

# Transient Global Amnesia Precipitated by Emotion in an Adolescent

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## Abstract

Transient global amnesia has been reported to be precipitated by intense emotion in adult patients. Transient global amnesia is uncommon in the pediatric age group. We report the unusual occurrence of this syndrome, apparently precipitated on two occasions by emotion, in an adolescent who had earlier in life suffered a left temporal and occipital lobe embolic infarction from congenital heart disease. Transient global amnesia following intense emotion may be a cause of some confusional states in children and adolescents. (*J Child Neurol* 1988;3:185-188).

Transient global amnesia is rare in the pediatric age group. This syndrome, which usually affects middle-aged and elderly persons, was first reported by Bender in 1956<sup>1</sup> and further described in detail by Fisher and Adams in 1964.<sup>2</sup>

Transient global amnesia consists of a sudden anterograde amnesia (inability to acquire new information), an associated retrograde amnesia (inability to remember recent events), and unaffected immediate and remote memory.<sup>2,3,4</sup> The amnesia lasts less than 24 hours and recurrences are infrequent.<sup>5,6</sup> Many attacks of transient global amnesia are accompanied by anxiety about the amnesia, but other neurologic signs are conspicuously absent. Transient global amnesia has been identified in which antecedent events "triggered" the amnesia. Some of the precipitants have included immersion in cold water, sexual intercourse, physical pain or exertion, and disturbing emotional events.<sup>2,4,5,6,7</sup> Recently the clinical characteristics and prognosis of 277 adult patients with transient global amnesia were extensively reported.<sup>8</sup>

We present a 17-year-old patient who experienced

transient global amnesia on two occasions following psychologically stressful events.

## Case Report

A 17-year-old left-handed male was evaluated following two episodes of behavioral and memory disturbances. The first episode occurred at 15 years of age when he was admitted to a local hospital with acute appendicitis. Two hours before surgery, while resting comfortably in the hospital room, before premedication had been given, the patient suddenly appeared frightened and confused. He began to question his mother "What am I doing here?" "What is happening to me?" "How did I get here?" After seeing a speaking to his grandmother, who then stepped out of the room, he asked when his grandmother was arriving. After these questions were answered and the patient was reassured by his mother he would repeat the same questions. During this episode the patient retained recognition of self and of his family. The episode lasted until surgery. Postoperatively the patient appeared normal with complete resolution of symptoms except for a retrograde amnesia for the two- to three-hour period prior to surgery. The second episode of transient global amnesia occurred six months later on the day of the Space Shuttle Challenger's explosion on January 28, 1986. The patient was eating in the den at home and watching the television coverage of the explosion, when he suddenly appeared frightened and unaware of what he had been doing. He asked how and when he had gotten to the chair in which he was sitting, if he had already eaten dinner, what time it was, and what he had been doing within the last hour. Some questions were repeatedly asked every five to ten minutes. The entire amnesic episode lasted approximately three hours with gradual resolution except for amnesia of the event itself. During both episodes he had no headaches, dizziness, visual disturbance, speech or language distur-

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bance, pallor, or other complaints. No other signs or symptoms of complex partial seizures or migraine occurred.

His past medical history was significant for congenital aortic valvular stenosis. At age 6 years he had an embolus from aortic valvular endocarditis leading to infarction of the left occipital and mesial temporal lobe. That stroke was manifested by weakness of the right leg and tremor of the right arm, but no identifiable disturbances of language or of visual or mental status. His aortic valve was replaced at 7 years of age. He had no further transient ischemic attacks, headaches, seizures, trauma, or meningitis. The patient was maintained on warfarin therapy to prevent recurrent emboli from his aortic valve. His family history included no members of the family with migraines, cardiovascular disease, or neuropsychiatric disturbances.

The physical examination at the time of neurologic evaluation was significant for a grade II/VI systolic murmur best heard at the right second intercostal space, radiating to the axilla and back. On physical examination, there was no evidence of embolic or vasculitic disease. Formal neurologic examination revealed a dense right homonymous hemianopsia, but no other abnormalities. The mental status examination was normal including immediate, recent, and remote memory, speech and language, affect and mood, and judgment and cognition.

Cerebral arteriography revealed an abrupt cutoff of the left posterior cerebral artery. No posterior communicating arteries were visualized. Computed tomography (CT) with contrast injection revealed porencephaly of the left

mesial occipital lobe and enlargement of the left lateral ventricular occipital horn. The left mesial temporal lobe appeared atrophic (Figure 1). Magnetic resonance imaging revealed decreased signal intensity in the left mesial occipital lobe using T<sub>1</sub>-weighted images which became increased using T<sub>2</sub>-weighted images (Figure 2). An awake and asleep electroencephalogram (EEG) demonstrated no evidence of epileptiform activity or significant slowing. A 24-hour, four-lead ambulatory EEG was performed, which revealed no epileptiform activity.

The patient was discharged on warfarin. In the last 12 months he has had no further episodes of seizures, transient ischemic attacks, transient global amnesia, or other ictal events.

## Discussion

Neuroradiographic studies in this adolescent demonstrated that he had pre-existing congenital and acquired anatomical cerebrovascular defects that might have predisposed him to the development of transient global amnesia. Arteriography revealed the absence of the posterior communicating arteries, a congenital vascular anomaly in the Circle of Willis. Such anomalies are common, with only 50% of the population having a "normal" configuration.<sup>9</sup> Anom-

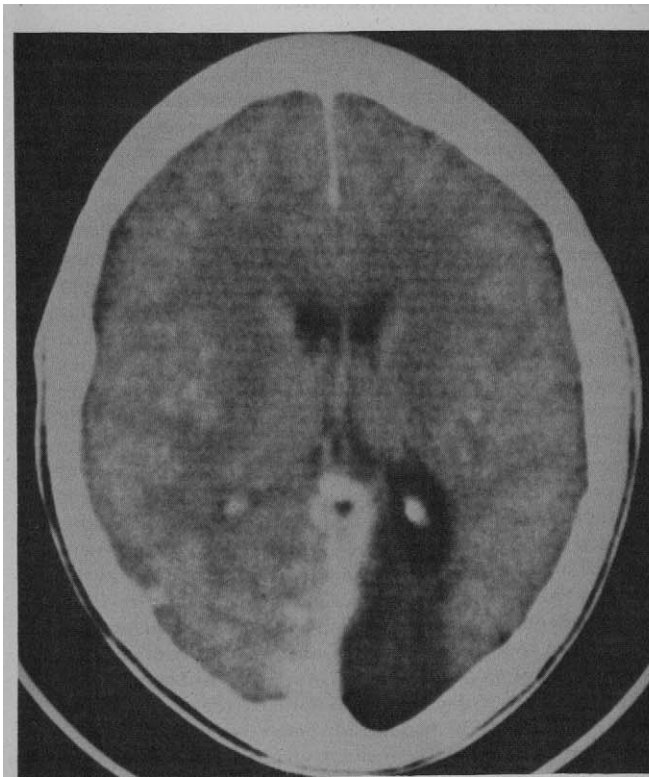


FIGURE 1  
CT scan demonstrating left mesial occipital lobe porencephaly and ex vacuo enlargement of the occipital horn.

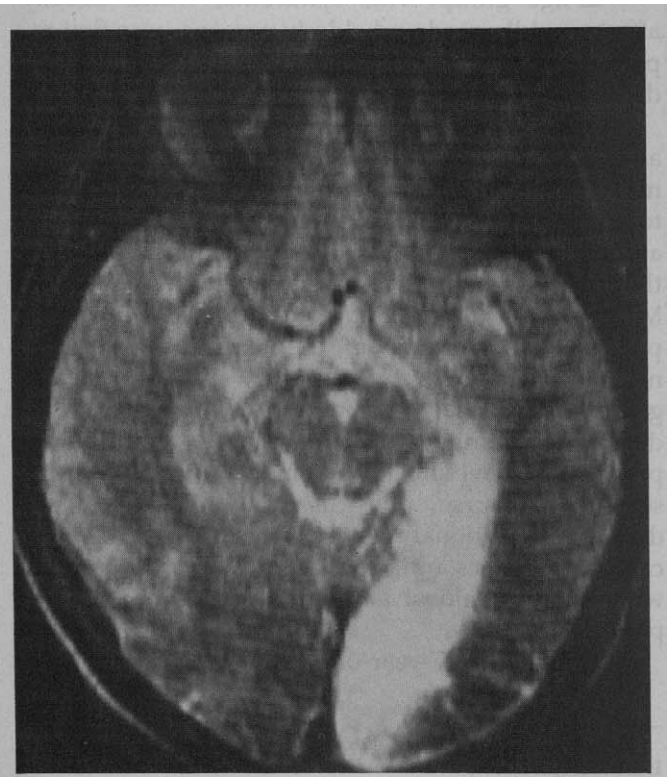


FIGURE 2  
MRI with T<sub>2</sub>-weighted images demonstrating left mesial occipital and temporal lobe porencephaly.

alies of the Circle of Willis such as this are associated with a higher incidence of cerebrovascular accidents, since collateral flow cannot rapidly be established in the case of sudden obstruction of another vessel. This anomaly would become clinically significant if an additional acquired insult to the Circle of Willis occurred. In this patient, presumably emboli from his damaged aortic valve lodged in the left posterior cerebral artery, infarcting the tissue supplied by this artery. Since an intact Circle of Willis was not present, collateral flow was not possible and tissue infarction of the occipital and mesial temporal lobes occurred. We could not prove that recurrent emboli precipitated the transient global amnesia episodes. The patient was appropriately anticoagulated prior to the transient global amnesia episodes, and it would seem unlikely that recurrent emboli entered the posterior cerebral artery circulation on two more occasions, since hemodynamic factors generally favor left ventricular or aortic emboli preferentially flowing to the anterior circulation, in particular, the middle cerebral vessels. Transient global amnesia associated with posterior cerebral artery infarction in adults appears particularly unusual; transient global amnesia did not occur in one series of 350 posterior cerebral artery stroke cases (C Miller Fisher, personal communication, 1987).

The fact that the patient had pre-existing left mesial temporal lobe pathology is significant. Recent memory is carried out in the mesial temporal lobes, in particular in the hippocampal formations. Unilateral injury to the right hippocampal formation will not result in loss of recent memory. Amnesia can occur transiently following unilateral left hippocampal lesions. Transient or lasting injury to either mesial temporal lobe when the contralateral mesial temporal lobe has already been damaged will often cause recent memory loss.

Transient global amnesia is a recent memory disturbance, which generally occurs in adults and only rarely in the pediatric age group. The pathophysiologic basis of transient global amnesia is unclear. Since it usually occurs in a patient population prone to arteriosclerotic cerebrovascular disease, bilateral arterial insufficiency to the mesial temporal lobes produced by either extracranial (for example, vertebral arteriosclerotic plaques or left ventricular or aortic valvular emboli) or intracranial arteriosclerotic disease is a possible explanation.<sup>3,4,10-12</sup> Migrainous changes in vessels supplying the mesial temporal lobes might also cause transient global amnesia.<sup>3,5,13,14</sup> The mesial temporal lobes are particularly prone to epileptiform activity. Epileptiform activity in the hippocampal formation has been implicated as a possible cause of

transient global amnesia and has prompted the use of anticonvulsant therapy in some patients.<sup>5,13,15-17</sup> EEG recordings during episodes of transient global amnesia have failed to document epileptiform activity, and only mild or moderate and nonfocal abnormalities have been observed in a minority of patients following transient global amnesia.<sup>14,18</sup> Transient global amnesia has also been reported to be associated with a variety of other conditions or procedures including polycythemia,<sup>10,13</sup> migraine,<sup>19</sup> tumors of the mesial temporal lobes,<sup>20,21</sup> digitalis toxicity,<sup>22</sup> diazepam toxicity,<sup>23</sup> cerebral and cardiac arteriography,<sup>24</sup> arterial digital subtraction angiography,<sup>25</sup> myxomatous degeneration of the mitral valve,<sup>10</sup> and arterial embolism.<sup>26</sup> Of the rare reported cases of transient global amnesia in childhood, a 16-year-old male developed transient global amnesia lasting nine hours during an all-night hike during which he became cold and drenched in the rain.<sup>6</sup> Dinsmore and Callender suggested that exposure to the cold precipitated transient global amnesia in the boy.

Acute confusional migraine, a condition relatively more common in the pediatric age group than in adults, exhibits similarities with transient global amnesia. In acute confusional migraine, the child develops an agitated confusion, with or without other signs or symptoms of migraine. The spells may be associated with amnesia for the episode.<sup>27-29</sup> Although the neuroanatomic basis for acute confusional migraine is not known, it is reasonable that bilateral posterior cerebral artery migrainous activity could present with both agitated confusion and amnesia.

Fisher described 78 patients, 48 to 84 years of age, who developed a total of 85 episodes of transient global amnesia.<sup>5</sup> Of these 85 episodes, 26 were associated with an unusual precipitating event. These events were usually emotionally or physically painful, related to sexual intercourse (7 of 26), or followed diving into the cold waters off the north Atlantic Ocean coast (3 of 26). Examples cited by Fisher of emotionally painful precipitants included a man robbed and handcuffed by thieves, a woman tearfully reconciled with her daughter who had run away, a woman whose husband died before her eyes, a man forced to resign his long-held job, a woman having a bitter fight with her husband, and others. All of Fisher's patients developed transient global amnesia in close proximity to the emotionally stressful event.

Fisher speculated that this association of pain, emotion, and temperature precipitating transient global amnesia might have a common anatomic explanation. Both emotion and memory share a similar neuroanatomic territory. Since both emotion and

memory share these structures anatomically and, presumably, physiologically, intense afferent input might reasonably be expected to alter the orderly processing of recent memory.

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