Denial of Eye Closure in Acute Stroke

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Background and Purpose Many patients suffering from stroke exhibit denial of illness. As part of this symptom complex we observed denial of eye closure. We therefore aimed to document the frequency and phenomenology of denial of eye closure in acute stroke.

Methods Denial of eye closure was sought in 43 cases of denial of illness from a series of 400 acute strokes. Subjects underwent a neurological examination, and audiotaped interviews were performed during which they were asked to finger count through their closed eyes and their denial was challenged.

Results Five of 43 patients with denial of hemiplegia after acute stroke were also found to have denial of eye closure (12%). Denial of eye closure was associated with drowsiness and in all but one patient with disorientation. In the three cases with imaging or autopsy data available, lesions were moderate to large, in the right hemisphere, and involved the frontal lobe. Three subjects confabulated as to what they saw through their closed eyes. One subject mislocalized the hospital closer to her home.

Conclusions Denial of eye closure occurs in a minority of patients with denial of illness after acute stroke. This phenomenon sheds light on denial as a whole and cannot easily be accounted for by unilateral explanations, such as inattention to one half of the body or loss of sensory input. There are aspects of denial, such as denial of eye closure, mislocalization, and the delusional intensity of beliefs, that can only be understood in cognitive terms. (Stroke. 1994;25:1958-1962.)

Key Words • denial • eye abnormalities • stroke

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Denial of Illness Was Originally Described by Seneca Nearly Two Millennia Ago and Denial of Hemiplegia Just Under 100 Years Ago, Yet Explanations of the Phenomenon Remain Unsatisfactory. Denial of Hemiplegia Is Not Uncommon. It Has Been Reported to Occur in 38% of Patients With an Acute Right Hemisphere Stroke, and the Condition Has Also Been Associated With Other Phenomena Such as Repetitive Paramnesia and Failure to Name Objects With a Medical Association.

We Report Denial of Eye Closure, Which Adds to the Types of Phenomena That May Be Observed Within the Overall Rubric of Denial. As with Other Forms of This Phenomenon, Denial of Eye Closure May Be Overlooked Unless Specifically Sought by the Clinician.

Subjects and Methods

Four hundred patients presenting with an acute stroke to a general hospital and a neurological center were screened for denial of illness. Subjects underwent a neurological examination and semistructured interview to determine whether they had denial. Forty-three subjects with denial of hemiplegia after stroke were identified. Denial was defined as present if patients denied either their diagnosis, disability, or the consequences of their disability. If denial was present, an audiotaped interview was recorded, which included questions about eye closure when the eyes remained closed. Neuroimaging and autopsy data were reviewed when available. Five subjects from the group with denial of hemiplegia showed denial of eye closure (four women and one man; mean age, 77.2 years; range, 70 to 82 years). Audiotaped interviews were recorded in four of the five subjects.

Results

Patient 1

Patient 1 was a 79-year-old right-handed woman who collapsed after a focal seizure involving the left side. When assessed 1 day after the event she was drowsy but oriented to person and location although not to date. She had a left homonymous hemianopsia and dense left hemiplegia with left-sided sensory loss. She denied that there was anything wrong with her and also denied that her eyes were closed. She confabulated when challenged. When subsequently reviewed she continued to have denial of illness but no longer had denial of eye closure.

The patient's eyes were closed throughout the interview, which follows.

Interviewer: Can you open your eyes for me? (Eyes remain closed) Are your eyes open?
Subject: Yes.
Interviewer: OK. Can you see me?
Subject: Yes.
Interviewer: OK. How many fingers am I holding up?
(Pause) How many am I holding up?
Subject: One.
Interviewer: How many am I holding up now?
(Pause) How many fingers am I holding up?
Subject: Two.
Interviewer: Your eyes look as though they are closed. Do you feel they are closed or open?
Subject: No, I have opened them.
Interviewer: You have opened them? Are they open at the moment?
Subject: Yes, now.
Interviewer: Can you see me?
Subject: Yes.
Interviewer: Because looking at you they look as though they are closed.
Subject: No.
Interviewer: They're not; they're open, are they?
Subject: Yes.

**Patient 2**

Patient 2 was an 82-year-old woman admitted after the sudden onset of a left hemiplegia. She was interviewed 3 days after the event when she was drowsy and had a Glasgow Coma Scale score of 12. She was oriented to person and place but had the date incorrect by 7 days. Clinically she had left-sided visuospatial neglect and crossed only one star from the far left side of the Behavioral Inattention Test's star cancellation sheet. She had a left homonymous hemianopsia and a dense left hemiplegia with sensory loss on the left. She denied her stroke and hemiplegia but admitted to being in pain.

Throughout the interview the subject's eyes were closed. The interviewer (S.J.E.) was unknown to the subject and has brown eyes and hair with a full beard.

Interviewer: Have you got any weakness anywhere?
Subject: No.
Interviewer: OK. Are your eyes closed? (Pause) Mrs B...
Subject: No.
Interviewer: Are your eyes closed? (Pause) Mrs B., how many fingers am I holding up? (Pause) Mrs B., how many fingers am I holding up?
Subject: No.
Interviewer: Can you see me?
Subject: Yes.
Interviewer: Good. Am I clean shaven?
Subject: Yes.
Interviewer: OK. Can you see my tie? What color is it?
Subject: Yes.
Interviewer: What color is my tie, Mrs B.?
Subject: Navy.
Interviewer: Navy tie, is it? Good.
Subject: Yes.
Interviewer: Your eyes look as though they are closed to me. Do you think they are closed?
Subject: No.
Interviewer: OK. Why do you think I think they are closed?
Subject: (Indecipherable sound)
Interviewer: OK. Let me ask you some more questions. If you were home as you are at the moment, could you manage?
Subject: Yes.
Interviewer: Good. You would be able to go out shopping, would you?
Subject: Yes. (Subject opens eyes.)
Interviewer: You have now opened your eyes. Can you see me?
Subject: Yes.
Interviewer: What do you think, do you think I am clean shaven?
Subject: No. No.
Interviewer: What have I got on my face?
Subject: Oh, dear.
Interviewer: What is it called?
Subject: A beard.
Interviewer: Yes. Why did you think I was clean shaven?
Subject: Because you are very handsome.

After this interview the patient's condition deteriorated, and she died 15 days after her stroke. Postmortem magnetic resonance imaging demonstrated a large infarct in the right middle and anterior cerebral artery territories involving the medial and lateral aspects of the frontal lobe, the parietal lobe, and to a lesser extent the temporal and occipital lobes (Fig 1). Autopsy confirmed these findings.

**Patient 3**

Patient 3 was an 80-year-old right-handed man who suddenly developed a left hemiplegia. He was assessed 1 day after the event, when he had a left homonymous hemianopsia, left visuospatial neglect, and a dense left hemiplegia with left-sided loss of sensation. He was mildly drowsy but oriented to person, time, and place. He denied that anything was wrong with him and denied eye closure.

The following conversation was recorded by S.J.E. 3 days after the event; the patient's eyes remained closed throughout the interview.

Interviewer: Why are you here?
Subject: I do not know.
Interviewer: Do you think you need to be here?
Subject: No.
Interviewer: OK. Are your eyes open?
Subject: Yes.
Interviewer: Can you see me? (Pause) Can you see me, Mr C.? (Pause) Can you see me, Mr C.?
Subject: Not yet.
Interviewer: Your eyes are open, are they?
Subject: Yes.
Interviewer: If your eyes are open, why can't you see me?
Subject: I don't know.
Interviewer: Your eyes are open, are they?
Subject: Yes.
Interviewer: Can you see out of the window? (Pause) Can you see out of the window, Mr C.? (Pause) OK. That's fine. Can you have a look at me again, and are your eyes open now?
Subject: Yes.
Interviewer: Do I have a moustache?
Subject: I don't know that.
Interviewer: What?
Subject: I don't know.
Interviewer: You don't know. Because what I can't understand is why you think your eyes are open if you can't see me. Is there a problem with your vision?
Subject: Not as far as I know.
Interviewer: OK. Because looking at you it looks as if your eyes are closed. (Pause) Is there any weakness in your arms or legs?
Subject: No problems. No.
Interviewer: Pardon?
Subject: No.

Four days after this interview the patient no longer had denial of eye closure. He continued to have elements of denial of illness for another month. A computed tomographic scan of the head demonstrated a right frontal infarct (Fig 2).

Patient 4
Patient 4 was a 75-year-old woman who was interviewed the day after the sudden onset of a left hemiparesis. On examination she was drowsy and oriented to hospital and person but not to date. She denied her hemiparesis and aspects of her disability but admitted feeling unwell. It was impossible to assess visuospatial neglect because of her general condition. She had a left homonymous hemianopsia and a dense left hemiplegia with hemisensory loss.

Throughout the interview the subject's eyes were closed. Later she voluntarily opened them.

Interviewer: Look at me. How many fingers am I holding up? (Pause) Can you see me?
Subject: Yes.
Interviewer: Can you see me?
Subject: Yes.
Interviewer: Are your eyes open?
Subject: Yes.
Interviewer: What?
Subject: No.
Interviewer: No, they are not. Open your eyes. Can you open your eyes, please, Mrs E.? (Pause) Are your eyes open?
Subject: Yes.
Interviewer: Yes. Can you see me?
Subject: Not very clearly.
Interviewer: Pardon?
Subject: Just.
Interviewer: Just. OK, how many fingers am I holding up? (Pause) How many fingers am I holding up? Mrs E.? (Pause) Pardon?
Subject: I can't see.
Interviewer: Can't see?
Subject: (Indecipherable sound)
Interviewer: Are your eyes open?
Subject: Yes.

Interviewer: OK, great; thanks very much.

The patient became comatose the day after the interview, and she died the following day. An autopsy revealed a 9 × 4.5 × 4.5-cm frontoparietal hematoma occupying white matter and extending into the parietal and frontal cortex. Histology demonstrated both congophilic angiopathy and argyrophilic plaques, many with amyloid cores, but no neurofibrillary tangles.

**Patient 5**

Patient 5 was a 70-year-old left-handed woman who was found collapsed on the floor with a left hemiplegia the day before being assessed. She was drowsy and oriented to person but not to date. She knew she was in the hospital but mislocalized the hospital as being within the locality of her home (she lived 150 miles north of Oxford). She recognized that she had had a stroke but denied that there was anything wrong with her. She felt that she could go home to her apartment and do odd jobs. She had a left homonymous hemianopsia and a dense left hemiparesis; clinically she showed left visuospatial neglect, but she was unable to undertake the star cancellation test because of her general condition. When she was asked to open her eyes she failed to do so yet maintained that she had actually opened them. When asked how many fingers the examiner was holding up, she confabulated. For an additional 6 days she continued to mislocalize closer to home, but she no longer demonstrated denial of eye closure, as her eyes were open spontaneously.

**Discussion**

In these five patients with denial of eye closure there was evidence of right hemisphere damage, drowsiness, and variable disorientation. None had evidence of aphasia. All had denial of hemiplegia, although one (patient 5) recognized that she had had a stroke. Denial of eye closure was seen soon after the cerebral insult. In three cases it was observed on a single occasion, but in two cases it persisted for 2 and 4 days. It appeared to depart once drowsiness lifted.

Denial of eye closure, seen in 5 of 43 cases of denial of hemiplegia, appears to be an additional phenomenon associated with the complex syndrome of denial of illness. This failure to admit that the eyes are closed was noted previously en passant but not studied in any formal sense.9 It seems to require the conjunction of drowsiness and denial of illness. The drowsiness may give rise to the eye closure and may be a necessary factor in dulling the critical faculties to allow inconsistencies. Once the subject has denied that the eyes are open, two possible responses to questions about visual stimuli: either admitting that they cannot see (patients 3 and 4) or confabulating (patients 1, 2, and 5). The additional option of not responding to questions was attempted by patient 3, but the interviewer’s persistence made his nonresponding untenable. Surprisingly, an inability to see objects does not result in the admission that there is anything wrong with vision (patient 3).

Patient 5 demonstrated mislocalization of the hospital in addition to denial of hemiplegia, denial of disability, and denial of eye closure. Reduplicative paramnesia was first described by Pick10 in 1903, and the term has subsequently been applied to describe replication of location.5,11,12 In this context the term denotes a condition whereby patients mislocate their geographic position, often with reduplication of the institution in which they are staying. The condition may be associated with other behavioral abnormalities such as disorientation, confabulation, and other delusions.13 For example, a hospitalized patient may believe that the hospital is situated elsewhere, either closer to home or further away. Patient 5 lived in Liverpool, 150 miles distant from Oxford; her mislocalization allowed her spatial disorientation to be recognized. It was initially thought that bilateral lesions, with greater damage involving the right hemisphere and with probable frontal lobe involvement, were necessary for this condition.13 However, two patients with mislocalization have been described with unilateral right-sided lesions.12

Denial of eye closure cannot readily be explained by unilateral theories that attempt to account for denial of hemiplegia such as sensory loss or inattention to one side of the body.15 Although visuospatial neglect can affect both halves of space,16 it remains an inadequate explanation for the denial we describe. Nor can denial of eye closure be attributed to an acute confusional state (ACS) alone, because patient 3 was fully oriented to person, time, and place. In addition, the recorded conversations demonstrate a remarkable similarity in their phenomenology and are too directed to be attributable to generalized confusion. Mori and Yamadori17 distinguish between ACS and acute agitated delirium (AAD) in patients with right middle cerebral artery infarction. None of our patients had AAD. Mori and Yamadori reported that ACS was associated with visual neglect and anosognosia, but they also report ACS without denial. We also found one subject (patient 3) without ACS, so clearly a double dissociation can exist. Although ACS and denial may be associated with each other and with middle cerebral artery infarction, ACS cannot be an adequate explanation for denial of eye closure.

An apraxia of eye opening could be a partial explanation, but the denial aspect would still remain unaccounted for. Dehen and Cambier18 described three patients with unilateral right parietal lesions whose total inability to close their eyes is in direct contrast to the phenomenon we describe. All three patients also exhibited left-sided spatial neglect. The authors suggest that an inability to voluntarily close the eyes should be viewed as motor impersistence and could be due in part to an imbalance between the two hemispheres, i.e., an antagonism between lid closure and speech activity. There have been reports that vestibular stimulation temporarily reduces visuospatial neglect19 and denial of hemiplegia.20 This is proposed to operate by selectively activating the contralateral hemisphere. It would therefore be of interest to observe whether this technique induces transient alteration in denial of eye closure.

The dysfunction seen in denial of eye closure seems to require two possibly distinct elements: a will not to acknowledge eye closure and a lowering of critical faculties to allow apparently incongruous statements. It is of interest that the subjects with known lesion localization (patients 2, 3, and 4) had frontal lobe involve-
ment. Frontal lobe dysfunction has been described as being associated with a "failure of judgement."22
Whatever the other contributory factors (visuospatial neglect, sensory loss, or general cognitive impairment) that help to produce the denial of illness syndrome, some central representation of self seems to be avoiding aspects of illness in these five patients. The deficit in denial is not necessarily limited to hemispace, as exemplified by denial of eye closure. The beliefs that deniers hold are often defended with a delusional intensity that is more reminiscent of psychiatric illness than organic brain disease. The dysfunction appears to be at a cognitive level, ie, the dysfunction occurs at a level in the hierarchy of brain functioning where self-image and views of self within the world are represented. Any description limited to a less sophisticated level is unable to encompass the thought disorder characteristic of denial.

References
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