

Amnesia Following Hot Water Bath from Gas Geyser

Sir,

A 48-year old had light-headedness followed by loss of consciousness while she was having bath with hot water from a gas geyser on a winter morning. She was found unconscious in bathroom with pulseless state requiring chest compression and mouth-to-mouth breathing and could be revived in 2–3 min. She had retrograde amnesia of events before bath. In hospital, her blood sugar and electrolytes were normal. On a personal note, she was habitual for bathing for 30–45 min daily, and on the day of ictus, she was in bathroom for more than 30 min.

She was treated with intravenous fluids and antiepileptic empirically (phenytoin at 20 mg/kg, intravenous). Her electrocardiogram and 24 h Holter monitoring were normal. Her electroencephalogram was also normal. Magnetic resonance imaging (MRI) of her brain revealed true diffusion restriction in bilateral hippocampus on diffusion-weighted images (DWIs) [Figure 1]. The hippocampal lesions were bright on T2-weighted sequences [Figure 2]. MR angiography was normal. Her cerebrospinal fluid (CSF) examination was normal (four lymphocytes, protein of 38 mg/dL, glucose of 78 mg/dL against paired blood glucose of 102 mg/dL). Her CSF autoimmune antibody panel (anti-NMDAR antibody, anti-LGI1, anti-CASPR, anti-GABA-A and GABA-B, anti-GAD antibody) was negative. She was discharged from that hospital after 24 h on oral phenytoin sodium (300 mg/day).

Her episodic and working memory did not improve over the next 6 days and examination revealed the following: forward digit span of 4 and backward digit span of 3 with deficits in recent memory. Her Mini-Mental State Examination was 26/30 (lost 3 points in recall and 1 point in 3-step commands). Remote memory, semantic memory, and rest of neurological examination were normal.

She did not give any prior history of migraine, epigastric or auditory aura, and alcohol or any drug intake. Her lipid profile, glycosylated hemoglobin, and routine hematochemistry were normal.

She had mild recovery in her working memory on follow-up at 2 months but she was still significantly disabled to join her work.

On enquiry from family, it was revealed that her brother-in-law had similar episodes of unconsciousness for about 2–3 min while he was having bath with hot water from gas geyser in the same bathroom 2 days ago. He had similar retrograde and anterograde amnesia for 36 h but had complete recovery after that. He was not investigated.

Unexplained neurological events have been described in literature during bathing with hot water from gas geysers due to carbon monoxide (CO) poisoning.^[1,2] These may range from seizure like episodes to toxic/hypoxic encephalopathy and even death. Singh *et al.* reported memory deficits and parkinsonian features on recovery from altered sensorium.^[1] Our patient had only persistent memory loss after recovering from cardiac arrest. Toxic injury to the hippocampus due to harmful emissions of CO, hydrocarbons, and nitrogen oxides formed by incomplete combustion of liquefied petroleum gas in gas geyser could be the cause of memory deficit in our patient.^[1]

Reports of MRI brain in gas geyser syndrome suggest either normal or non-specific (loss of gray–white matter differentiation) changes.^[2] T2 hyperintensity in bilateral globus pallidi and diffusion restriction in bilateral occipital lobe^[1,2] are the other described findings. Regarding acute CO poisoning, abnormalities in MRI have been shown in basal ganglia complex, subcortical and periventricular white matter, cerebral cortex, and hippocampus.^[3,4] It was also shown that those having hyperintensity in hippocampus had no other areas of cortical involvement. The MRI findings of diffusion restriction and T2 hyperintensity in bilateral hippocampal region in our patient further strengthen our view that CO poisoning from gas geyser may have lead to hippocampal injury and resultant amnesia. Other possibility of transient autonomic imbalance (parasympathetic underactivity with associated sympathetic dysfunction) on exposure to hot water leading to bradycardia, hypotension, cardiac arrest, and resultant post-arrest MRI changes remains.^[1,5] However, relatively similar history in one more unrelated family member points more in favor of an acquired cause (CO poisoning in this context) and not a genetic channelopathy of cardiac arrest, even if we consider the MRI findings to be post-arrest changes.



Figure 1: Diffusion-weighted image showing gyriform pattern of diffusion restriction in bilateral hippocampus

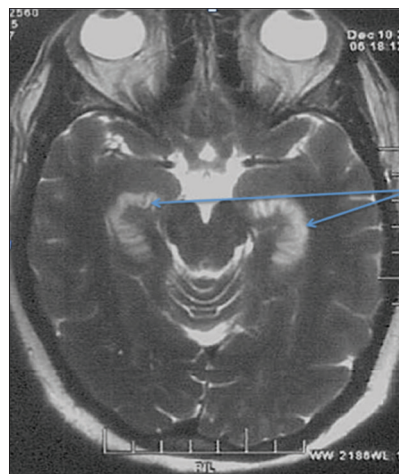


Figure 2: T2-weighted images showing increased hyperintensity in gyriform pattern in bilateral hippocampal region

Other radiological possibility of Transient global amnesia (TGA) was unlikely in our case as TGA is acute-onset anterograde amnesia with inability to form new memories during that period lasting less than 24 h with complete recovery. MRI features include punctate foci of bright signal in DWI images of hippocampus.

Toxic gases emanating from gas geyser in a closed bathroom can cause injury to various neural structures including hippocampus. Awareness of these toxic effects may help prevent further catastrophic sequelae from gas geyser use.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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