Behavioral Response to Headache: A Comparison Between Migraine and Tension-type Headache

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Objective.—To compare patients with migraine and tension-type headache in their behavior during the attacks and the maneuvers used to relieve the pain.

Background.—Patients with headache often perform nonpharmacological measures to relieve the pain, but it is not known if these behaviors vary with the diagnosis, clinical features, and pathogenesis.

Methods.—One hundred consecutive patients with either migraine (n = 72) or tension-type headache (n = 28) were questioned (including the use of a checklist) concerning their usual behavior during the attacks and nonpharmacological maneuvers performed to relieve the pain. The results of the two types of headache were compared.

Results.—Patients with migraine tended to perform more maneuvers than individuals with tension-type headache (mean, 6.2 versus 3). These maneuvers included pressing and applying cold stimuli to the painful site, trying to sleep, changing posture, sitting or reclining in bed (using more pillows than usual to lay down), isolating themselves, using symptomatic medication, inducing vomiting, changing diet, and becoming immobile during the attacks. The only measure predominantly reported by patients with tension-type headache was scalp massage. However, the benefit derived from these measures was not significantly different between the two groups (except for a significantly better response to isolation, local pressure, local cold stimulation, and symptomatic medication in migraineurs).

Conclusions.—The behavior of patients during headache attacks varies with the diagnosis. Measures that do not always result in pain relief are performed to prevent its worsening or to improve associated symptoms. These behavioral differences may be due to the different pathogenesis of the attacks or to different styles of dealing with the pain. They can also aid the differential diagnosis between headaches in doubtful cases.

Key words: nonpharmacological treatment, behavior during headache, headache diagnosis

Abbreviation: TTH tension-type headache

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"I drink coffee with lemon juice, and it seems to stop the attack . . ." "I put a belt around my head to press it." " I use nasal drops . . ." These are some examples of tricks used by patients to cope with pain.

Many individuals with headache know many nonpharmacological measures and stratagems to help relieve the pain, and they share them with their family and acquaintances. However, it is not known if behavior during the attack is headache type-specific (as it seems to be in the case of cluster headache)[1] or a general response to head pain. In a previous study involving 55 subjects with migraine,[2] it was found that, on average, subjects performed six different maneuvers during attacks to improve the headache. The present work continues that previous study and compares migraine and tension-type headache (TTH), using the same methodology. The purpose was to determine if the maneuvers used (and the response to them) differed according to diagnosis.

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METHODS

The study was conducted prospectively by two examiners in headache outpatient clinics. Consecutive patients, regardless of visit (first or follow-up) were included if they met the following criteria: (1) chronic headache (headache attacks for more than 6 months), (2) diagnosis of either migraine or TTH (episodic or chronic), and (3) diagnosis fulfilling the International Headache Society (IHS)[3] criteria.

Patients with more than one type of headache (and any combination of migraine and TTH) and those with analgesic or ergotamine abuse were excluded, because they would have introduced confounding variables.

The results of the first 55 patients with migraine have been reported previously.[2] The present study included additional patients with migraine and a group of patients with TTH, and used the same methodology. All patients were interviewed during their consultation according to a standard questionnaire and checklist that included biographic information, clinical data, present headache status, and questions regarding patient behavior during attacks. Biographic information included age, sex, occupation, and educational level. Educational level was categorized as less than 4 years of school, 4 to 9 years of school, and more than 9 years of school. Clinical data included headache diagnosis (migraine or TTH), age at onset of attacks, number of years of illness, and current prophylactic treatment (yes or no). Present headache status included attack frequency (responses were categorized as less than one attack per month [group 1], one to three attacks per month [group 2], and four or more attacks per month [group 3]) and attack duration (less than 24 hours [group 1], 24 to 48 hours [group 2], and more than 48 hours [group 3]). Pain described as unremitting or nearly constant in chronic TTH was included in group 3. Average attack intensity was categorized as mild, not interfering with daily activities; moderate, daily activities are performed with effort; or severe, attacks prohibiting daily activities. An overall headache severity index was obtained by the sum of attack frequency, average attack intensity, and attack duration, and ranged from 3 (minimal impact) to 9 (maximal impact of attack).

Patients were also asked questions about their behavior during headache attacks and tricks used to relieve the pain. The first question concerned the number of different maneuvers and attitudes reported spontaneously—"Tell me everything you do to relieve your headache, when you are in pain."

After answering the question described above, the patients were questioned according to a checklist. Behaviors were classified as the following: (1) pharmacological measures, (2) food (fasting, reducing food intake, selecting specific foods, etc), (3) inducing vomiting, (4) postural measures (lying down and the number of pillows used during the attacks, was specifically asked), (5) pressing the site of pain, (6) local heat or cold, (7) sleep, (8) sensory isolation (from light, sound, people), (9) immobilization or particular movements, and (10) others. After completing the questionnaire, the total number of different maneuvers performed was counted (independently of whether they were effective in relieving the pain or not).

The patient was then asked about the efficacy of each maneuver. Sometimes maneuvers were performed for reasons other than pain relief (such as vomiting spontaneously or isolation as a result of going to bed). Although these were not classified as pain-relieving methods, the patient was still asked about their effects upon pain. Efficacy on pain was rated as positive (that specific maneuver always or often reduced pain) or negative (rarely or never reduced pain).

When answers were impossible to code (uncertain or ambiguous answers, the patient did not know or was unsure of the answer), it was coded as "missing" and not used for statistical analysis. This also applied to difficulties obtaining accurate data regarding the age of onset of headache, present attack frequency, or other features of the attacks.

Statistical analysis was performed using both parametric and nonparametric tests. Chi-square was used to analyze the frequency distribution of behaviors or their efficacy, according to the diagnosis. Student *t* test and analysis of variance (ANOVA) was used to compare averages between diagnosis (age, duration of illness in years, number of maneuvers performed). Pearson correlation and linear regression was performed to examine the interaction between variables, using Statistix, 1992 version.[4]

RESULTS

Clinical and Biographic Data.—There were 100 patients (85 women, 15 men). Mean age was 37.4 ± 11.5 years and ranged from 15 to 73 years. The mean age at which attacks began was 22.5 ± 11.6 years, and the mean duration of illness was 14.9 years. At the time of the inquiry, 36.4% of the individuals were taking prophylactic medication and 63.6% were not. A diagnosis of migraine was made in 72 patients (migraine with aura in 10, without aura in 50, and both with and without aura in 12); a diagnosis of TTH was made in 28 patients (episodic type in 5 and chronic type in 23).

Clinical and biographic data according to the diagnosis are shown in Table 1. There was a predominance of women in both groups. On average, individuals with TTH were older than those with migraine (41.5 versus 35.8 years), but the difference was not significant. Migraineurs began their attacks at a younger age (19.7 versus 30.6 years, Student $t = -3.5$, $P = .001$) and had, on average, a more long-standing illness (16.5 years versus 10.5, Student $t = 2.5$, $P = .012$) than patients with TTH. Migraineurs also had a higher educational level, having completed school more often than patients with TTH ($\chi^2 = 15.6$, $P < .00$). There were no differences in the proportion of patients taking prophylactic medication ($\chi^2 = 0.30$, $P =$ NS).

There were differences between the two diagnostic groups in the frequency, duration, and severity of the attacks, and the differences were closely linked to the diagnosis itself. Migraine attacks were less frequent ($\chi^2 = 56.6$, $P < .00$) and shorter in duration (patients with chronic TTH often reported continuous

Table 1.—Patient Characteristics

Feature	Migraine Group (n = 72)	Tension-type Headache Group (n = 28)	Statistical Test*	*P*
Ratio of women to men	60:12	25:3	$\chi^2 = 0.56$	NS
Age, mean (SD), y	35.8 (9.5)	41.5 (15.2)	$t = -1.83$	NS
Age at onset, mean (SD), y	19.7 (9.1)	30.6 (14.3)	$t = -3.51$	.001
Years of illness, mean	16.5	10.5	$t = 2.55$	.012
Years of schooling			$\chi^2 = 15.6$	<.00
<4	3	3		
4-9	21	18		
≥10	44	5		
Attack frequency/mo			$\chi^2 = 56.6$	.00
<1	14	1		
1-3	48	1		
>3	9	26		
Duration, h			$\chi^2 = 9.02$	.011
<24	25	3		
24-48	23	4		
>48	19	13		
Intensity			$\chi^2 = 62.2$	.00
Mild	1	17		
Moderate	16	11		
Severe	54	0		
No. of maneuvers reported spontaneously	2.80	1.28	$t = 6.21$	.00
Total No. of maneuvres reported	6.21	3.00	$t = 11.47$	.00

*χ^2 indicates chi-square test; *t*, Student *t* test.

around-the-clock pain) ($\chi^2 = 9.02$, $P = 0.01$), but were more severe than TTH ($\chi^2 = 62.2$, $P < .00$).

Maneuvers Used for the Relief of Pain.—*Number of Maneuvers Reported Spontaneously and After Questioning.*—The overall number of different maneuvers performed to relieve the pain was 2.4 (range, 0 to 6) when reported spontaneously and 5.3 (range, 1 to 10) after the checklist (total number of maneuvers). Patients with migraine reported significantly more tricks and behaviors, both spontaneously (average number of maneuvers in migraineurs was 2.8 versus 1.3 in TTH; $t = 6.2$, $P < .00$) and after answering the questionnaire (6 versus 3, $t = 11.5$, $P < .00$), than patients with TTH (Table 1). The checklist helped both groups of patients to identify attitudes and tricks they did not mention spontaneously. The total number of maneuvers reported was similar within the same diagnostic subgroups: 6.3 in migraine without aura, 5.9 in migraine with aura, 5.9 in migraine with and without aura, 3.0 in chronic TTH, and 3.0 in episodic TTH.

Because there were demographic differences (age at onset, years of illness, schooling) in addition to the clinical differences between the two groups, we investigated the possibility of obtaining a different number of maneuvers as a result of a bias associated with the diagnosis rather than the diagnosis itself. The total number of maneuvers reported (ie, after the checklist) was positively correlated both with a higher education level (F ANOVA = 7.01, $P = .002$), more severe attacks (F ANOVA = 24.5, $P < .00$), and less frequent attacks (F ANOVA = 15.7, $P < .00$) which are typical of subjects with migraine, compared to TTH. The total number of maneuvers reported was also positively associated with the overall duration of illness (Pearson correlation = 0.28, $P = .006$) (ie, more years of illness, more maneuvers) and negatively correlated with the age at headache onset (Pearson correlation = −0.35, $P = .0006$) (ie, younger age at onset, more maneuvers were performed). Attack duration (F ANOVA = 2.9, $P = .06$ NS), current prophylactic medication (Student $t = 0.5$, $P = .5$ NS), and overall headache severity index (Pearson correlation = 0.04, $P = .7$ NS), were not associated with the number of maneuvers used.

In order to differentiate between these interrelated factors, a linear regression analysis was undertaken where the total number of maneuvers reported was the independent variable, and diagnosis (TTH or migraine), educational level (in 3 classes), current frequency of attacks (3 groups), severity of the attacks (3 groups), duration of illness, and age at headache onset were the dependent variables. Only diagnosis (Student $t = -9.75$, $P < .00$, confident interval of 95%) was retained as a variable to explain the total number of maneuvers. This demonstrated that attack frequency and severity only contribute as part of the diagnosis. This result was confirmed by an ordered logistic regression analysis.

Specific Tricks and Behaviors.—The most common behaviors reported in the entire series of 100 patients are summarized in Table 2. The most common behaviors included drug intake (91.8%, 90 of 98 patients); isolation (from light, sound, people) (90.8%, 79 of 87 patients); changing posture (87.8%, 86 of 98 patients); trying to keep still (77.6%, 59 of 76 patients); alimentary changes (70.4% overall, 69 of 98 patients; avoiding food [53.1%, 52 of 98 patients] or eating selected foods [17.3%, 17 of 98 patients]); pressing the site of pain (57.1%, 56 of 98 patients); trying to sleep (50%, 49 of 98 patients); using local cold (39.8%, 39 of 98 patients); other measures (27.6%, 27 of 98 patients); and inducing vomiting (15%, 15 of 100 patients). Measures described under the heading of "others" were variable, ranging from hyperventilation (deep breathing or "controlling the breath"), trying to be distracted from pain (by talking with a friend, ironing clothes, driving, going out for a walk), exercising outdoors, massaging the scalp, use of nasal decongestants, forehead massage with mint gel, and emotional comfort by resting the head against the mother's lap. Use of local heat was not reported. The most common dietary modifications were taking a light meal (fat-free diet) or a special beverage such as coffee with lemon juice (n = 3), coffee, tea, or salted water with sugar (n = 2 each), and Coca Cola or lemon juice (n = 1 each). Changes in posture included lying down but not specifying the position (n = 46), lying with more pillows than usual (n = 13), sitting (n = 8), lying on the side of pain to press on it (n = 7), lying flat without pillows (n = 6), reclining in bed (n = 3), and lying on the side opposite the pain (n = 1).

The efficacy of these behaviors in relieving the pain or stopping the attack was 92.5% (49 of 52 pa-

Table 2.—Maneuvers Used

Behavior	Migraine Group	Tension-type Headache Group	χ^2	*P*	*df*
Takes medication	100 (70/70)	71.4 (20/28)	21.8	<.00	1
Change eating habits	85.7 (60/70)	32.1 (9/28)	28.1	<.00	2
Avoids food	62.9 (44/70)	28.6 (8/28)			
Eats special food	22.9 (16/70)	3.6 (1/28)			
Vomits	80.5 (58/72)	0			
Spontaneous	59.7 (43/72)	0			
Induced	20.8 (15/72)	0			
Sleeps	60 (42/70)	33 (7/28)	9.8	.002	1
Local cold pads	50 (35/70)	14.2 (4/28)	10.7	.001	1
Local pressure	74.2 (52/70)	14.2 (4/28)	29.4	<.00	1
Changes position	97.1 (68/70)	64.2 (18/28)	20.1	<.00	1
Lies down	88.8 (64/72)	78.5 (22/28)	1.8	NS	1
Uses more pillows than usual	33.8 (23/68)	7.6 (1/14)	3.9	.05	1
Does not move	88.1 (52/59)	41.4 (7/17)	16.8	<.00	1
Isolation	95.3 (62/65)	77.2 (17/22)	6.5	.01	1
Other	28.5 (20/70)	25 (7/28)	0.1	NS	1
Massage	3.8 (2/52)	38.4 (5/13)	12.9	<.00	1

Values are percentages (number of patients) unless otherwise indicated.

tients) for pressing the site of pain; 90.8% (78 of 87 patients) for taking medication, 84.2% (32 of 38 patients) for local cold, 80.2% (65 of 81 patients) for isolation; 73.1% (19 of 26 patients) for other measures, including massaging the pain site (improvement in 6 of 7 patients); 64.4% (38 of 59 patients) for immobility; 62.1% (36 of 58 patients) for vomiting (either spontaneous or provoked); 60% (33 of 55 patients) for sleep; 45.7% (37 of 81 patients) for adopting a special posture; and 14.5% (9 of 62 patients) for alimentary changes (either not eating or having a special diet).

Significant differences between the two groups were demonstrated for almost all of the specific maneuvers used (Table 2). Migraineurs, when compared to patients with TTH, took medication for the attack more often ($\chi^2 = 21.8$, $P < .00$), induced vomiting (15

Table 3.—Percentage (No.) of Patients Reporting Relief

Behavior	Migraine Group	Tension-type Headache Group	χ^2	*P*	*df*
Takes medication	94 (63/67)	80 (16/20)	3.63	.05	1
Changes eating habits	13.2 (7/53)	22.2 (2/9)	0.5	NS	1
Vomits	62.1 (36/58)	0			
Spontaneous	58.1 (25/43)	0			
Induced	73.3 (11/15)	0			
Sleeps	58.6 (27/46)	66.6 (6/9)	0.2	NS	1
Local cold pads	88.2 (30/34)	50 (2/4)	3.9	.05	1
Local pressure	97 (48/49)	25 (1/4)	28.2	<.00	1
Change in position	41.5 (27/65)	62.5 (10/16)	2.3	NS	1
Lies down	6 (4/66)	11.7 (2/17)	0.7	NS	1
Does not move	65.3 (34/52)	57.1 (4/7)	0.2	NS	1
Isolation	87.3 (55/63)	55.5 (10/18)	8.9	.002	1
Other	78.9 (15/19)	57.1 (4/7)	1.2	NS	1
Massage	100 (2/2)	80 (4/5)	0.5	NS	1

patients with migraine and none of the patients with TTH), changed eating habits ($\chi^2 = 28.1$, $P < .00$), modified posture ($\chi^2 = 20.1$, $P < .00$), remained immobile ($\chi^2 = 16.8$, $P < .00$), pressed the pain site ($\chi^2 = 29.4$, $P < .00$), applied local cold (cotton-wool with cold water or ice, cloths with alcohol, cold potatoes) ($\chi^2 = 10.7$, $P < .001$), tried to sleep ($\chi^2 = 9.8$, $P = .001$), or avoided light, noise, or people ($\chi^2 = 6.5$, $P = .01$).

Patients were specifically asked if they would lie down during the attacks whenever possible; there were no differences between the two groups ($\chi^2 = 1.8$, $P = .18$, NS, $df = 1$). However, 33.8% of migraineurs reclined in bed using more pillows than usual, while patients with TTH (7.6%) rarely did this.

Migraineurs reported more relief than patients with TTH in four maneuvers (Table 3). Migraineurs reported a better response to symptomatic medication ($\chi^2 = 3.63$, $P = .05$), isolation ($\chi^2 = 8.9$, $P = .002$), local pressure ($\chi^2 = 28.2$, $P < .00$), and local cold pads ($\chi^2 = 3.9$, $P = .05$).

When we analyzed patients' replies, we found that some maneuvers were not performed for pain relief. For example, migraineurs often reported remaining still during the attacks not only because not moving would relieve pain, but mostly because movement aggravated pain.

When specifically asked why they took to a horizontal position during the attacks, 65 migraineurs (those who answered yes, they would lie down during the attacks whenever possible) reported that lying down per se did not relieve pain, but being away from noise and light (50 of 65 patients), not moving (35 of 53 patients), trying to sleep (25 of 61 patients), or pressing on the site of pain provided pain relief. Only 5 of 65 patients reported feeling better just by assuming a horizontal position. Patients were also asked if they used the usual number of pillows when lying down. While most patients with TTH (13 of 14 patients) did not change the number of pillows, migraineurs reported that they used more pillows than usual (23 of 68 patients) ($\chi^2 = 3.9$, $P = .05$) (Table 2). Some mentioned that they had to be propped up because lying flat increased head pain.

COMMENTS

Patient behavior during headache attacks is easy to elicit, can be informative and useful for the diagnosis, and may help understand the pathogenesis of pain.

Nonpharmacological measures are often tried by patients with headache, with or without concurrent pharmacological treatment, to relieve or reduce pain. However, there are few studies dedicated to this topic,[1,5-7] and only two compare different types of headache,[8,9] albeit in a very restricted number of measures.

The group studied spontaneously reported a mean of 2.4 maneuvers; the number of maneuvers increased to 5.3 after answering the checklist questionnaire. This suggests that studies relying only on spontaneous reporting may miss several types of behavior.[10]

The group of patients studied had a predominance of migraineurs because they are referred to our neurology department more often than patients with TTH. Individuals with TTH (mostly chronic TTH) seen in our outpatient clinic often overuse analgesics or describe occasional episodes of more intense pain (sometimes associated with nausea, photophobia, and phonophobia), suggesting more than one type of headache. We decided to exclude these patients from the study, because we could not be sure which type of headache they would be describing.

There were significant differences in attack behavior according to the diagnosis. Individuals with migraine performed many more maneuvers than those with tension headache. That difference was associated with the severity of pain and the educational status of the patients (higher in migraineurs than in TTH) in this cohort. Higher education may facilitate answering the inquiry (patients may structure their responses more easily), promotes access to information, and could make subjects more actively research pain relief measures. However, in a previous study[2] confined to migraineurs, we found the educational level was unrelated to the number of maneuvers performed. Other factors that could explain the behavioral differences between groups were the different severity or frequency of attacks. In another study,[9] differences in behavioral responses between patients with migraine and those with TTH disappeared if attack severity was taken into account. In the present study, individuals with migraine had more intense attacks and a more long-standing headache history (their attacks began earlier in life) than patients with TTH, but patients with TTH had much more frequent attacks. That could make them look for specific methods for

pain relief, but they did not. On linear regression analysis, it was demonstrated that diagnosis was the main factor responsible for the differences in the number of maneuvers performed, not severity. All other variables were linked to the diagnosis and were not independent.

Some specific maneuvers were predominantly used by patients with migraine. Some of these are closely associated with the condition itself, as defined by the IHS criteria,[3] such as vomiting or anorexia (producing a change of the usual diet); others are quite independent of the diagnostic criteria (such as the relief of pain by posture, local cold, or local pressure) but are still predominantly performed by migraineurs. Only head massage was used more by patients with TTH (38.4% versus 3.8% of patients with migraine). These differences are explicable by the different pathogenesis of migraine and TTH; migraineurs tend to perform vasoconstrictive maneuvers (local cold, nasal vasoconstrictive drops, pressure on the superficial temporal artery in the temple, hyperventilation), which may neutralize the extracranial vascular component of migraine. Conversely, patients with TTH prefer to massage the scalp, possibly trying to relax tense extracranial muscles. However, the limited number of maneuvers attempted by patients with TTH is noteworthy. Many tricks that relieve muscle tension were not attempted, such as mental relaxation, local application of hot pads (often useful to reduce skeletal muscle pain), muscle relaxants or tranquilizers, hot baths, sleep, and distracting maneuvers. This supports the hypothesis that TTH pain has a predominant central origin (qualitative changes of the central processing of sensory information)[11] with secondary peripheral factors.

However, there are alternative explanations. When the efficacy of the maneuvers was compared, the two groups of patients differed only in a few of them. Local cold, local pressure, and isolation were significantly more efficient in relieving pain in migraine compared to TTH, thus justifying differences in behavior. All the other behaviors reported, although still predominantly performed by migraineurs, were not more helpful for them than for individuals with TTH. Thus, the behavioral differences are probably due to other factors.

1. Migraineurs may perform nonpharmacological measures in order to avoid worsening of pain rather than to improve it. For example, immobility or reclining in bed (instead of lying flat) seems to prevent worsening of pain.
2. Maneuvers are performed to improve associated symptoms of migraine attacks and not pain.
3. Migraineurs may have more initiative or a different style to deal with pain, compared to patients with TTH, and try everything to improve the pain, even if the benefit is minimal or rarely achieved. Perhaps chronic TTH-afflicted patients tend to become more easily resigned to pain, which would not be surprising given the fact that they have lower pain thresholds.[12] Patients with chronic TTH are frequently depressed or anxious, and tend to have atypical personality profiles, both in clinical and population-based studies.[13-15] Depression may make them less likely to fight pain or make them have a different cognitive/emotional response to suffering, with less initiative or excessive resignation and passivity to it. It has also been shown that passive or avoidance coping strategies and worse appraisal of coping are associated with poorer adjustment to headache.[9,16-18] A depression scale was not used in this study, but it would be important to relate patients' behavior with other emotional and cognitive differences.

We concluded that the reported differences in attitudes and behaviors between migraine and TTH can be useful in differentiating these two headache types when the diagnosis is difficult. Factors that precipitate and aggravate headache attacks also differ in migraine and TTH.[19] International Headache Society criteria alone do not allow us to classify all patients.[20] Behavior during the attacks in cluster headache[1] or trigeminal neuralgia can be very specific. A behavioral checklist could also be helpful in children who have difficulty describing details about their headache, but may still lead us to look for some of these relieving maneuvers.

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