Late-life Migraine Accompaniments As A Cause Of Unexplained Transient Ischemic Attacks

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SUMMARY: *Occasionally patients in the stroke age-bracket over 40 have unexplained transient cerebral ischemic attacks in association with normal cerebral angiograms. From this group 120 have been collected in whom the transient episodes resembled the neurological accompaniments of migraine. According to symptoms, the patients were categorized as follows: Visual accompaniments (patients with only ordinary scintillating scotoma were excluded), 25; visual and paresthesias, 18; visual and speech disturbance, 7; visual, and brain stem symptoms, 14; visual, paresthesias, and speech disturbance, 7; visual, paresthesias, speech disturbance and paresis, 25; recurrence of old stroke deficit, 9; miscellaneous, 8. In establishing the diagnosis angiography is advisable in all but classical cases. Typical of migrainous accompaniments are the buildup and migration of visual scintillations, the march of paresthesiae, and progression from one accompaniment to another, characteristics that do not occur in thrombosis and embolism. Diagnosis is facilitated when 2 or more similar episodes have occurred or migraine-like scintillations are present. Headache occurred in 50% of cases. Other cerebrovascular processes, coagulation disorders, and cerebral seizures must be ruled out.*

RÉSUMÉ: *Il arrive parfois que des patients agés de plus de 40 ans, et dans l'âge des accidents cérébro-vasculaires, aient des épisodes d'ischémie cérébrale transitoire en association avec des angiogrammes cérébraux normaux. De ce groupe nous avons étudié 120 patients dont les épisodes transitoires ressemblaient à la migraine accompagnée. Les patients furent classifiés, selon les symptômes: accompagnements visuels 25 (sauf les patients avec scotomes scintillants ordinaires), visuels et paresthésies: 18; visuels et dysarthrie 7; visuels et symptômes du tronc cérébral 14; visuels, paresthésies et troubles de la parole 7; visuels, paresthésies, troubles de la parole et parésie 25; retour d'un déficit parétique antérieur 9; variés 8. Donc pour établir un diagnostic, l'angiographie est recommandée chez tous les cas non-classiques. Les symptômes suivants caractérisent les accompagnements migraineux: croissance et migration des scintillations visuelles, marche des paresthésies et progression d'un accompagnement à un autre. Ces caractéristiques ne se voient pas dans les thromboses ou les embolies. Le diagnostic est facilité lorsque 2 ou plusieurs épisodes semblables ont eu lieu, ou des scintillations migraineuses sont présents. Des céphalées surviennent chez 50% des cas. Évidemment d'autres processus cérébrovasculaires, troubles de coagulation ou crises épileptiques doivent être éliminés.*

Commonly patients over the age of 40 presenting with what appear to be transient cerebral ischemic attacks (TIAs) are found to have normal angiograms. When embolism, thrombocythemia, polycythemia, postural hypotension, cerebral seizures, etc. have been ruled out as the cause, the nature of the attacks in most of these stroke-age patients remains unexplained. With increasing experience, the view has gradually crystallized that in many the TIAs resemble the neurological accompaniments of migraine although there may be no associated headache and no history of headache or previous migraine accompaniments. When the spells are wholly typical of migrainous accompaniments, particularly if a scintillating scotoma is present, interpretation is relatively easy even with a negative past history, whereas extension of the concept to cases without all the characteristics has had to be tentative. Recognition of these cases is important not only in the interpretation of cerebrovascular symptoms, but also because it broadens the concept of migraine activity, at least the "classical" part of the syndrome.

To begin with, an explanation of the use of the term migrainous "accompaniments" is in order. The neurological deficits which may occur before, during, or after a headache are commonly referred to as the aura or prodrome and the migraine is said to be classical. The French language terminology migraine accompagnée or accompanied migraine is preferable because it does not connote a temporal sequence and has the advantage that it is easy to refer to the symptom as an accompaniment. Accompaniments might then be classed according to their duration as *transient*, less than 24 hours; *prolonged*, 1 day to 3 months; and *permanent*. The term *hemiplegic*

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migraine is imprecise. Although widely used in referring to patients with paresthesiae and/or slight weakness, it is better reserved for cases of severe weakness which are rare. Referring to accompanied migraine as 'complicated' migraine when in fact it is classical should be avoided.

THE SELECTION OF PATIENTS

The main neurological accompaniments of classical migraine are listed in Table 1. The migrainous nature of these transient manifestations is accepted when they occur repeatedly in association with headache in patients under the age of 30. It is a different matter when similar phenomena occur *for the first time* after the age of 40, when differentiation from the transient ischemic attacks (TIAs) of cerebrovascular disease may be necessary. It is an old observation that scintillating scotomas may appear for the first time in midlife in the absence of a history of migraine or after a migraine-free period of many years. (Adams, 1940; Weeks, 1940; Walsh, 1957; Alvarez, 1958). In a personal series of 70 neurological patients over the age of 55, 11 (16%) reported that they had experienced the late occurrence of migrainous scintillations. But what of other migrainous accompaniments — blindness, homonymous hemianopia, inability to focus, paresthesias, aphasia, dysarthria, brain stem symptoms, transient monocular blindness, hemiparesis, etc.? The present series of cases demonstrates that these too can appear in various combinations for the first time after the age of 40. Usually the attacks are transient and often occur without headache and without a history of migraine headache or migrainous scintillations. The many different patterns they take — some simple, some complex — make classification difficult. Why term them migrainous? Unfortunately, there is no diagnostic criterion, laboratory or clinical for migraine. However, the phenomena under discussion resemble classical migraine accompaniments so closely in their form and temporal sequence that the designation migrainous appears justified, particularly since the presence of these very symptoms converts an ordinary headache into "classical migraine". The absence of specific criteria, however, no doubt creates some uncertainty in the selection of cases.

TABLE 1

Migrainous Accompaniments

Visual-scintillating scotoma	Ophthalmoplegia
Paresthesias	Oculo-sympathetic palsy
Aphasia	Mydriasis
Dysarthria	Cofusion-stupor
Hemiplegia	Cyclical vomiting
Brain-stem symptoms	Seizures
Blindness	Diplopia
Blurring of vision	Deafness
Hemianopia	Recurrence of old stroke deficit
Transient monocular blindness	Chorea

One hundred twenty patients were placed in several different categories according to their main accompaniments (Table 2). The patients had experienced one or more attacks of migrainous accompaniments for the first time after the age of 40 or they had experienced additional accompaniments for the first time after the age of 40, having had other accompaniments in the past which in some cases did not recur in the new attacks. Some of the cases were described in a preliminary account (Fisher, 1971). Because they are well known to clinicians, cases in which only scintillating visual phenomena occurred for the first time after the age of 40 were excluded from the study, although some had interesting and unusual displays not readily recognizable as migrainous and thereby posed a diagnostic problem.

In the absence of strict criteria for including a case in the migrainous category, several clinical features assisted in making a decision. The presence in the episode of homonymous scintillating phenomena was strong positive evidence for migraine

TABLE 2

Classification of 120 Patients with Migrainous Accompaniments

Visual (excluding scintillating scotoma)	
Blindness	14
Homonymous Hemianopia	5
Blurred or Hazy Vision, Difficulty Focussing	6
Visual and Paresthesias	18
Visual and Speech Disturbance (Dysarthria or Aphasia)	7
Visual and Brain-Stem Symptoms	14
Visual, Paresthesias and Speech Disturbance	7
Visual, Paresthesias, Speech Disturbance and Paresis	7
Non-visual Accompaniments Only — Paresthesias Speech Disturbance, Paresis, etc.	25
Recurrence of Old Stroke Deficit	9
Miscellaneous	8
Total:	120

since 90% of all cases of accompanied migraine under the age of 30 have visual phenomena either alone or in combination with other accompaniments. In 10% of cases there are only non-visual accompaniments, paresthesia, aphasia, etc. Particularly typical of the scintillating scotoma of migraine is its gradual enlargement over a period of 3 to 30 minutes beginning in a small area, spreading to much of the visual field, and often migrating to the periphery. We have used the term 'buildup' for this gradual expansion. Buildup is characteristic of migraine and does not occur with the scintillations associated with ischemia of the calcarine region in thrombosis and embolism of the posterior cerebral artery (Fisher, 1968). Scintillations do not occur in middle cerebral and anterior cerebral artery ischemia. Whether they result from ischemia of the optic tract and lateral geniculate body in the territory of the anterior choroidal artery is uncertain. Scintillations may occur in thrombocythemia and polycythemia but without buildup. Buildup is thus of first importance in establishing the visual disturbance and hence the entire episode as migrainous. However, only 75% of young patients with migrainous scintillations report buildup, the remaining 25% stating that the visual display becomes maximum almost immediately. The absence of visual buildup therefore does not exclude migraine.

Because visual manifestations are often crucial in diagnosis, a description of their varied patterns in migraine may be useful. In a personal analysis of 100 cases of migrainous visual phenomena, the most frequent pattern (30%) was the scintillating scotoma or scintillating zigzag. Therefore, in this paper the term scintillations has been used broadly for all types of luminous phenomena. In the 100 cases other descriptions were: scintillating, sparkling, dazzling, dancing or flickering lights, 12 cases; vision as if looking through a film of water, 6 cases; blurred, opaque, or foggy vision, 5; spots, 4; circles, 3; changing sector defects, 3; lights like a movie marquee, 2; little white things moving around, 2; fire rings, 2; dancing lines, 2; stars, 2. Each of the following descriptions was given by one patient; heat over a pavement, pulsating scintillating mass of blues, greens and yellows moving in from the right, tiny triangles of colored lights, colored broken glass, mosaics, herringbone vision, darting fireflies, shimmering fog, flashes, bright rods, little moving lines, tiny flickering beads moving down, octagonal kaleidoscopic geometric figures fitted together in 10 colors, dimness like wearing brown glasses, stars, rings and circles moving up and down, black and white rectangles, pinwheels, rippling vision, bright chains of red, green and blue stars and lines off to one side. Of the 93 with positive phenomena 75% used a term suggesting brightness, 50% referred to flickering, 50% had a scotoma and 50% mentioned colors, the most frequent being red, green, yellow or gold, blue and purple. The visual phenomena in the present series of cases are almost all included in the above description, although this by no means exhausts the list of variations evoked by the calcarine play of migraine which may be expected to occur in accompaniments of late onset. Interpretation is complicated by the frequent occurrence of nondescript flashes of light or spots before the eyes in older patients. Migrainous visual phenomena can be methodically described under the following headings: position, form (points, spots, figures, lines, waves, rockets, etc.), motion (rotation, oscillation, rolling, kaleidoscopic), flicker, colors, clarity (foggy, blurred, opaque, etc.), brightness, expansion, and migration.

In the present cases the patient sometimes failed to mention the visual display if it was brief or minor or if it had been experienced in the past and disregarded. The visual symptoms commonly lasted 5 to 30 minutes, but some patients insisted they came and went in less than 30 seconds. In some cases they occurred hours or days before or after the other accompaniments or at altogether different times and a relationship was not obvious. It may be necessary therefore to inquire specifically about the presence of a visual component. A scotoma may well go unobserved by the patient unless the reading of small print is attempted. Frequently, distinguishing a luminous monocular display from a hemianopic one is a problem. When is far lateral in the temporal field calcarine source is likely, whereas location in the center of vision is mor in keeping with a retinal origin. Eve precise patients may report that th scintillations are in only one eye unt very careful observations are unde taken. When a scotoma or othe negative phenomenon is present read ing with each eye separately wi indicate whether the deficit is bilatera or unilateral. A sophisticated patien may be able to localize the scintilla tions by gently displacing the eyeba rhythmically with the fingertip. Th visual display will move with th eyeball if it arises in the retina but no if it originates in the calcarine region

In classical migraine the visua disturbance may also take the form o blindness, sudden homonymous he mianopia, blurred vision or bilatera altitudinal defects without scintilla tions. When any of these rather than scintillations occurs for the first time after the age of 40, a migrainous process must be suspected. These purely visual accompaniments accounted for 25 cases in the series. It is a clinical adage that basilar artery disease commonly gives rise to spells of transient blindness whereas actually this is a rare event occurring as the only manifestation in only 2% of basilar cases.

A reliable sign of migrainous paresthesias is the "march" of numbness as it gradually spreads over the face or fingers and hand and migrates from face to limb or vice versa or crosses to the face and hand on the opposite side, the evolution lasting up to 30 minutes, commonly 15 to 25 minutes. This gradual spread is unusual in thrombotic or embolic cerebrovascular disease. A pure sensory stroke due to thalamic ischemia is the only stroke whose evolution may resemble the typical march of migraine paresthesias and then only rarely. The march of a sensory seizure is much more rapid, being measured in seconds. However, not all migraine patients with paresthesias describe a march, some 15% reporting the appearance of paresthesias at all sites simultaneously (Fisher, 1968). The numbness in an attack may be markedly circumscribed involving, for

example, one finger, only the 4th and 5th fingers, the 2nd and 3rd fingers, one cheek, or one half the lips. Paresthesias are second in frequency to scintillations as an accompaniment of migraine.

Although buildup and march are most important in the diagnosis of migraine, even in their absence, scintillations and/or paresthesias remain useful clues in diagnosis. When visual and paresthetic symptoms are both missing from the clinical picture, uncertainty is likely to attend the selection of cases.

Another kind of march specifically characteristic of migraine is the progression from one accompaniment to another, for example; visual to paresthesias to dysphasia sometimes with an intervening delay of 5 to 30 minutes unlike the transient spells of cerebral thrombosis in which the several manifestations occur more or less simultaneously.

The occurrence of 2 or more episodes, particularly if they closely resemble one another, is important in diagnosis. This will generally exclude cerebral embolism which is a prime diagnostic possibility when there has been only one attack. The history of a similar spell as long as 20 or 30 years before is strong evidence for migraine. An identical vascular spell even 2 or 3 years before, if the patient has been symptom free in the interim, favors migraine over thrombotic vascular disease. The time one might have to wait before a second attack occurs is highly variable. In one of our patients with only scintillations, an episode with buildup occurred in the left visual field at the age of 57 and the precise mirror image on the right side at the age of 62, with no symptoms in between. The diagnosis can be made on the basis of one episode when the evolution of the accompaniments shows classical buildup, march or progression, or cross to the opposite side of the body. The same is probably true when in a case of blindness one posterior cerebral artery arises from the internal carotid artery and the other from the basilar artery, although the possibility that a sudden insult to one calcarine area may sometimes cause transient blindness cannot be excluded.

The occurrence of a headache in the episode is in keeping with migraine, especially if it is particularly severe or if there have been identical headaches in the past. However, while headache can be an important clue it is not diagnostic, for head pain may occur with thrombosis, embolism, or dissection involving the internal carotid, middle cerebral, anterior cerebral, posterior cerebral, basilar, and vertebral arteries. In the present series, headache was part of the episode in only 50% of patients and the absence of headache therefore does not weigh against migraine. At times the associated headache is evoked only on shaking the head or coughing or is so slight as to be disclaimed as a headache.

The duration of the episode may assist in diagnosis since migrainous episodes classically last 15 to 25 minutes, whereas approximately 95% of transient ischemic attacks associated with internal carotid, middle cerebral, and basilar artery disease last less than 15 minutes.

The years around 50 are a favorite time for the appearance of episodes of migrainous accompaniments that come and go over a period of several months either appearing for the first time or reappearing after a symptom-free period of 20 or 30 years. A "flurry" of migrainous activity around the age of 50 is therefore not unexpected.

A point of some value in retrospect is the generally benign nature of the spells, permanent sequelae being rare. Repeated good recovery from what appears initially to be a threatening situation is reminiscent of migraine. In the present series, long term follow-up information was available in many cases and usually the episodes faded out without special treatment.

In establishing the migrainous nature of neurological episodes occurring for the first time after the age of 40, the angiographic demonstration of normal cerebral arteries is a most important piece of information. Angiography was performed in 75% of cases in this series. A normal angiogram will exclude cerebral thrombosis of arteries larger than 1 mm. as a factor. Occasionally, an arteriosclerotic plaque and migraine will coexist, possibly leading to an error in clinicoangiographic correlation and unwarranted anticoagulation or surgery.

In the present series, pathologic studies were made in only 5 cases and the absence of atherosclerosis from the arteries of the involved territory was consistent with the diagnosis of migraine.

In the selection of cases it was first necessary to rule out other neurological conditions, particularly cerebral thrombosis and embolism and carotid dissection as the cause of the patient's spells. Cerebral angiography was either normal or any abnormality visualized did not satisfactorily explain the patient's symptoms. As already mentioned, cerebral embolism was unlikely if there were multiple spells of similar pattern. Cerebral seizures were considered in the differential diagnosis in a few cases and could be satisfactorily excluded. Lateralized electroencephalographic 3 to 6 Herz slow wave abnormalities were found in many but not all cases for up to 3 weeks after a migraine accompaniment.

Conditions which may cause TIAs in the presence of normal angiograms had to be ruled out, for example; thrombocythemia, thrombotic thrombocytopenia, and polycythemia. The controversial diagnosis of non-convulsive seizure paralysis was a consideration in the 9 cases classed as recurrence of old stroke deficit (Fisher, 1978). For the most part, normal angiography was the laboratory keystone in excluding other causes.

After exclusion of these conditions, migraine is not necessarily the only diagnosis remaining for it is possible that an entirely unrecognized process is being overlooked.

THE CLINICAL CATEGORIES

The 25 patients with visual accompaniments fell in three groups:

(a) Patients who suddenly developed temporary blindness for seconds to minutes;
(b) those who abruptly developed a homonymous hemianopia in the absence of a scintillating or luminous display that might have suggested migraine; and
(c) those who complained of blurred vision or inability to focus, also in

the absence of scintillating phenomena.

In 53 patients luminous visual symptoms formed various combinations with one or more other accompaniments: numbness, 18; brain stem symptoms — diplopia, vertigo, tinnitus and oscillopsia, 14; dysarthria and/or dysphasia, 7; numbness and speech disturbance, 7; numbness, speech disturbance, and hemiparesis, 7.

Twenty-five patients did not have scintillations as part of their episodes and were classed as 'non-visual'. Their symptoms consisted of combinations of all the accompaniments that had occurred with the visual in the above 53 cases — viz. numbness, speech disturbance, brain stem symptoms, and hemiparesis.

The category 'recurrence of old stroke deficit' refers to patients who, having had a stroke in the past from which recovery was satisfactory, in the following years experience almost identical temporary recrudescences in the absence of convulsions and in association with normal cerebral angiograms. Some of these had scintillations suggesting migraine while others responded to anti-seizure medication. The differential diagnosis has been discussed in a previous paper (Fisher, 1978) and the inclusion of these cases here is provisional.

The 8 miscellaneous cases did not fall readily into any of the other categories and included transient monocular blindness with numbness or paresis, and scintillations with memory impairment, chorea, dysphagia, or seizures, respectively.

ANALYSIS OF THE CASES

Of the 120 patients, approximately 60% were male and 40% were female. Twenty-five percent were 40 to 49 years of age; 35%, 50 to 59; 30%, 60 to 69; and 10%, 70 or over. About 1/4 had elevated blood pressure (more than 150/90), 3/4 were normotensive.

Approximately 50% of patients had a history of headache in the past, while 25% gave a history of scintillations or other accompaniments in the past. About half the patients had a headache associated with one or more of their attacks. Sometimes it was slight. The number of episodes per patient varied from one to many. Twenty-five percent had one spell, 21% had two spells, 20% had 3 to 10, and 32% had more than 10. The duration of the attacks varied from patient to patient and between attacks in the same patient. It was estimated to be less than 5 minutes in 12%, 5 to 30 minutes in 42%, 30 minutes to 24 hours in 21%, and longer than one day in 15%. A point of special interest was that in 16% there occurred remarkable hour to hour fluctuations in or recurrences of the neurological deficits within the same attack.

CLINICAL DESCRIPTION OF CASES

The clinical details, even within each of the several categories, varied greatly from case to case in regard to symptoms, sequence, severity, duration, circumstances, etc. making it impossible to reduce the cases to a few typical syndromes. Ideally an account of each case would be desirable but since this is not feasible, 35 illustrative examples have been selected to try to convey a representative picture of the clinical spectrum. But the variations in the details seemed to be almost limitless.

Visual Accompaniments — Blindness

Case 1. A woman, aged 55, had had mild headaches for many years. One evening at 2200 she developed headache, nausea, vomiting, blurred vision, and in the night at 0300 saw flashing white lights bilaterally. Examination disclosed blindness and slight confusion. On examination at 0900 she was blind and had a severe memory loss. She was agitated, raved uncontrollably, and failed to respond to the examiner, seeming to be deaf. She remained blind for 2½ days and recovered in the following 13 days. During recovery she showed occipital dyslexia and elements of Balint's syndrome. Carotid and vertebral angiograms were normal. She gave the history that 2 years before she had experienced an episode of shimmering vision and blindness and had to be led on the street. By the following morning vision had improved and in 2 days was back to normal.

Case 2. A woman, aged 47, while seated in a restaurant suddenly lost all vision. For about 1 minute everything was absolutely black and the return of vision was abrupt. There were no scintillations or headache. Three weeks later she had four similar episodes in one day, after the last of which there was a sensation that the environme was rocking. The floor seemed to be wa as she walked. For 7 years she had h recurrent headaches in association wi menstrual periods. Arch aortograph demonstrating all of the intracranial ar extracranial arteries was normal. The CS was normal. The patient had taken r female hormonal preparations.

Case 3. A woman, aged 70, while seate playing bingo, lost all vision for 1½ hour The episode which began with "wave appearing before her eyes took 20 minut to reach its peak. There was no associate dizziness, weakness, or confusion. Th patient recalled all events during th episode and while blind felt her way to th bathroom along the wall. Vision returne over a period of 20 minutes. Ten days late there was another episode in which visio only dimmed without failing completely. A left brachial arteriogram showed irregula ity of the basilar artery without sever stenosis. The blood pressure was 160/9 mm. Hg. An EEG showed slow wav activity in the anterior midtempora regions bilaterally, more on the right There was no personal or family history o migraine.

Case 4. A man, aged 50, suddenl developed shining lights before his eyes an within a few minutes became totally blind He was guided to the podium of th auditorium where he delivered a schedule address without being able to see his notes Afterwards he was driven to his home an vision returned about 3 hours from th onset. Three years later he had a simila spell.

Case 5. A man, aged 62, for 2 weeks ha had recurrent episodes of blindness lastin 5 to 20 minutes occurring up to three time daily. There were no accompanying neurological symptoms, no impairment o consciousness or memory and he con versed normally during an attack. In one he experienced "sparkles of fire". There wa an associated "filling of the head" or heavy feeling. Some of the spells were followed by pain at the occiput and temples. The patient vaguely recalled that 1 year before he had had a similar spell and 7 years before everything had got dark for about 10 minutes. Angiography was normal. The blood pressure was 120/70 mm. Hg. There was no personal history of migraine.

Visual Accompaniment Without Scintillations

Case 6. A normotensive man, aged 59, in 3 months had seven spells in which the visual fields suddenly constricted until all was dark except for a central vertical slit in which vision was entirely normal. The spells lasted about 20 minutes and the

patient noted no scintillations or march. Each spell occurred at about 1600. The patient had one spell also lasting 20 minutes in which central vision was blurred as if looking through a drop of water while peripheral vision was preserved. There was no accompanying headache. Vertebral-basilar angiography was normal. There was a history of infrequent headaches related to constipation. There was no family history of headache.

Visual — Blurred Vision

Case 7. A man, aged 54, in 2 years had 6 attacks of blurred vision lasting 15 minutes during which he was unable to bring distant or near objects into focus. There were no scintillations. He likened it to looking through a drop of glycerine. As a youngster he probably had migraine headaches with vomiting.

Visual — Paresthesias

Case 8. A man, aged 61, all his life had had episodes of flickering and narrowing of the visual fields as a prelude to nausea. From age 35 to 50 he had periodic headaches. Four years before admission episodes began in which the left side of the page looked funny "like a cloud of non-vision, not a cloud of darkness" and there was hesitation in perceiving the letters p, b and g. A sentence had to be read twice. Three months prior to admission the patient began to have episodes of numbness and dysesthesia at first every week, but for 10 days, every day or more often. The numbness developed in a period of a few minutes and lasted up to 15 minutes. The topography varied greatly — head, face, arm and leg on one or the other side (never the two entire sides), both legs from the hips down, both arms, one arm or one leg. On one occasion it started in the right heel and spread up past the ankle and calf to the hip and after 1 minute appeared in the left sole and ascended the left leg. The spread was deliberate but rapid, taking about 30 seconds to ascend the entire leg. The tingling at times changed to a cold freezing sensation or it could start with this feeling. The trousers often felt tight as if "closing in on me" or he felt he had icy, freezing, muddy pants on. Once one cheek felt sunburned. On touching the skin it felt remote. There may have been a premonitory feeling of acidity in the teeth ("not quite a taste"). In some spells the knees tended to buckle and there was a feeling in the head like that after smoking the first cigarette. The voice could change. The neurological examination was normal. The blood pressure was 160/115 mm. Hg. Carotid and vertebral angiograms showed no arterial stenosis. On anticoagulant therapy all spells ceased.

Case 9. A woman, aged 45, suddenly developed a right hemianopic scotoma as if blinded by looking at the sun. There were no scintillations. After 20 minutes it gradually moved off to the right. Suddenly her right hand went dead for 2 minutes. Ten minutes later her tongue became numb bilaterally for about 1 minute. She was unable to think clearly and developed a headache.

Case 10. A woman, aged 66, had about 10 episodes beginning with bright shimmering lights in the left temporal visual field, then on the right side followed by a severe throbbing left-sided headache. A few minutes later numbness of the left fingers began and spread gradually to the left arm, left half of the face, head and trunk and left leg without weakness of the limbs. She was almost blinded and had an unpleasant dazed, dizzy feeling. The accompaniments ceased in 20 to 30 minutes, the headache in 1 to 3 hours. The blood pressure was 190/100 mm. Hg. There was a history of recurrent slight headaches since the menopause 12 years before.

Visual — Dysphasia

Case 11. A diabetic male, aged 56, at 1600 one day developed blurred vision and shimmering jagged colored lights in the left temporal field which gradually increased to form the letter C open to the right. This display faded in 10 minutes. At 1640 he was unable to pronounce simple words. At 1725 he spoke fluently but at 1740 became mute again. At 2100 speech had returned to normal. The patient noted a dull central headache. There had been no paresthesias. The next morning he experienced scintillations for 10 minutes. Bilateral carotid angiography was normal. There was no personal or family history of headache or scintillations.

Case 12. A man, aged 58, for 5 years had one or two spells each year of combined visual and speech disturbance. For 6 months, spells occurred 2 or 3 times a week. In a spell, the ability to focus was lost and the lateral parts of the visual field were filled with shimmering pinpoints of light. There was a "buildup" for 2 or 3 minutes, the symptoms remained at a peak for 30 minutes, and faded and disappeared in 1 hour. At the height of the episode the patient was unable to read. At the same time enunciation and fluency of speech were impaired. There were no paresthesias. The patient was aware of a slight pressure in the head at the onset but did not call it a headache.

Case 13. A man, aged 71, had severe recurrent throbbing frontal headaches 1 to 3 times a week between the ages of 25 and 38. At the age of 67 he began to have episodic scintillating scotomas every 4 to 6 months developing and receding gradually. The scotoma was always a dazzling white color rather than dark. The only associated headache was a pain behind the right eye on coughing. On two occasions when the scintillations were maximum he was unable to think of the first names of people or do simple arithmetic for about 2 hours.

Visual — Paresthesias — Dysarthria

Case 14. A woman, aged 68, awakened one night at 0300 with a severe, pounding generalized headache associated with dazzling, blinking, fluorescent lights and stars shooting out. She walked to the next room and on lifting a glass found that the left hand and arm were numb without tingling. The headache and scintillations lasted about 3 hours while the duration of the numbness could not be recalled. Seven and a half weeks later, at breakfast, the patient noted blurred vision of the same type as before, a throbbing headache and numbness and tingling of the left 4th and 5th fingers. All symptoms cleared in a few minutes. Thereafter, the left arm felt clumsy. In the 10 days prior to admission, on three occasions, the patient had scintillations in one or other temporal field while watching television. She usually lay down and did not note the duration of the display. About 12 years before admission the patient late one evening developed a feeling of tingling or ants crawling in both arms which gradually spread proximally from the fingers to the shoulders and at the same time the patient saw shiny shooting sparks before her eyes. There was no history of classical migraine headaches but all her life the patient developed a left frontal headache when hungry. Angiography showed a non-stenosing ulcerated arteriosclerotic plaque in the right internal carotid artery. The right posterior cerebral artery arose from the internal carotid artery, the left from the basilar artery. The carotid plaque was removed but 1 year later the patient had two further episodes of light-headedness and numbness of the left 4th and 5th fingers lasting 5 minutes and one episode of light-headedness associated with dysarthria lasting 4 minutes. She also experienced flickering lights in the extreme left visual field.

Case 15. A man, aged 59, for three days had 3-minute episodes of feeling that the right arm was detached, numbness of the right side of the face and slurred speech, and one episode of shimmering triangles in the left visual field and numbness of the left cheek. Cerebral angiography was normal.

Visual — Brain Stem Symptoms

Case 16. A man, aged 45, had a headache in the left occipital region and above the left eye for 6 days. At 2200 one evening he developed numbness of his tongue and dysphagia for 5 minutes. At 2300 he noted tingling of the face, arm,and leg on the right side. At 0900 the next morning he noted tingling of the right leg and a few minutes later of the right arm and right cheek. He became nauseated and vomited. At 1100 he suddenly developed vertical oscillopsia. Examination at 1500 showed upward beating nystagmus, a questionable left Horner's syndrome, and weakness (7/10 power) of his right arm and leg and a right Babinski sign. The right side still tingled. Left vertebral angiography was normal. Two days later he experienced scintillations bilaterally for 15 minutes. A similar spell occurred 2 hours later. Left vertebral angiography during the scintillations was normal. Next day scintillations with "buildup" occurred and lasted 7 minutes. There was a history of recurrent headaches and in the past the patient probably had visual accompaniments which he disregarded.

Case 17. A man, aged 57, for 7 years had episodes of scintillations and right hemianopia lasting up to 30 minutes followed by a severe frontal headache and nausea lasting 1 day. In many of the spells he was almost blind. One day prior to admission while reading he noted everything "ran together". This was improved by covering one eye. At the same time his tongue became numb. On the day of admission the patient noted diplopia, unsteadiness on his feet and tingling around the mouth and on the fingertips. The symptoms disappeared but later in the day recurred twice. On examination there was crossed diplopia, weakness of the right side of the face and slight right ptosis. The blood pressure was 140/85 mm. Hg. A left brachial arteriogram showed no abnormality. There was no family history of migraine.

Case 18. A woman, aged 73, had headaches since the age of 15, always preceded by scintillations. At age 63 the headaches stopped but episodes of scintillations continued to occur every 2 months lasting 30 minutes. Three months prior to admission she awakened in the night and had a feeling that she could not "see" her feet between the knees and the toes. She thought she was dying. On arising the next morning she was unable to recall the names of people, street numbers and telephone numbers. She recognized faces and could remember events. She entertained guests who noted nothing wrong. The deficit disappeared in one week. Two months before admission after arising one morning and while sitting on the edge of the bed she was struck with dizziness, nausea and vomiting. She could not walk and her arms were so weak she was unable to raise them to her face. On the day before the onset of the paralysis she had had at least 12 attacks of scintillations recurring on and off. Such a bout had not occurred previously. After 1 week she could walk with help but staggered badly. There was no dysphasia, dysarthria, or diplopia. Her mind remained lucid. Recovery occurred gradually and neurological examination on admission was approximately normal. Carotid and vertebral basilar angiograms were normal.

Case 19. A man, aged 45, in 3½ years had four spells in which he became totally blind for about 1 hour, vision gradually constricting. Examination showed a bilateral altitudinal superior visual defect of which the patient was unaware. In the following 2 years he had further spells of faintness, weakness of the limbs, dysarthria and confusion lasting up to 8 hours. Angiography, pneumography, and a computed tomographic (CT) scan were normal. There was no history of headache.

Case 20. A hypertensive man, aged 61, for 6 years had 5 kinds of spells lasting 2 to 15 minutes. Diplopia and dizziness occurred about once a month, floppy weakness of the right arm once in 2 months, numbness and tingling of the cheek, teeth and gums on the right side infrequently, weakness of the left arm infrequently and slurred speech on two occasions. The symptoms of 2 of the 5 occurred together at times. Sometimes a shimmering haze appeared before his eyes. There was a long history of severe throbbing headache occurring every 2 months. Four vessel cerebral angiography was normal.

Case 21. A woman, aged 46, for 10 years had spells of shining flickering lights in front of both eyes up to several times a week, each lasting about 20 minutes. She had recurrent severe headaches before the age of 30, not afterwards. Three weeks before admission she suddenly developed nausea, vomiting and violent vertigo. Next day vision was greatly impaired, only vague outlines of people being visible. For several days she could not identify faces but gradually improved. The right visual field was filled with bright scintillating lines similar to those present for years. Headache was present every day. The blood pressure was 210/120 mm. Hg. Examination disclosed a right homonymous hemianopia. A right brachial angiogram showed a normal vertebral-basilar circulation. The patient died in coma six months later. Two days before the final admission she had been in her physician's office because of an episode of blindness with retention of only central vision. Autopsy showed arteriosclerosis of the basilar artery with "irregular constriction" but no occlusion. The brain was normal grossly and microscopically. Although the clinicopathologic correlation is imperfect, this case has been included to illustrate the probability that the migraine process is occasionally disastrous.

Visual — Paresthesias — Paresis

Case 22. A woman, aged 42, suddenly developed "sky rockets" in both temporal visual fields and after 10 minutes became blind in the left half field for 30 minutes. There was no headache. The next day the left arm and leg were numb and heavy and this complaint lasted about 1 week. Angiography was normal. One month from the onset, flashing lights reappeared in both visual fields for 15 minutes and on awakening the next morning the left limbs were again weak and heavy for 3 days. She then developed attacks of blurred vision lasting 5 minutes, recurring on and off for 3 days and vision remained fuzzy. She then experienced her first severe headache and the next morning the left limbs were again weak and the fingers tingled. In the next 3 months headache recurred and the patient complained of pain in the left limbs that fluctuated in severity. Thirteen years before the patient had severe headaches for 3 years.

Case 23. A hypertensive man, aged 61, while seated, suddenly developed paralysis of the right arm and leg and was totally unable to speak. After 10 minutes speech returned and in 30 minutes power in the limbs. Before the onset of paralysis he had experienced a shimmering light in the right temporal field for about 10 minutes. Two days later a similar spell occurred that lasted 2 hours. In the following 2 months there were about 15 slighter spells with shimmering lights in the right field followed by a slight weakness of the right limbs. Examination was normal. A left carotid angiogram showed slight stenosis in the region of the sinus and a left carotid thromboendarterectomy was performed. Five days later however the patient had 5 spells of scintillations, numbness and hemiparesis. Anticoagulants were started and there was no recurrence in the next 2 years.

Visual — Paresthesias — Paresis — Aphasia

Case 24. A woman, aged 57, for 4 days had a slight to moderate bifrontal headache associated with twinkling, flashing lights before her eyes and a feeling of pulling in the eyeballs. At 0200 on the 5th

day the headache was worse and the patient received medication which was promptly forgotten. Her husband noted that she was confused and agitated. Speech was slurred and the right arm and leg were weak and numb. The patient complained of an electric burning feeling behind the right ear extending down along the spine. She was dizzy and vomited several times. Examination showed a right facial weakness, a left homonymous quadrantanopia, decreased sensation over the right face and weakness of the right arm and leg. The patient was unable to pronounce words correctly, name objects, or read. The neurological deficits slowly cleared in the next 4 days and the headache abated. A left carotid angiogram was normal. The patient recalled that at the age of 29 she had had a severe headache associated with visual symptoms and a diagnosis of migraine was made. The patient's mother, sister, and paternal aunt had recurrent headaches. The patient remained well in the next 3 years.

Visual — Hemiparesis

Case 25. A woman, aged 56, suddenly developed a complete left hemiplegia at 0800 while seated telephoning. Recovery occurred in 1 hour. At 1000 hemiplegia recurred for 5 to 10 minutes during which neurological examination showed a complete flaccid paralysis without sensory change. There was a slight behavioral change in that the patient became quiet, irritable, and slightly uncooperative. Immediately preceding the second spell the patient experienced many black spots before her eyes followed by a headache. She had had similar episodes of spots followed by headache for about 3 years, each spell lasting about 20 minutes. There was no numbness. The blood pressure supine was 120/80 mm. Hg. and fell to 90 systolic on standing up. Four vessel angiography 6 hours later showed no abnormality. There was a slight recurrence of hemiparesis 16 days later. A CT scan was normal.

Visual (Transient Monocular Blindness) — Paresthesias

Case 26. A man, aged 58, developed tingling of the face, lips and arm on the left side for 4 minutes. Two days later he developed a right frontal headache and was blinded in the right eye by a sparkling white fog for 5 minutes. Angiography was normal. There was a history of weekly headaches.

NON-VISUAL

Paresthetic Accompaniments

Case 27. A man, aged 51, had two spells five days apart of numbness spreading over the right hand and fingers and up to the face and corner of the mouth and side of tongue over a period of 15 minutes. There was a history of headache and scintillations in the past but not numbness.

Case 28. A 43 year old man, who for many years had typical migraine headaches associated with scintillations, suddenly developed numbness of the left hand which gradually disappeared in several hours. The next day numbness occurred again involving first the left hand and later the left side of the face, taking 5 minutes to spread from one region to the other. In these attacks he had no headache or scintillations. Angiography was normal.

Paresthesias — Aphasia

Case 29. A man, aged 46, had three spells in one year in which the right hand became numb and cool and in seconds or minutes dysphasia and numbness of the left fingers appeared. The numbness lasted 1½ hours and the disturbance of speech 6½ hours. Headache was associated with the second spell. Four vessel angiography was normal. There was no history of headache.

Case 30. A normotensive woman, aged 47, had a single episode in which she first became dysphasic for 5 minutes. This was followed by numbness which involved first the left fingers and hand and a few minutes later the tongue. A few minutes still later the fingers and hand on the right side became numb. All symptoms disappeared in about 20 minutes and a headache developed, associated with nausea. During part of the episode she could not focus her vision properly but there were no scintillations. There was a history of recurrent headaches.

Case 31. A hypertensive, diabetic man, aged 62, began to have recurrent headaches 8 years before. In the last 2 years he experienced 4 transient neurological episodes. Two years before admission the patient suddenly developed numbness of the entire right half of the body from the top of the head to the toes — scalp, cheek, lips, tongue, arm, trunk and leg. In addition, he had slurred speech, dysphasia, and impaired memory for about 2 hours. Three months before admission the right side of the face and lips felt numb for 10 minutes. Six weeks before, he developed a severe headache and was unable to speak or understand what was said. Recovery occurred in 20 minutes. One week before admission he developed a slight headache and was unable to understand what he read. After 20 minutes the fingers and hand on the right side became numb. One and a half hours from the onset words came out incorrectly. On awakening the next morning he had recovered. At no time were there scintillations. Four vessel angiography was normal.

Case 32. A woman, aged 54, suddenly felt nauseated and speech became slurred. In 2 minutes numbness spread over the left side of the face after which the left foot became involved over a period of 2 to 5 minutes followed by a creeping involvement of the left hand. Angiography was normal. There was no history of headache, scintillations or migraine.

Paresthesias — Paresis

Case 33. A hypertensive man, aged 51, while eating lunch, suddenly developed numbness and complete paralysis of the left arm and hand, numbness of the left side of the face and slow thick speech. There was no march, headache or visual scintillations. All function returned to normal in about 15 minutes. Three months later, after losing his temper, the left side of the face tingled and speech was again thick and slow as in the previous attack. The symptoms cleared in about 5 minutes. There was no headache or visual change. Angiography was normal. Two years before, while driving his car, the patient developed tingling of the left hand and arm and was unable to move the fingers for a few seconds. He was subject to common headaches about 5 times a year. There was no family history of similar episodes. The blood pressure was 150/100 mm. Hg.

Paresthesiae, Paresis, Aphasia

Case 34. A man, aged 61, in 2 months had about 6 transient spells of tingling and numbness of the right arm lasting a few seconds. At the same time he developed a sore tender spot in the left frontoparietal region. There was a constant feeling of light-headedness. Three weeks before admission, while driving his auto, the right arm went completely limp for a few minutes and he had to drive with the left hand. Ten days later the right leg suddenly became numb and weak for a few minutes causing him to fall. Three days later he had transient loss of speech during an argument and this was unassociated with other complaints. One day before admission his right arm became paralyzed and he was unable to speak for about 30 minutes. The right side of the face sagged. He remained alert and could walk. Examination on admission was normal. The blood pressure was 138/80 mm. Hg. The CSF and an EEG were normal. Heparin and Warfarin were started. Two days later numbness and tingling involved the right 3rd, 4th and 5th fingers and the right leg for 5 to 10 minutes. The next day there was a slight headache. One month later the patient experienced a

sharp, flashing pain behind the left eye and 4 minutes later became stuporous, glassy-eyed, paralyzed in the right arm, unable to speak and, according to his wife, developed twitching of the right foot. Recovery was complete in 30 minutes. The patient became inappropriately jocular and spent money unwisely. An EEG showed a slow wave focus on the left side. Angiography, brain scan, and pneumoencephalography were normal. In the following 6 weeks, the patient had 8 further spells of right-sided numbness, right hemiplegia and speech arrest, with questionable shaking of the right leg but no impairment of consciousness. After the last one, a right hemiparesis persisted and he made paraphasic errors. He was readmitted to the hospital and on the first day had 3 spells of numbness of the left face and left leg below the knee lasting a few minutes. In one there was a transient left frontal headache. An EEG showed slow waves in the left temporal, central, parietal and occipital regions. Pneumoencephalography was again normal. The CSF was normal.

Brain-Stem Accompaniments

Case 35. A man, aged 49, one evening when cold, hungry, tired, and exhausted after exertion suddenly saw double. Fifteen minutes later he staggered and 30 minutes from the onset speech became slurred. At the end of an hour the left arm and left leg were totally paralyzed. Examination showed nystagmus, dysarthria, cerebellar ataxia and inappropriateness of affect. Four days later nystagmus was the only remaining abnormality. Four vessel angiography was normal. The blood pressure was 150/100 mm. Hg. There was no history of headache.

DISCUSSION

In trying to establish new clinical guidelines for a group of cases when there is no specific test for the diagnosis, in this case migraine accompaniments, all one can do is describe the cases, point out the common features that bind them into a recognizable entity and present evidence that they fit no other diagnosis. Since the manifestations of migraine accompaniments involve several modalities and are variable in extent, duration, severity and quality, the diagnosis is sometimes difficult even in young persons with headache. Interpretation is all the more difficult when various accompaniments occur in different combinations for the first time after the age of 40, often without a headache or history of such.

The case histories illustrating the various syndromes offer evidence that in many instances the features closely correspond to those described in young patients with classical migraine. Other diagnoses have been ruled out. The generally benign course of events is also consistent with the diagnosis of migrainous accompaniments. At present no further authoritative proof for the concept can be mustered. Long term follow-up information is available in many cases and usually the episodes fade out without special treatment.

When the episodes are frequent and severe, anticoagulant therapy can be tried. In some cases it appears to be effective (cases 8 and 23), in others, not (case 34). In recent years we have often prescribed aspirin and dipyramidole.

During the last 10 years this new information concerning the interpretation of cerebrovascular disease has been fruitful in establishing a practical working diagnosis, advising on management and treatment, and offering a reliable prognosis. In this regard the concept has practical value.

The occurrence of migrainous accompaniment for the first time in mid-life will be important to students of migraine since any hypothesis formulated concerning the disorder must take into consideration this extension of the syndrome. The added knowledge concerning the biology of migraine may even provide new clues to the mysterious mechanism of migraine.

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TABLE 3

Main Criteria for the Diagnosis of Late-Life Migrainous Accompaniments

1.	Scintillations or other visual display in the spell. Next in order, paresthesias, aphasia, dysarthria and paralysis.
2.	Buildup of scintillations. This does not occur in cerebrovascular disease.
3.	"March" of paresthesias. This does not occur in cerebrovascular disease.
4.	Progression from one accompaniment to another often with a delay.
5.	The occurrence of 2 or more similar spells. This helps to exclude embolism.
6.	Headache in the spell.
7.	Episodes last 15 - 25 minutes.
8.	Characteristic mid-life "flurry" of migrainous accompaniments.
9.	A generally benign course.
10.	Normal angiography. This excludes thrombosis.
11.	Exclusion of cerebral thrombosis, embolism and dissection, epilepsy, thrombocythemia, polycythemia, and thrombotic thrombocytopenia.

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