

## Near hanging: Early intervention can save lives

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## ABSTRACT

Hanging is a common method of suicide/homicide in the Indian scenario. We report three successive cases of attempted suicidal hangings seen over a period of 4 months in our intensive care wards. All of them presented gasping with poor clinical status and required immediate intubation, resuscitation, assisted ventilation and intensive care treatment. None had cervical spine injury, but one patient developed aspiration pneumonia. All the three patients received standard supportive intensive care and made full clinical recovery without any neurological deficit. We conclude that the cases of near hanging should be aggressively resuscitated and treated irrespective of dismal initial presentation. This is well supported by the excellent outcomes in our cases despite their poor initial condition.

**Key words:** Cerebral hypoxia, cervical spine fracture, near hanging

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## INTRODUCTION

Hanging is increasingly described in India as a method chosen by adults to attempt suicide. Hanging is defined as death due to external pressure on the neck when a ligature is applied to the neck of a wholly or partly suspended individual.<sup>[1,2]</sup> The term “near hanging” refers to patients who survive a hanging injury long enough to reach the hospital.<sup>[1,2]</sup> Despite being a prominent cause of suicidal deaths in India, particularly among young adults, there are hardly any statistics available on its epidemiology in a pan-Indian scenario. The published data on injury patterns, clinical aspects and management is also limited. Here, we share our experience of managing three successive patients of near hanging seen over a period of 4 months in our intensive care wards.

## CASE REPORTS

## Case 1

A 48-year-old male was brought to the casualty after he was found hanging from a ceiling fan, with one leg on a stool and the other hanging free. The duration of hanging was not known, but the time to hospital presentation was about 60 min. He was a known case of depression. On arrival, he was drowsy, restless, with

saliva drooling out of his mouth and glasgow coma scale (GCS) score of 6. A partial ligature mark was noted around his neck. His respiratory rate (RR) was 44/min, pulse rate (PR) 122/min, blood pressure (BP) 200/100 mm Hg, arterial oxygen saturation (SPO<sub>2</sub>) on room air 85%, pupils dilated bilaterally and reacting sluggishly to light. There was no sub-conjunctival haemorrhage. Bilateral crepitations were observed on chest auscultation. After securing intravenous access, he was sedated with midazolam 0.04 mg/kg and Propofol 1 mg/kg, his neck was stabilized using cervical collar and the airway was secured by endotracheal intubation (using McCoy blade). Assisted controlled ventilation was provided with tidal volume 8 ml/kg, RR 12/min, positive end-expiratory pressure (PEEP) 5 cm water (H<sub>2</sub>O) and inspired fraction of oxygen (FiO<sub>2</sub>) 1. He was nursed in a head-up position (30°–45°) maintaining sedation and muscle paralysis with infusions of Midazolam and Vecuronium, respectively. Blood samples were sent for routine biochemical and haematological investigations, including arterial blood gas (ABG) analysis, urinary catheterization were performed and central venous line was secured. Because central venous pressure was elevated, fluid administration was restricted and Frusemide was administered. Short-duration intravenous infusion of nitroglycerine was administered to control the

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elevated blood pressure, and was discontinued soon thereafter. Other elements of management included maintaining normocarbica partial pressure of carbon dioxide in arterial blood (PaCO<sub>2</sub>) (30–35 mmHg), prophylactic antibacterials, ensuring euglycemia, intravenous Ranitidine and Methylprednisolone (1 g infused over 10 min). Chest and cervical spine X-rays were performed in bed, while computed tomography (CT) scan of the head and neck was performed after the patient was stabilized haemodynamically. All biochemical, haematological and radiological investigations were reported as normal. With improvement in chest condition and reduction in FiO<sub>2</sub> support after 28 hrs of presentation, Vecuronium infusion was discontinued. Thereafter, the patient was gradually weaned off assisted ventilation over the next 8 hrs and was extubated when he regained full consciousness and good spontaneous respiratory efforts. The patient was kept under observation for another 24 hrs in the intensive care unit and was finally discharged from the hospital without any neurological sequela after a total of 4 days of care.

The clinical presentation of cases 2 and 3 has been summarized in Table 1. Whereas their management was broadly on lines similar to that followed in case 1, variations specific to their clinical condition and

management have been described in the following section.

### Case 2

Clinical features of aspiration pneumonitis were present at admission, which was corroborated by right hilar opacity on chest skiagram. ABG revealed partial pressure of oxygen in arterial blood (PaO<sub>2</sub>) 104 mmHg (on fiO<sub>2</sub> 0.5), pH 7.36, PaCO<sub>2</sub> 40 mmHg, base excess (BE) 1.6 and PaO<sub>2</sub>/FiO<sub>2</sub> 208, suggestive of acute lung injury. Additional aspects in management included taking endotracheal aspirate for culture and sensitivity before initiation of antibacterials and providing assisted ventilation with tidal volume 6 ml/kg, PEEP 8 cm H<sub>2</sub>O and respiratory rate 18/min. Clinical and radiological improvement in the patient's chest condition occurred after 48 hrs of ventilation, following which weaning was commenced and the patient was successfully extubated after the next 6 hrs. This patient too did not exhibit any pulmonary or neurological sequela and was discharged from the hospital after 7 days.

### Case 3

Presenting in an unconscious state, this patient had a history suggestive of convulsions during transit. An additional finding at presentation was bradycardia, which was corrected by a single intravenous 0.6 mg dose of Atropine. Besides the management as followed in the previous two cases, additional measures included intravenous administration of Mannitol (1 mg/kg), Phenytoin (25 mg/kg followed by 100 mg 8-hourly) and Hydrocortisone (100 mg 8-hourly). CT scan reported laryngeal oedema, which, during intubation (endotracheal tube number 7.5), was neither recognized nor posed any difficulty. This patient showed rapid recovery, was extubated after 24 hrs of assisted ventilation and discharged from the hospital after a total of 3 days of hospital stay, with complete neurological recovery.

## DISCUSSION

In classical judicial hanging, which involves drop from a distance  $\geq$  body height, death is due to cervical spine fracture or transection of the spinal cord. In near hanging, which involves drop from a minimal height (<body height), injury occurs due to compression of the neck structures. The pathophysiology of morbidity and mortality is described in the literature as:<sup>[1,2]</sup>

- Venous obstruction and cerebral hypoxia
- Laryngeal oedema and delayed airway

**Table 1: Summary of clinical presentation**

	Case 2	Case 3
Age (years)	52	22
Gender	Female	Male
Background medical illness	None	None
Method of hanging	Cord	Belt
Time to hospital presentation (min)	90	45
Key clinical findings at presentation		
Glasgow coma score	5	7
Pulse rate (/min)	116	45
Blood pressure (mmHg)	176\114	100\56
Respiratory rate (/min)	35	38
SPO <sub>2</sub> at room air	82	90
Pupils	Bilateral dilated, sluggish reaction to light	Bilateral dilated, sluggish reaction to light
Chest auscultation	Bilateral crepitations, right>left	Bilateral crepitations
Focal neurological deficit	None	None
Other findings	Partial ligature mark present around the neck	Circumferential ligature mark present around the neck

- obstruction (due to loss of neck muscle tone)
- Carotid sinus stimulation causing increased vagal tone
- Local injuries (thyroid cartilage/hyoid bone fracture/laryngeal rupture)
- Pulmonary complications (aspiration pneumonia, development of adult respiratory distress syndrome, pulmonary oedema secondary to negative intrathoracic pressure due to attempted inspiration in upper airway obstruction or centrally mediated sympathetic discharge leading to generalized vasoconstriction)
- Secondary cerebral injury (diffuse because of cerebral oedema and generalized cerebral hypoxia and/or focal because of arterial dissection or arterial spasm or subarachnoid haemorrhage)
- Other complications (hyperthermia, status epilepticus, bleeding into vessel wall or intima of carotid arteries or lower oesophageal rupture)

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.<sup>[1,3-8]</sup> A GCS score of 3 at presentation has been described as a predictor of poor clinical outcome independently in three case series,<sup>[3-5]</sup> whereas the same was not found to have any predictive value in a large series published by Nair *et al.*<sup>[6]</sup> Similarly, while a GCS score of <7 at presentation was found to have a significant association with poor clinical outcome in series published by Karanth *et al.*,<sup>[7]</sup> a score of  $\leq 8$  on arrival was found not to have significant association with clinical outcome in series published by Ali *et al.*<sup>[8]</sup> Nonetheless, considering that survival rates of up to 32% described even in patients with GCS scores of 3 at presentation,<sup>[3]</sup> aggressive resuscitation of all such patients, irrespective of their GCS score, is advocated.

Other predictors of poor clinical outcome described in the case series include long hanging time, cardiopulmonary arrest at presentation and presence of cervical spine injury;<sup>[5]</sup> drop height greater than body height;<sup>[9]</sup> anoxic brain injury on CT scan;<sup>[8]</sup> presentation beyond 4 hrs and hypotension on arrival;<sup>[7]</sup> need for airway control, cardiopulmonary resuscitation and cerebral oedema on CT scan;<sup>[4]</sup> contact with ground;<sup>[3]</sup> and a PaO<sub>2</sub>/FiO<sub>2</sub> ratio of <100 at admission.<sup>[6]</sup> Type of ligature mark has also been described as having potential prognostic

significance, with circumferential marks reflecting severe arterial occlusion and cerebral anoxia likely associated with poorer clinical outcomes as against partial marks. Information on many of these parameters was not available in the cases described here.<sup>[5]</sup>

In the absence of a dedicated guideline for management of near-hanging patients, the approach largely described in the literature is on lines recommended by the advanced trauma life support guidelines,<sup>[10]</sup> primarily including immobilization of neck, securing airway by endotracheal intubation, positive-pressure ventilation, maintenance of fluid, electrolyte balance, euglycaemia and normocarbica (to control intracranial tension).<sup>[1,2]</sup> However, in order to address cerebral oedema, fluids are largely restricted and diuretics, with or without mannitol or hypertonic saline, may be indicated.<sup>[1,2,11]</sup> We preferred to use mannitol as our centre has limited experience with the usage of hypertonic saline. For the management of raised blood pressure, whenever noticed, short-acting sympatholytics or centrally acting agents may be preferred over vasodilating agents to avoid an increase in the intracranial pressure. The role of prophylactic anticonvulsants, naloxone, calcium channel blockers and steroids remains controversial.<sup>[2,11]</sup> A plain radiograph of the neck may be taken to rule out injury to the larynx and cervical spine. Further radiological evaluation, including CT scan of the head and neck, may be asked for if there is no neurological improvement within 24 hrs of admission. In our cases though, we opted for CT scan of head and neck after the patients were stabilized haemodynamically.<sup>[1,5,7]</sup>

Our clinical experience with patients of near hanging, as reported here, is consistent with the existing knowledge and reiterates optimistic final outcomes with a standard management protocol. Accordingly, all patients with suicidal near hanging, even those with severe initial neurological deficits and/or respiratory distress, must be aggressively managed as the recovery is often complete.

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