Neuropsychiatric sequelae of attempted hanging and diagnostic dilemmas

Suicide is an important cause of death worldwide, and India is not immune to this major health problem. Suicide by hanging is one of the lethal methods widely practiced. However, literature is very sparse as well as old in the context of neuropsychiatric consequences seen in those who survive such attempts. We present a case of a young boy who survived an attempted hanging and was left with neuropsychiatric sequelae in the form of retro/anterograde amnesia, aggression, lability of affect, and impaired memory and visuomotor deficits. The associated diagnostic dilemmas, namely whether to diagnose such patients with Korsakoff’s psychosis, organic amnestic syndrome, or major neurocognitive syndrome, are discussed and a brief review of literature of this largely ignored area is also presented.

S uicide has become an important public health issue in view of increased numbers of suicides globally and nationally. The national estimates of suicide rate in individuals aged ≥15 years are 22 for each 100,000 of population, with suicidal hanging being the most frequently used modus operandi.[1]

Suicidal hanging, a lethal method, is different from other modes of suicide in the mechanism of causation of death. A range of factors are implicated in causation of death by hanging that include carotid and vertebral artery occlusion, jugular venous compression, tracheal obstruction, stimulation of carotid sinuses, and the parasympathetic and sympathetic nervous systems.[2,3] Hanging leads to both hypoxic/anoxic injury and ischemia. The former is due to obstruction of airway and the latter is due to occlusion of blood flow and is significant in causation of cerebral necrosis.[4,5] Human brain requires a continuous supply of oxygen to sustain function which if disrupted leads to activation of autoregulatory mechanisms that maintain a minimum supply of oxygen but to a certain level only.[5] Furthermore, there is selective vulnerability of different brain regions to sustain hypoxic–ischemic injuries such as hippocampus, striatum, thalamus, globus pallidus, and third layer of cerebral cortex, which are more prone.[2,6] Thus, survivors of cerebral anoxia due to suicidal hanging may present with varying neurological deficits and psychiatric symptoms/syndromes, which in the past had received differing diagnoses such as acute and chronic amnestic syndromes, dementia, Korsakoff’s syndrome, and even hysteria.[2,7,10] This case report and

Access this article online

Quick Response Code:
Website: www.industrialpsychiatry.org
DOI: 10.4103/ipj.ipj_46_15

How to cite this article: Aneja J, Jangli S, Kulhara P, Bathla M. Neuropsychiatric sequelae of attempted hanging and diagnostic dilemmas. Ind Psychiatry J 2017;26:239-42.
literature review highlights neuropsychiatric sequelae of suicidal hanging and dilemmas in diagnosing them.

**CASE REPORT**

In October 2014, a 22-year-old male survivor of suicidal hanging was brought to our psychiatric outpatient unit with severe cognitive and behavioral problems. At the age of 20 years, he was diagnosed with ulcerative colitis for which he received oral/local steroids, aminosalicylic acid, and antibiotics off and on with frequent exacerbations. One and a half year later, he developed depressive symptoms in the form of low mood, reduced interest in work as well as his daily routine, anhedonia, getting tired easily, disturbed sleep, bleak and pessimistic views of future, and ideas of hopelessness and worthlessness. On one occasion, he voiced his wish to die to his paternal uncle who consolated him. One evening when the family members were otherwise busy, the patient slipped away from home and sneaked into the fields. Within 10–15 min, the family members tried to reach the patient on phone, but it was switched off. Sensing it to be unusual, they went to search him in the fields and found him hanging, by a ligature tightened to a tree with the patient’s feet about 1 foot above ground. The family members brought him down and removed the ligature. He had turned blue and was gasping at the time of rescue and was taken to a nearby private multispecialty hospital. As per the information available from his medical records, he was kept on artificial ventilation in the Intensive Care Unit (ICU). He survived the attempt but remained in coma for nearly 72 h. There was no evidence of spinal fracture and hypoxic/ischemic changes in the brain on neuroimaging. In the initial 3–4 days of regaining consciousness, he remained disoriented to time and place but remembered relatives who visited him. He would be very aggressive, did not remember the hanging episode as well as events of almost 6 months preceding the attempted suicide, and showed confabulation. He had hoarse voice as well as difficulty swallowing for initial days, so nasogastric feeding was done for around 9–10 days during the hospital stay. No tracheostomy was done. He was managed in ICU for a week and was discharged from the hospital after another 1 week. One month after the incident, anterograde/retrograde amnesia, confabulation, and emotional lability and impulsivity (suggestive of executive function deficits). Although he was nonalcoholic, one may contend thiamine deficiency due to ulcerative colitis as a possible etiological factor. However, clear-cut temporal relationship of symptoms to the hanging attempt made it a more relevant etiology. Our final diagnosis was organic amnesic syndrome, not induced by alcohol and other psychoactive (International Classification of Diseases, 10th revision [ICD-10]), intentional self-harm, severe depressive disorders currently in remission and ulcerative colitis.

With this clinical presentation, we ended up in a diagnostic dilemma. Conceptually, our patient fulfills most of the clinical features of Korsakoff’s syndrome as he had anterograde amnesia, confabulation, and emotional lability and impulsivity (suggestive of executive function deficits). Although he was nonalcoholic, one may contend thiamine deficiency due to ulcerative colitis as a possible etiological factor. However, clear-cut temporal relationship of symptoms to the hanging attempt made it a more relevant etiology. Our final diagnosis was organic amnesic syndrome, not induced by alcohol and other psychoactive (International Classification of Diseases, 10th revision [ICD-10]), intentional self-harm, severe depressive disorders currently in remission and ulcerative colitis.

**DISCUSSION**

Hanging has been defined as death due to external pressure on the neck where the force being applied is due to suspension of a part or whole of the body weight. In literature, the term “near hanging” is used to refer to those victims who survive a hanging injury long enough to reach hospital. There have been some case reports/series where victims of suicidal/judicial hanging had survived following intensive resuscitation measures as well as some reports of delayed death. Some authors have suggested that irrespective of initial presentation, even severe neurological defects may be reversible if resuscitation is instituted within half an hour of suspension, but before cardiac arrest has occurred. While some other observational studies on near-hanging victims have shown that lower level of sensorium at presentation and greater lapse of time in hours from incident to arrival at hospital predicts poor outcome. In the index case, we do not have sufficient details about the incident of hanging, time lapse and level of sensorium at the time of presentation to the hospital, and details of vital parameters, so it is difficult to establish the severity of hanging injury. However, a normal cervical spine and absence of cerebral edema, hypoxic/ischemic injury, and cardiopulmonary complications probably favored the outcome.
The major long-term complications of near hanging are neuropsychiatric and scientific papers on this subject are very limited. Berlyne and Strachan[5] described in detail a patient of suicidal hanging who subsequently developed neuropsychiatric sequelae and reviewed the available literature. The patient in their report had spatial and temporal disorientation and confabulation. Hence, he was initially diagnosed with hysterical pseudodementia. However, on further observation and assessment, he was found to have severe memory impairment, confabulation, marked apathy, and self-neglect; therefore, diagnosis was later revised to Korsakoff’s syndrome and the neuropsychiatric symptoms were attributed to the anoxic injury of brain. Twenty-two years later, Collins and Jacobson[31] reported a very interesting case of a young woman who was a known case of bipolar affective disorder and suffered anoxic brain injury following suicidal hanging and later developed clinical features which were very difficult to be clearly delineated into organic and psychological categories. Her neurological symptoms of mutism, dystonia (grimacing, pouting, and head turning), intermittent urinary incontinence, pupillary changes, and poor self-care and abnormal electroencephalogram were attributed to seizures originating from frontal lobe damage, while visual range finding abnormalities and variability in performance of routine tasks were labeled as hysterical. Medalia et al.[10] reported two patients who developed isolated memory deficits (severe antero/retrograde amnesia) following suicidal hanging. They did not find any other cognitive deficits or personality deterioration in their patients, and a diagnosis of delayed postanoxic syndrome was considered for both of the cases. Zabel et al.[40] comprehensively examined the neuropsychological profile in two young survivors of suicidal hanging. Memory deficits were present in both of the cases in initial recovery period, but persisted in only one. Both of the patients displayed deficits in visuospatial and executive functioning, but one of them exhibited significant deficits in areas of attention and language too. Changal et al.[22] reported a case of suicidal hanging from India who developed hypoxic ischemic injury and amnesia for the incident which improved during the course of treatment. In a review of the neuropsychological and neuropathological outcomes of cerebral anoxia of different etiologies, it was found that memory alone was affected in 19% of cases, and in 54% of cases, memory deficits were present with other neuropsychological sequelae such as instability of mood, apathy, and intellectual impairment. Personality and changes in behavior were noted in 46.2% and visuospatial deficits in 31.3% of cases.[9]

Although there has been research on the neuropathological and neuropsychological consequences due to cerebral anoxia and ischemia due to cardiovascular etiologies, little attention has been paid to survivors of attempted suicidal hanging presenting with neuropsychological symptoms. This is also evident from the classification of mental disorders according to two major systems (ICD-10 and Diagnostic and Statistical Manual of Mental Disorders, 5th edition) where diagnosis for neurocognitive impairments in survivors of suicidal hanging does not find place. At the most, the earlier mentioned categories can be extrapolated to arrive at a diagnosis. Another important issue beyond assessing and diagnosing the survivors of suicidal hanging presenting with neuropsychiatric sequelae is provision of social welfare benefits which will again depend on proper assessment and diagnosis.

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.

Acknowledgment
We thank Dr. Sonam Arora for her contribution in writing this manuscript.

Financial support and sponsorship
Nil.

Conflicts of interest
There are no conflicts of interest.

REFERENCES

1. Patel V, Ramasundarahettige C, Vijayakumar L, Thakur JS, Gajalakshmi V, Gururaj G, et al. Suicide mortality in India: A nationally representative survey. Lancet 2012;379:2343-51.
2. Berlyne N, Strachan M. Neuropsychiatric sequelae of attempted hanging. Br J Psychiatry 1968;114:411-22.
3. Miyamoto O, Auer RN. Hypoxia, hyperoxia, ischemia, and brain necrosis. Neurology 2000;54:362-71.
4. Zabel TA, Slomine B, Brady K, Christensen J. Neuropsychological profile following suicide attempt by hanging: Two adolescent case reports. Child Neuropsychol 2005;11:373-88.
5. Strandgaard S, Paulson OB. Cerebral autoregulation. Stroke 1984;15:413-6.
6. Adams N. Near hanging. Emerg Med 1999;11:17-21.
7. Collins MN, Jacobson RR. Changing interactions between bipolar affective disorder and anoxic brain damage. Br J Psychiatry 1990;156:736-40.
8. Markowitsch HJ. The neuropsychology of hanging: An historical perspective. J Neurol Neurosurg Psychiatry 1992;55:507.
9. Caine D, Watson JD. Neuropsychological and neuropathological sequelae of cerebral anoxia: A critical review. J Int Neuropsychol Soc 2000;6:86-99.
10. Medalia AA, Merriam AE, Ehrenreich JH. The neuropsychological sequelae of attempted hanging. J Neurol Neurosurg Psychiatry 1991;54:546-8.
11. Howell MA, Guly HR. Near hanging presenting to an accident and emergency department. J Accid Emerg Med 1996;13:135-6.
12. Pradeep KG, Kanthaswamy V. Survival in hanging. Am J Forensic Med Pathol 1993;14:80-1.
13. Karanth S, Nayyar V. What influences outcome of patients with suicidal hanging. J Assoc Physicians India 2005;53:853-6.
14. Wahlen BM, Thierbach AR. Near-hanging. Eur J Emerg Med 2002;9:348-50.
15. Sabermoghaddam M, Abad M, Golmakani E, Mozaffari N. Survival after judicial hanging. Am J Forensic Med Pathol 2015;36:56-7.
16. Kodikara S. Attempted suicidal hanging: An uncomplicated recovery. Am J Forensic Med Pathol 2012;33:317-8.
17. Nithin MD, Manjulatha B, Pramod Kumar GN, Sameer S. Delayed Death in Hanging. J Forensic Res S1:001. doi:10.4172/2157-7145.S1-001.
18. Taware AA, Jadhao VT, Tatiya HS. Delayed death in suicidal hanging: A case report. J Forensic Med Sci Law 2013;22:1.
19. Aggarwal NK, Kishore U, Agarwal BB. Hanging-delayed death (a rare phenomenon). Med Sci Law 2000;40:270-2.
20. Penney DJ, Stewart AH, Parr MJ. Prognostic outcome indicators following hanging injuries. Resuscitation 2002;54:27-9.
21. Vander Krol L, Wolfe R. The emergency department management of near-hanging victims. J Emerg Med 1994;12:285-92.
22. Changal HK, Raina AH, Parray MA, Allai MS. Attempted suicidal hanging leading to hypoxic ischemic encephalopathy. Int J Med Health Sci 2013;2:376-81.