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Headache of recent onset in adults: a prospective population-based study

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J. Duarte[1], A. P. Sempere[1], J. A. Delgado[2], G. Naranjo[2], M. D. Sevillano[1], L. E. Clavería[1]

Division of Neurology[1], Department of Radiology[2], General Hospital of Segovia, Spain

One hundred consecutive adult patients with headache of recent onset were prospectively studied. Every patient was examined by craneal CT scan. Their mean age was 46 years (range 17–82). Neurological examination was normal in 80 patients. Organic headache represented 39% of the entire group, and 26% of them had a normal neurological examination. The yield of CT scan in patients with headaches and a normal neurological examination was 22.5% (95% IC: 14%–33%); of which we encountered the following pathologies: intracranial tumors (13), hydrocephalus (2), arachnoid cyst (1), toxoplasmic abscess (1) and parenchymal hemorrhage (1). The clinical characteristics of the headache on their own was insufficient to rule out the possibility of an intracranial tumor. Neuroimaging studies should be performed in all adult patients with non-vascular headache of recent onset, and previously headache-free individuals.

Key words: headache of recent onset; neuroimaging; tumor; cranial CT scan; cranial MRI

J. Duarte, Division of Neurology, General Hospital of Segovia, Ctra de Avila s/n. 40001, Segovia, Spain

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Headache is one of the most common symptoms in neurological practice. Every year 1,600 patients per 100,000 population consult their family doctors because of headache (1). Although most patients with headache do not harbour an intracranial lesion, this concern leads many physicians to perform either CT or MRI to rule out an organic cause of headache such as a tumor, vascular malformation, subdural hematoma, or other structural lesions.

Physicians should consider obtaining imaging studies if they suspect an intracranial lesion (2). However, is isolated headache in and of itself enough to raise clinical suspicion? With proliferation of imaging facilities, increasing sensitivity to medical-legal risks, and increasing patient demand for "high-tech" evaluation, CT and MRI are extensively used to evaluate headache. However, up till now, there is little objective data to support this policy. A recent report from the Quality Standards Subcommittee of the American Academy of Neurology concluded that at present there is insufficient evidence to define the role of CT and MRI in the evaluation of patients with non-migranous headaches (3).

The presence of abnormal neurological findings might be a clear indication for requesting neuroimaging procedures in most cases. Other situations that raise concern of a serious underlying organic cause for headaches are those of recent onset, especially in middle-aged or elderly patients (4). However, to our knowledge, there is no such prospective study in this group of patients.

In order to analyze the outcome of headache of recent onset in the adult and the diagnostic role of neuroimaging, specially in patients with normal neurological examination, we performed the following study.

Patients and methods

Our study was performed in Segovia (Spain), located 100 km north to Madrid. This province is a rural area with a population of 147,188 (1991 census). Ninety-eight percent of the population are covered by the National Health Service. Specialized neurological referal is provided by a General Hospital located in Segovia capital where our Neurological Unit is the only one providing such assistance in the province. The Neurology Unit attends only patients aged 15 and over whereas children with neurological problems are attended by the Pediatric Unit.

During 1994 (12-month period), one hundred consecutive patients with headache of recent onset as their main symptom refered to the Neurology Unit were included in the study. Headache of recent onset was defined as that which had

appeared for the first time ever in the last 12 months. Patients with a past history of headache were excluded except, if a change of character of the previous headache had been the reason for referral. Patients with facial pain (including trigeminal neuralgia), headache associated to seizures, and those with headache after lumbar puncture were also excluded. In the initial stage of the study, regular meetings with General Practitioners were held in order to encourage referral of patients with headaches of recent onset.

All patients were examined by one of us (JD). Every patient was investigated by craneal computed tomography (CT) with and without intravenous contrast if possible. Erythrocyte sedimentation rate was determined in all patients over 60. Lumbar puncture, blood tests, craneal magnetic resonance imaging (MRI) of the head, magnetic resonance angiography (MRA) and temporal artery biopsy were performed in selected clinically indicated patients. Classification of type of headache and final diagnosis was performed according to the operational criteria of the International Headache Society (5). Patients with features of both migraine and tension-type headache were considered as mixed type. Headaches were divided into: organic headache (OH) and non organic headache (NOH). Organic headache comprised headache associated with vascular disorders and those associated with nonvascular intracranial lesions. All other headaches were classified as NOH (5).

The intensity of headache was rated as mild or severe. Headache was considered mild if it was relieved by simple analgesics, like aspirin or acetaminophen, and did not interfere with the patient's daily activities. On the other hand, headache was considered severe if they were not relieved by simple analgesics, and clearly interfered with the patient's daily activities.

Comparison between OH and NOH was performed using SPSS 5.0 for Windows (6). Continuous variables such as age and duration were compared using Student's unpaired *t* test. Discrete variables were compared by means of the odds ratio. Confidence intervals were calculated by standard methods (7). All probabilities are two-tailed.

Results

One hundred consecutive patients (63 women and 37 men) were included in the study. Mean age was 46.2 years (range: 17–82 years). In 90% of our patients, headache had appeared for the first time ever and in 10% they had a past history of headaches but had recently, within the last 12 months, noted a clear change in character. Neurological examination was considered normal in 80 patients (80%). Final diagnosis in the 100 patients and in those with normal neurological examination are summarized in Table 1. One patient with drug-induced headache was related to indomethacin. One patient with headache related to dialysis was included in the group of headache secondary to metabolic abnormalities. An HIV-infected patient with recent-onset headache was diagnosed of toxoplasmic intracranial abscess although not biopsied. Of the three patients with intracranial hematomas, two were spontaneous parenchymal hemorrhages and one had a subacute subdural hematoma. Two patients suffered an ischemic carotid stroke several days after the onset of global non-specific headache, unassociated with other neurological symptoms, and were included in the group of other vascular disorders. Carotid dissection was ruled out in both patients by means of MRI and MRA. Lymphocytic meningitis was found in five patients in which headache and malaise were prominent as the early initial symptom, without clinical signs of meningeal irritation. The CSF of these 5 patients demonstrated lymphocytosis with normal glucose and protein. Bacterial and fungal infections were satisfactorily excluded by culture, and the possibility of carcinomatous meningitis was considered in every case but no malignant cells were found, and a primary tumor was clinically excluded. Virus were not isolated, and serological test showed normal titres to a number of common viruses.

Intracranial neoplasms were diagnosed in 21 patients. This represents just over 50%, of the total diagnosed incidence of brain tumours at our Hospital in Segovia during the period of study which was 40 tumours. Neurological examination was considered normal in 13 of them. Their characteristics are summarized in Table 2. Four of the 21 intracranial neoplasms were metastases, all of which had a previously known primary tumor. Of the 17 primary brain tumors, 9 were glioblastomas, 4 meningiomas, 2 acoustic neurinomas, 1 pituitary adenoma and 1 low-grade astrocytoma. Considering only those patients with normal neurological examination, there were 3 metastases, 3 meningiomas, 4 malignant gliomas, 2 acoustic neurinomas (although hearing loss was present in all) and 1 low-grade astrocytoma. The duration of headache prior to be seen and examined by us ranged between 1 to 7 months in this group of patients.

Headaches were considered organic in 39 (39%) of the 100 patients, and in 21 (26%) of the 80 with normal neurological examination. A Cranial CT scan was performed in all patients. Positive results of CT examination in the series were: intracranial

Table 1. Diagnosis of headaches of recent onset in adults

Headache diagnosis	All patients (n=100)	Patients with normal neurological examination (n=80)
Tension type	26 (26%)	25 (31.25%)
Migraine	22 (22%)	21 (26.25%)
Intracranial neoplasm	21 (21%)	13 (16.25%)
Subacute meningitis	5 (5%)	0 (0%)
Mixed type	4 (4%)	4 (5%)
Intracranial hematoma	3 (3%)	1 (1.25%)
Sinusitis	3 (3%)	3 (3.75%)
Other vascular disorders	2 (2%)	2 (2%)
Hydrocephalus	2 (2%)	2 (2.5%)
Cluster headache	1 (1%)	1 (1.25%)
Subarachnoid hemorrhage	1 (1%)	0 (0%)
Temporal arteritis	1 (1%)	1 (1.25%)
Pseudotumor cerebri	1 (1%)	0 (0%)
Venous thrombosis	1 (1%)	0 (0%)
Arachnoid cyst	1 (1%)	1 (1.25%)
Intracranial abscess	1 (1%)	1 (1.25%)
Post-traumatic	1 (1%)	1 (1.25%)
Metabolic abnormalities	1 (1%)	1 (1.25%)
Drug-induced	1 (1%)	1 (1.25%)
Other diagnosis	2 (2%)	2 (2.5%)

Table 2. Intracranial neoplasms associated with headache of recent onset

Tumor	Sex/age (yrs)	Neurological examination	Duration (months)
Glioblastoma	F/72	Normal	3
Glioblastoma	M/69	Normal	2
Glioblastoma	F/66	Abnormal	5
Glioblastoma	M/78	Normal	2
Anaplastic astrocytoma	M/64	Abnormal	3
Anaplastic astrocytoma	M/48	Abnormal	5
Anaplastic astrocytoma	F/32	Abnormal	5
Anaplastic astrocytoma	M/49	Normal	3
Low-grade astrocytoma	F/17	Normal	4
Anaplastic oligodendroglioma	F/39	Abnormal	6
Metastases	F/51	Abnormal	1
Metastases	M/49	Normal	2
Metastases	F/49	Normal	2
Metastases	F/54	Normal	1
Meningioma	F/35	Normal	1
Meningioma	F/45	Abnormal	6
Meningioma	F/44	Normal	4
Meningioma	F/70	Normal	7
Acoustic neurinoma	F/58	Normal*	3
Acoustic neurinoma	F/73	Normal*	4
Pituitary adenoma	M/63	Abnormal	8

M=male, F=female.
* Unilateral hearing loss was present, but no other signs were elicited.

tumors (13), hydrocephalus (2), arachnoid cyst (1), toxoplasmic abscess (1) and parenchymal hemorrhage (1). The yield of CT in patients with headache of recent onset and normal neurological examination was 22.5% (95% IC: 14%–33%). The diagnosis in the three patients with OH, normal cranial CT scan and no abnormal neurological signs were the following: temporal arteritis (1), and two patients with headache preceding an ischemic stroke. Both of these patients were over 50 years old and had known vascular risk factors.

We compared the group of patients with OH and NOH, considering only those with normal neurological examination. Headache had a shorter history in the OH group (mean duration=2.9 months) than in the NOH group (mean duration=8.2 months), $p<0.001$. Of patients with tumors and normal neurological examination, only one, who had a meningioma, suffered headaches for more than 6 months duration prior to diagnoses. There was an age difference at diagnoses between patients with OH and NOH, 52.6 years versus 44.2 years, although it did not reach statistical significance ($p=0.07$). OH patients had their headache aggravated by Valsalva manoeuvre more often than those with NOH (Table 3). Other characteristics did not differ significantly between both groups, although they were more frequent in OH (intensity, accompanying nausea or vomiting, and awakening from sleep). The absence of any of these four characteristics (severe intensity, nausea or vomiting, awakening from sleep, and worse with Valsalva) did not rule out the presence of intracranial tumors. Four such patients in our series had a tumor with a normal neurological examination. Their final diagnoses was: meningioma, acoustic neurinoma, glioblastoma and low-grade astrocytoma.

Table 3. Characteristics of organic headache and non-organic headache in adult patients with recent-onset headache and normal neurological examination

	Organic headache	Non-organic headache	Odds ratio (95% CI)
Number of patients	21	59	
Intensity (mild)	13 (62%)	36 (61%)	0.96 (0.35–2.7)
Nausea or vomiting	8 (38%)	16 (27%)	1.65 (0.58–4.7)
Aggravated by Valsalva	8 (38%)	9 (15%)	3.4 (1.1–10.6)
Awakening from sleep	6 (29%)	9 (15%)	2.2 (0.68–2.3)

Discussion

Prospective studies on headaches of recent-onset in adults are limited. Headaches of recent onset are not necessarily a benign condition. Tumors were diagnosed in 21% of patients, and overall headache was considered organic in 39% in our series. In those 80 patients with normal neurological examination, an intracranial tumor was diagnosed in 16%, and in 26% of their the headaches were considered organic.

Intracranial tumors represented an important cause of recent-onset headaches in our study. Oth-

ers have noted that headaches may be the first and isolated symptom in 8% of patients with brain tumors (8). However, in their series symptoms were collected "retrospectively", after the brain tumor had been diagnosed, and headache in the early course of tumors may have been underreported. It has been suggested that with recent-onset headache, a CT or MRI should be obtained if the headache is severe or occurs with nausea, vomiting, or abnormal signs (9). However, headache in four patients with intracranial tumors in our study was mild, no nausea or vomiting occurred, and was not aggravated by Valsalva nor did it awake them during the night, and were unassociated with abnormal neurological signs.

In our study isolated headache preceded an ischemic stroke in the carotid territory in two patients. Neither of them suffered from previous migraine, and there was no evidence of carotid dissection documented by MRI and MRA. It is known that headaches occur even in patients with transient ischemic attacks, preceding or accompanying neurologic symptoms (10). In elderly patients with accepted vascular risk factors, the appearance of recent-onset headache should alert the physician of the possibility of impending stroke.

The rate of intracranial pathology in patients with non specific long lasting headaches with normal neurological examination is low (11). However, headaches of recent onset in the adult with no previous history represent a high-risk group. The yield of CT in patients with headache of recent onset and normal neurological examination was 22.5% in our study. Symptoms such as associated nausea or vomiting, worsening with Valsalva and awakening from sleep were more frequent in patients with OH. Four patients with intracranial tumors had no symptoms suggestive of an underlying lesion except for the presence of recent-onset headache as their main symptom.

We suggest that neuroimaging studies should be performed in all adult patients with non vascular headache of recent-onset, and no previous history, irrespective of the characteristics of the headache or findings in the neurological examination, specifically if the history of headache is less than 6 months duration. In elderly patients, the possibility of temporal arteritis should always be considered.

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