Pure transient amnesia during nonconvulsive status epilepticus

P. Vuilleumier, MD; P.A. Despland, MD; and F. Regli, MD

Article abstract—We report a patient with a generalized frontal-predominant nonconvulsive status epilepticus without clinically apparent altered consciousness. The patient was examined and EEG performed during and after the episode. Severe retrograde and anterograde amnesia during the seizure, contrasting with a preservation of ongoing memories that could be assessed only after its resolution, suggests a transient disconnection of access to stored minimal representations. This unusual memory disorder is both clinically and electrographically dissimilar to other reported cases of transient epileptic amnesia. Although the patient probably had numerous episodes previously, there was no history of overt seizure.

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Transient amnesia as the only manifestation of seizure is uncommon and reported either as a postictal Todd-like phenomenon after brief, unnoticed, complex partial seizures or as an ictal state during complex partial status epilepticus. Prolonged nonconvulsive status epilepticus is more often accompanied by other behavioral abnormalities such as stupor, confusion, or automatisms, followed by complete amnesia for the episode.

We report a patient with an isolated severe transient amnesia during a generalized spike-and-waves nonconvulsive status epilepticus, without other alteration of consciousness, who retained an accurate memory of what happened during the episode itself. This unusual memory disorder suggests a temporary loss of access to mnemonic associations. Although the patient probably had recurrent undiagnosed similar episodes over many years, there was no history of overt seizure.

Case report. A 41-year-old right-handed woman without previous medical or psychiatric illness was found trying to enter her former house, where she had not lived for 3 years, and was taken to the police station. A psychiatrist was called, who suspected transient global amnesia, and sent her to our hospital's emergency room.

On admission, the patient was fully conscious and alert. She was totally disoriented in time and profoundly amnesic. Although she knew she was in a hospital, she could not tell its name or when and where she had come from. She could give her name, age, and birthdate but not her address, not even the one where she had just been found. No name, address, or phone number of close relatives could be obtained from her, so that it was impossible to get any further information about her.

The patient was cooperative, calm, and smiling, a little perplexed, but not anxious at all. She spoke little spontaneously, unless being asked questions. There were no stereotypes and no repetitive questioning. She answered questions and executed complex orders quickly and accurately. General physical and detailed neurologic examination was normal, except for a very slight, fast, and irregular eyelid blinking, which appeared only with eye closure and could not be suppressed by the patient. There were automatisms, no myoclonias, no grasping or other archic reflexes, and no fluctuations in the clinical state of the patient. There was no fever, no meningism, no headache, and no signs of head injury.

Because EEG could not be performed immediately, the patient was administered a detailed memory and neuropsychological testing.

Neuropsychological examination. A prominent isolated retrograde and (seemingly) anterograde memory disturbance was observed. Digit span was six. From a 10-word list, 4 words were recalled at the first trial, 4 at the second, and 6 at the third trial, but only 1 word was retrieved at 1 minute and none after 3 minutes. In a short story task, all test words, only one was correctly recognized and there was also one false recognition. After 3 minutes, no elements of the story could be recalled. When two of four words each were successively presented, there was no proactive interference, but there was marked retroactive interference, as none of the words from the first were recalled nor recognized, whereas three from the second list were recalled after 2 minutes, and two were recognized 3 minutes later.

The gradient and the extent of the retrograde amnesia could not be precisely evaluated because of an almost total lack of personal information about the patient at the time she was examined in the emergency room. In addition, her inability to give any account of the recent past did not recall her profession nor workplace. She was unable to evoke the name of any person she knew, such as family, friends, neighbors, colleagues, or employers, except...
her husband's name. However, she did not remember
mentioning 3 years ago. She first claimed having no
children and then remembered having two daughters and
three, but she could only give the right birthdate of her
child and the right age only for the elder. She denied
having had any surgery, although an abdominal scar of
endarterectomy during childhood had been noticed on phys-
ical examination. She also denied previous identical mem-
ory troubles.

The patient could not recall any significant recent pub-
lic event nor could she recognize true from false in a series
of stories about local or international politics. From a
collection of famous faces from the past 40 years, none were
known and the patient could not tell whether they were
old or alive. She failed to name and describe the main
temple in a series of famous places in Lausanne and
other Swiss cities, as well as to describe the path to walk
to one another. During these tests the patient kept
complaining about her difficulties. She often said “I’m not
sure I know it, but I can’t remember anymore,” and
laughed, not frustrated at all. Although she said she
was not feeling normal, she was unable to tell why. She
had dream-like or “déjà-vu” feelings. There was no re-
strictive delusion.

Other cognitive functions were within normal range.
There was no language abnormality and visual naming
was prompt and correct. Category-related word list gener-
ation, however, was poor and with some persevera-
tions. Judgment was perfect and oral calculation flaw-
less. There were no apraxia for transitive and nontransitive limbs and
motor movements. Visuospatial abilities were preserved.
Drawing, Poppelreuter Test, Hooper Visual Organiza-
tion Test, and orientation on a blank geographic map. Re-
trance to confrontation and response inhibition were
used by a forum’s alternating gesture sequences and a go-
no paradigm, which were both moderately altered.

Other investigations and clinical course. An EEG was
performed 2 hours after admission and showed a continu-
gous generalized epileptic activity with rhythmic spikes and
wave waves at a 3.5- to 4-Hz frequency that predominated
in the right frontotemporal regions (figure 1). There was no correlation be-
 tween eyelid blinking and EEG rhythmicity. Part of the
neurological examination was repeated under EEG
monitoring to be reviewed later and was un-
changed.

An IV 1-mg bolus of clonazepam was then adminis-
tered. Within 4 minutes, EEG epileptic activity disappeared, al-
though a rhythm returned with anterior intermittent epilepti-
form discharges (figure 2), and immediately the patient
replied, “Now I can tell you. I recall everything. I can see
what happened....”

She was now normally oriented and recollected every-
things about herself and others. Moreover, she could recall
what happened in the morning, at least partially. Of the two 10-word lists she had been administered
hours before, she could now recall 4 words and recognize
her friends at a former house, how she had met her former
neighbors, and what they had said. The recall of events
in their order was consistently accurate (as it was
feared afterward with people she had met), but she was,
however, totally unable to reckon their correct duration.
She explained that at that time she experienced a strange feeling “As if I was brought back in the past” or “As if I was backward.” The onset of the amnesic episode could not be
situated precisely but probably occurred on awakening in the night, and it probably lasted at least 10 hours.

It was soon discovered that the patient had experienced several identical episodes since her teenage years. They
occurred about once a year, more frequently after each of
her childbirths, and had become more frequent and men-
eses-related during the last 4 years. An epigastric anguish
aura always preceded them and they were often present on
awakening. During those episodes, she could usually carry
on her usual work but had difficulty in finding things and

Figure 1. Ictal EEG showing generalized continuous rhythmic spikes and spike waves at a 3.5- to 4-Hz frequency, with predominance and occasional phase reversal in anterior frontal regions bilaterally.

Figure 2. Four minutes after 1-mg clonazepam IV, alpha rhythm returns, with persistence of occasional anterior discharges.
prices. She always retained ongoing events and actions. Epigastric aura never occurred in isolation. There was no history of other partial seizures symptoms, no febrile convulsion in childhood, and no family history of epilepsy or absence. Her amnesic episodes had been considered for years by her entourage and physicians as functional or hysterical.

A detailed neuropsychological examination was repeated 2 days later. Memory was normal. Learning and recall of auditory verbal and visual material were within normal ranges, as well as recognition of recurrent words and faces, recognition of famous faces, evocation of past personal facts and events, and memory for public events and people. Language, praxic, and gnosis abilities were normal. A slight disorganization in copying Rey-Osterrieth's complex figure and failure to maintain Luria's alternating graphic sequences were noted, but other frontal lobe function tests were normal. A second interictal EEG 5 days later showed intermittent generalized theta activity without focal or epileptiform abnormalities. MRI with special emphasis on mesiotemporal regions was normal.

A treatment with carbamazepine was introduced progressively, to reach 400 mg b.i.d. There was no recurrence at 6 months follow-up.

**Discussion.** The patient presented a nonconvulsive status epilepticus with generalized spike-and-waves and, as unique ictal behavioral manifestation, a striking memory disorder. During status epilepticus, although there was no identity loss, the patient had a dense retrograde amnesia, with an almost complete inability to retrieve anything about past events, personal facts, public facts or people, and even more general knowledge such as famous places and buildings. At the same time, although the patient behaved as totally forgetful, the ongoing formation of memory traces was remarkably preserved, because she subsequently retained much of the events and actions during the episode itself, as well as several items of the neuropsychological tests, which could be retrieved only after the end of the status epilepticus. Amnesia cleared immediately with suppression of status epilepticus, suggesting that the seizure caused a transient loss of access to memory traces, dissociated from an intact ongoing registration process.

The patient had a history of undiagnosed recurrent similar seizures since her teenage years, with clear hormonal precipitating influences. EEG rhythmicity and generalized spike-and-wave patterns and absence of postictal state and slight ictal eyelids blinking would all be compatible with an absence status, but frontal predominance and intermittent anterior temporal phase reversal of epileptiform activity, together with the anamnestic epigastric aura, suggest a partial seizure onset in anterior temporoinsularic regions with secondary spreading, especially to frontal cortex. In particular, epigastric aura is associated with mesiotemporal or anterior insular involvement. The interictal EEG, however, showed no focal abnormality. Distinction between partial complex status and absence status with focal characteristics as described by Niedermeyer et al. may be difficult, as the entities may overlap.

Alteration of consciousness is variable during generalized nonconvulsive status epilepticus, either absence type or of complex partial type, but although some patients continue to function apparently quite normally, most are dull and confused. Minim confusional state is unlikely to explain the mem- disturbance of our patient. Failure of attention with failure of forming new memories are prominent confusion, resulting in a residual amnesia for the episode, which is exactly the opposite of the patient's case.

There are several reported cases with transi- pure amnesia of epileptic origin. Diagnosis, however, was often based more on abnormalities dur- interictal than ictal EEG. In those cases, abrupt onset of impaired anterograde memory was accompanied by a variable retrograde components and followed by definitive residual memory loss the episode itself. Amnesia probably results from postictal Todd phenomenon due to focal epileptic charges in mesiotemporal regions, probably bilaterally. The ictal clinical manifestations, such brief loss of contact and automatism preceding amnesia attack, may be lacking, subtle, and un- ticed. Amnesia as the only ictal clinical manifesta- tion during nonconvulsive status epilepticus, even of absence type or of complex partial type, has been reported and it was also invariably follow by definitive memory loss for the episode.

The transient memory disorder of our patient clinically and electrophysiologically dissimilar to b- transient epileptic amnesia types. First, it was a p- longed and continuous state related to concomit- generalized seizure. Second, despite both ante- grade and retrograde ictal impairment, there was subsequent residual amnesic “gap.” According to I- pur, predominant retrograde memory loss, only mild or absent anterograde failure, might b- distinctive characteristic of some transient amnes- es of epileptic origin. We are aware of only six report- patients somehow similar to ours, that is, with tr- sient marked retrograde amnesia contrasting w- intact ongoing memorization during the episode. In three cases, an epileptic cause was suggested an interictal EEG abnormality in the left tempo- region, but none of the patients were examined during the acute amnestic period.

Transient inability to access memory traces with out compromise of ongoing memorization empha- that impaired retrieval is dissociable from acqu- tion of new memories and relies on distinct anato- functional substrates. Subclinical discharges li- ited to the hippocampal region can selectively aff- recall without disturbing registration, especia- with high-frequency rhythmic spikes. Retrieval “indexing” units in anterior or medial tempo- structures probably subserve the reactivation pro- cess of neocortical distributed mnemonic stores, as we hypothesize that our patient’s continuous epil-
iform discharges caused a functional disconnection of those indexing networks and thus recall and recognition failure. Seizure activity might preclude the coordinated time-locked reactivation processes subserved by the indexing units, or, alternatively, involvement of frontal lobe structures or connections might be critical in preventing the initiation of retrieval processes.20,26-28

Our patient probably had more than 50 or 60 amnesic episodes for 30 years before seizure was diagnosed, although she never had any other overt seizure. The episodes were considered as hysterical by her family and doctors. Hormonal factors, increasing their occurrence after each of her childbirths,29 strengthened this impression. Indeed, clear distinction between the patient's epileptic amnesia and psychogenic amnesia was possible mainly because of the abnormal ictal EEG. Recognition that such unusual memory disorders may have an organic treatable cause (even if interictal EEG and cerebral MRI are normal) is important.

References


