of 97 cancer patients with undiagnosed headache (14). All but three were due to metastatic disease to the brain, skull, meninges, or upper cervical spine. In children, a study found that 12% of headaches were caused by metastatic tumors and 1% by secondary primary brain tumor (3).

A careful history and physical examination may help to distinguish between the many potential causes of headache in cancer patients (Table 116-3). Also, a CT scan or MRI is essential. An MRI scan with gadolinium enhancement is superior for parenchymal metastases, leptomeningeal disease (11), and ruling out vascular complications such as venous sinus thrombosis. If a sinus thrombosis is suspected, MR angiography/MR venography (MRA/MRV) sequences should be included. A CT scan may be better than MRI for base of skull lesions or acute hemorrhage. Once mass lesions are ruled out by CT scan or MRI, lumbar puncture with cytologic examination of the CSF may demonstrate leptomeningeal metastases if MRI is negative or unavailable and CT is negative. Opening pressure, glucose, protein, and cell count also should be measured. Both MRI scans (31) and CSF cytology (31,91) have a significant false-negative rate of 25 to 50% for leptomeningeal metastases, and a normal cell count does not preclude positive cytology. Biologic and cellular markers as well as flow cytometry may be helpful in identifying leptomeningeal disease (44). If the index of suspicion remains high for leptomeningeal disease, studies should be repeated.

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In patients without a history of cancer who present with new or changed headache, advancing age, progressive headache, emesis, headache worsening with Valsalva maneuver or exertion, nocturnal or early morning headache, meningismus, or new neurologic signs or systemic symptoms, evaluation for serious or life-threatening causes of headache, including brain tumors, should be performed (61,62).

Many patients undergo neuroimaging to rule out a brain tumor. A tumor is rarely present if the examination is normal (19) or if the presentation was one of a recurrent primary headache disorder, such as migraine (67) or cluster headache (24). In particular, new-onset headache over age 50 years should invoke consideration of a secondary headache disorder resulting in specific diagnostic testing. Up to 15% of patients over 65 years old, who present to neurologists with new-onset headache, will have serious causes (19). Patients with "chronic daily headache" probably need to be investigated at some point (19). Frishberg (24) states: "... patients with new-onset headaches, headaches with a progressive course, headaches with a significant change in pattern, headaches that never alternate sides, and headaches associated with any neurologic findings or seizures have a substantially higher likelihood of a secondary cause such as tumor, arteriovenous malformation, or other structural lesion. In these situations, imaging must be considered as part of the workup."

TABLE 116-4 Causes of New Headache in Cancer Patients

Intracranial metastasis:
Skull, base of skull, meninges
Cranial nerves and vessels
Nonmetastatic causes:
Vascular hemorrhage in tumor, subdural and subarachnoid
Infarction and venous thrombosis
Infections (abscess, meningitis, etc.)
Side effects of therapy:
Chemotherapy:
Hormones, antibiotics, conventional agents, cytokines, intrathecal
Supportive therapies:
Corticosteroids, antinauseants, withdrawal from opioids
Anticoagulants causing CNS bleeding
Ibuprofen causing aseptic meningitis
Radiotherapy:
Acute edema, delayed radionecrosis, radiation-induced neoplasm
Radiation-induced atherosclerosis causing stroke
Surgery:
Hemorrhage, vascular injury, perioperative stroke, and CSF leak
Other causes
Fever
Metabolic
Hypoxemia, hypercapnia, and hypoglycemia
Referred pain extracranial structures (cervical metastases, lung tumors)
Postlumbar puncture headache

CNS, central nervous system; CSF, cerebrospinal fluid.
Adapted from (22) Forsyth PA, Posner JB. Intracranial neoplasms. In: Olesen J, Tfelt-Hansen P, Welch KMA, eds. *The headaches*. 2nd ed. New York: Raven Press, 2000:856.

Headache Due to Treatment of Brain Tumors

There are many potential causes of headache in cancer patients and several are treatment related (Table 116-4). It is important to recognize treatment-related causes of headache to avoid unnecessary investigations and inappropriate therapy.

Postsurgical headaches following craniotomy for brain tumors are well recognized. The majority of patients with supratentorial craniotomies do not have persistent headache. In one study, by 2 months postcraniotomy, 83% of patients did not have headache (42). Only 4% had medically uncontrolled new headache 1 year postoperatively. Temporal craniotomies disrupt the temporalis muscle and many patients complain of new temporomandibular joint discomfort and head pain if questioned (personal observation). Usually this resolves within a few weeks.

Surgery in the posterior fossa is associated with a higher incidence of postoperative headache. Suboccipital craniotomy for acoustic neuroma has been reported to cause headache in 64% of patients, with 22% of those with headache reporting their pain as incapacitating 3 months postoperatively (77). These headaches persisted in 84%. The incidence of headache appears to be related to the surgical technique, with headache occurring far less frequently when the bone flap is replaced (78), cranioplasty is performed, or a mini-craniotomy is performed (33,73,82). Divalproex sodium and verapamil have been reported to be effective in treating these postoperative headaches in a few cases (32,35).

Postsurgical headache may be due to other complications of surgery such as postoperative hematoma, CSF leak, or infection. Less commonly, sinus thrombosis may complicate craniotomy (43,70).

Radiotherapy may cause headache. Transient cerebral edema may cause acute radiation encephalopathy with headache at the onset of radiotherapy. A subacute demyelinating radiation encephalopathy 1 to 6 months postradiotherapy also may cause headache and increased symptoms (79). It may be indistinguishable from recurrent tumor clinically and radiographically although positron emission tomography (PET) scans or MR spectroscopy may differentiate the two. Both forms of encephalopathy respond to corticosteroids. A late complication of radiation is prolonged strokelike migraine attacks, which may occur many years posttherapy (6,55,80). These attacks may be associated with striking enhancement of the cortical ribbon on MRI with gadolinium enhancement. Gamma knife

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radiosurgery for tumors may cause new headache. In a series of 75 patients treated for acoustic neuroma, 6% experienced a worsening of their headache and 2% reported new headache (41).

Chemotherapeutic agents and supportive therapies commonly cause headache. Temozolomide, used for primary brain tumors, has been reported to cause headache in 25% of patients (53,94). Intrathecal chemotherapy, especially the sustained-release version of cytosine arabinoside, is associated with headache in up to 25% of patients (27). Ondansetron and other selective serotonin type-3 receptor antagonists are reported to cause headache in 14 to 39% of patients (18,38). Withdrawal from corticosteroids can cause headache.

Management of Brain Tumor Headache

The management of headache associated with brain tumors depends on the tumor type and the patient's functional status. In patients with brain metastases, the choice of therapy is influenced by the number, size, and location of metastases, the activity of the systemic disease, and the patient's functional status. Dexamethasone or other corticosteroids reduce cerebral edema and often provide dramatic relief of headache and other symptoms.

Whole brain radiotherapy has been the mainstay of treatment for brain metastases and usually provides temporary symptom control. Borgelt et al. reported that 82% of patients with headache due to brain metastases had relief with palliative radiotherapy (10). Patients who have limited numbers of metastases and controlled systemic disease may benefit from surgical resection or stereotactic radiosurgery (45,60,72).

Headache due to a primary brain tumor often is caused by increased intracranial pressure or mass effect. Corticosteroids frequently reduce cerebral edema and provide good headache relief. Often simple analgesics are sufficient to relieve headache, but narcotics may be required. Definitive treatment may include surgery, radiotherapy, and/or chemotherapy. In the authors' experience, treatment of malignant gliomas usually alleviates headache temporarily. However, at recurrence, 52% of patients with malignant gliomas complain of headache (58). Palliative care should include good pain control using corticosteroids and analgesics as necessary. Acetazolamide has been reported to be effective in headaches and other symptoms caused by plateau waves (92).

For patients with potentially curable tumors or tumors with prolonged survival, management of headache is more complex. Patients with a prior history of headache are more likely to have headache with a brain tumor (22), so correct diagnosis of the cause of headache is essential for successful therapy. Headaches not due to the tumor should be managed as in any other patient. Headaches caused by a tumor may respond to treatment of the tumor. Both surgery and dopamine agonists are effective in relieving headache due to prolactinomas (1,2), but in a series of acoustic neuromas, most patients (80 to 94%) had no change in their headaches whether treated with stereotactic radiosurgery or microsurgery (41). For neuropathic pain, tricyclic antidepressants, gabapentin, lamotrigine, and topiramate may be helpful. Lancinating pain may respond to carbamazepine or oxcarbamazepine. Secondary headache syndromes may respond to the same agents as the primary headaches (25,90).

In summary, the diagnosis and care of the headache patients with headache attributed to intracranial neoplasms is an important area of clinical concern. Careful neurologic assessment and diagnosis, along with appropriate ancillary investigations, will lead to the best therapeutic options for each patient. Finally, it is important to manage headache and other symptoms in patients with known intracranial neoplasms in an effective and timely fashion, given the limited life span of many patients.

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