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Case Report

## Isolated posterior inferior cerebellar artery stroke secondary to near-hanging: A case report

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Suicide is the eighth leading cause of death in males, while strangulation injuries account for approximately 2.5% of all traumatic deaths worldwide. Hanging or 'self-suspension' is a form of ligature strangulation where the pressure is produced by the weight of the body itself. It is easily accessible, comparatively painless, almost always suicidal and cheap method of committing suicide. These attributes make it one of the most common methods of committing suicide all over the world. We report a case of isolated posterior inferior cerebellar artery stroke secondary to hanging, (which is a very rare entity) in a 15 years old boy brought in an unconscious state following a suicide attempt to the emergency in GTBH, Delhi. He presented there with a Glasgow Coma Scale score of 6/15, ligature mark over the neck, normal vital signs with low oxygen saturation by pulse oximeter, cyanosis, subconjunctival hemorrhage and positive bilateral Babinski sign. The patient was intubated and put on ventilator support in view of respiratory failure. Patient's magnetic resonance imaging (MRI) brain was done which showed left posterior inferior cerebellar artery territory infarct with cytotoxic edema in bilateral thalami, most likely due to hypoxia. After vigorous treatment in the intensive care unit with fluid restriction, mannitol and intravenous antibiotics he was extubated and transferred to the general ward with glasgow coma scale score of 8/15 (E4V1M3). Later patient was discharged from the hospital and with an advice to follow up in medical and psychiatry outpatient departments. Survival and recovery after partial hanging is possible if proper care is given as early as possible. We also need to understand the changes which adolescents face in their day to day life and hence be more alert to any social, emotional or professional stress in their life. Also, we should provide counseling and necessary support so that such accidents are deterred.

**Key words:** Near-hanging, posterior inferior cerebellar artery stroke.

### INTRODUCTION

Suicide is the eighth leading cause of death in males, while strangulation injuries account for approximately 2.5% of all traumatic deaths worldwide (Omalu et al., 2011). The rates of suicide have greatly increased among youth, and youth are now the group at highest risk in one-third of the developed and developing countries. The suicide rates in India risen from 6.3 per 100,000 in 1978

to 8.9 per 100,000 in 1990, an increase of 41.3% during the decade from 1980 to 1990, and a compound growth rate of 4.1% per year.

The methods of self-inflicted lethal injury were hanging (46%), use of firearms (24%), jumping in front of a train (11%), drug intake/intoxication (8%), drowning (5%), jumping from height (4%) and use of explosives (1%).

Hanging is one of the most common methods of suicide, especially among victims who have suffered extreme traumatic experiences and have a diagnosed posttraumatic stress disorder (Mihaljevic et al., 2012; Mythri and Ebenezer, 2016). Hanging or 'self-suspension' is a form of ligature strangulation where the pressure is produced by the weight of the body itself. It is easily accessible, comparatively painless, almost always suicidal and cheap method of committing suicide, which is usually fatal and hence one of the most common methods of committing suicide all over the world. Injuries emerging in cervical near-hanging victims depend upon the type of strangulation cord, the knot location, the height of the fall, complete or incomplete suspension and duration of hanging (Knight B. Simpson's Forensic Medicine, 1997; Singhal et al., 2002). Injury in hanging mainly arises through pressure on the neck veins and arteries compression of the airway is less common and cervical spine injuries are quite rare. Laryngeal injuries like thyroid cartilage and hyoid bone fractures are seen less often. The external compression causes venous cerebral congestion, hypoxic circulation, reduced arterial cerebral supply and may succumb due to severity of hypoxic and ischemic brain injury. But, there is a chance of survival if the person is brought down after short period of suspension and treated in hospital immediately. Carotid artery injuries in patients who have tried to commit suicide by hanging occur in approximately 3% of victims, either as dissection or occlusions, which may be unilateral or bilateral (Singhal et al., 2002). The brain injury mechanism after near-hanging may be the result of either hypoxic encephalopathy without ischemia or cerebral infarction. Treatment options in cases with acute cerebral infarction are limited due to abundant comorbidity and numerous contraindications for intravenous thrombolytic therapy that usually accompany near-hanging victims, primarily acute bleeding and bone fractures (Svjetlana et al., 2013). We report a case of isolated posterior inferior cerebellar artery stroke secondary to hanging, which is a very rare entity and no case report could be found with similar finding in literature. The mechanism of involvement of posterior inferior cerebellar artery is not very clear and we assume possibility of some congenital anomaly in arterial system of patient, details of which require MR angiography in the future visits of patient.

## CASE REPORT

A Hindu male aged 15 years male presented in emergency (Guru Tegh Bahadur Hospital, Delhi) with an alleged history of attempted suicide by hanging. He was

found hanging from ceiling fan at his home and was rushed to the hospital thereafter by some coworkers. According to history, patient had some altercation with his girlfriend and took this extreme step.

At the time of admission to the hospital he was unconscious, without history of seizure, bleeding from nostrils, eyes and mouth. The pulse rate was 84/min, blood pressure was 110/80 mm Hg, respiratory rate was 18/min and oxygen saturation by pulse oximeter was <80%. Both pupils were mid-dilated and responding to light. Glasgow Coma Scale was 6/15 and bilateral Babinski sign was positive. Cyanosis was present on lips and nail beds. Subconjunctival hemorrhage was present in both the eyes. Nasal mucosa, post pharyngeal wall and bilateral tympanic membrane were not congested. Local examination revealed one circumferential shallow abraded ligature mark around cricoid cartilage starting from right side of angle of mandible and extending up to 11 cm in length and 3 cm in breadth. Radiograph, CT Scan, fundoscopy and other biochemical investigations were found to be within normal limits. The patient was intubated and put on ventilator support in view of respiratory failure. (Saturation was 80% on high flow oxygen). Patient's MRI brain was done which showed left posterior inferior cerebellar artery territory infarct with cytotoxic edema in bilateral thalami, most likely due to hypoxia.

After three days of vigorous treatment in the intensive care unit with fluid restriction, mannitol and intravenous antibiotics he was extubated and transferred to the general ward with glasgow coma scale of 8/15 (E4V1M3). Later patient was discharged from the hospital and with advice to follow up in medical and psychiatry outpatient department.

## DISCUSSION

There are two major types of hanging: Judicial hanging, in which the body drops a distance greater than the body height and death occurs by spinal cord transection and non-judicial hanging, where there is no significant drop and injury occurs due to compression of neck structures. Non-judicial hanging may be fatal or non-fatal; in the latter case the term "near hanging" is used (Rosen et al., 1992). The effects of hanging depend on the distance of fall to the ground. If this distance is greater than the body height (as in judicial hanging) then the head is forcefully torn away from the body with cervical spine fracture, spinal cord transection, and instantaneous death (Singhal et al., 2002). If the distance is small, as in non-judicial hanging, the mechanism of injury is that of ligature strangulation and the death is delayed where there is

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only venous obstruction without much compression on the wind pipe/trachea as in partial hanging. Average fatal period is about 3 to 5 min. Those who reach hospital alive have high probability of survival (Martin et al., 1994). In the present case, the patient was found hanging from the ceiling of his room and the duration of suspension was most probably was less, if we consider 3 to 5 min as an average fatal period.

In near hanging, a person may suffer from complications related to hanging. Pulmonary complications include pulmonary edema and bronchopneumonia secondary to aspiration. The edema may be due to a centrally mediated sympathetic discharge or due to negative intra thoracic pressure which is generated as the person attempts to inspire through an obstructed airway. Neurological complications include transient hemiparesis, spinal cord syndromes, focal cerebral deficits, cerebral oedema, various nerve palsies and larger infarctions (Rosen et al., 1992). Other complications like hyperthermia, subarachnoid haemorrhage, pneumo-peritoneum, ruptured oesophagus may also occur. Some factors such as systolic blood pressure < 90, Glasgow coma score < 8, anoxic brain injury on CT scan, and Injury Severity Score > 15 have been found to be significantly associated with mortality in near-hanging (Mehmat and Feyzi, 2015).

Survival without neurological damage is possible after attempted suicide involving near hanging. Initial neurological assessment is a very poor guide to final outcome (including fixed, dilated pupils) (Kaki et al., 1997). While the overall survival rates described in patients with near hanging is optimistic and ranges from 70 to 100%, factors predicting clinical outcomes have been variably described and remain largely inconsistent, the most controversial of them being GCS score. A GCS score of 3 at presentation has been described as a predictor of poor clinical outcome. The worst prognostic indicators are absent or agonal respiration, absence of vital signs or the need for resuscitation. Therefore, aggressive resuscitation should be attempted on all victims of hanging and transfer to hospital performed if initial resuscitation is successful (Gandhi et al., 2011). Early management in hospital should include intubation if the person requires cardiopulmonary resuscitation, having a compromised airway or has neurological compromise. The cervical spine should be protected even though fractures are extremely rare. Consideration should be given to performing a cerebral CT scan and carotid studies. All victims of suicidal hanging also require psychiatric support (Yıldırım et al., 2015).

In this case, there was isolated posterior inferior cerebellar artery on brain imaging, secondary to hanging, which is a very rare entity and no case report could be found with similar finding in literature (Nair, 2012). The mechanism of involvement of posterior inferior cerebellar artery is not very clear and the possibility of some congenital anomaly in arterial system of patient can be

proposed, details of which require MR angiography on future visits of patient to medical outpatient department.

## Conclusion

Survival and recovery after partial hanging is possible if proper care is given as early as possible. Also, we need to understand that the changes which adolescent children face in day to day life and hence we should be more alert if we doubt any social, emotional or professional stress in their life. In the end, we should provide counseling as well as necessary support so that such accidents are deterred.

## CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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