

Early Resuscitation and Judicious Management Irrespective of Clinical Presentation and Predictors May be Life Saving in Near Hanging Victims

Chitragupta Atma Prakash^{1*}, Singh Dharmendra², Phool Kanwar Singh Brar³, Pandey Amit⁴

¹M.D (Anaesthesiology); Department of Anaesthesiology, Military Hospital, Bikaner, Rajasthan, India.

²M.D (Internal Medicine); Department of Medicine, Military Hospital, Bikaner, Rajasthan, India.

³M.D (Anaesthesiology); HOD, Department of Anaesthesiology, Military Hospital, Bhatinda, Punjab, India.

⁴M.S (General Surgery); Department of Surgery, Military Hospital, Bikaner, Rajasthan, India.

ABSTRACT

Hanging being one of the commonest modes of suicide, emergency departments sees a definite surge in the near hanging victims presenting to them. We present four successive cases of near hanging managed at our peripheral hospitals. All presented with seizures and pulmonary edema, three of them had dismal clinical condition, with poor clinical predictors. Unusual presentation of hyperthermia and refractory status epilepticus was observed in one patient. Complete clinical and neurological recovery was the outcome in all the cases. Based on our experience, we suggest considering early resuscitation and judicious management supported by advanced trauma life support for all near hanging victims irrespective of clinical presentation and predictors.

Key-Words: Near Hanging, Seizure, Hyperthermia, Early Resuscitation, Judicious Management, ATLS.

INTRODUCTION

The word suicide means an "intentional act of taking away one's own life", originates from Latin, *sui* "of oneself" *cidium* "killing". Hanging is one of the commonest methods implicated for committing suicide worldwide.¹ Gunnell *et al* reports an estimated mortality of 70 percent associated with hanging.² Near hanging being the sequelae of a failed attempt at suicide, requires urgent and immediate medical care as it encompasses a myriad of pathophysiological changes critical to survival. Despite of associated high mortality, there remains a paucity of epidemiological data in respect to its incidence and prevalence. Survivors may suffer from innumerable complications both acute and delayed which may endanger their lives; urgent medical attention, judicious resuscitation and intensive care can be beneficial in saving these critical patients.³ We share our experience of managing four successive cases of near hanging over a span of twenty months at our resource limited peripheral hospitals.

CASE 1

A 21 year old female brought to the emergency department (ED) of our hospital with alleged history of suicidal hanging of unknown duration following domestic altercation. On arrival patient was

*Correspondence to:

Dr. Atma Prakash Chitragupta,
Department of Anaesthesia,
187, Military Hospital, Bikaner, Rajasthan, India.

Article History:

Received: 29-01-2017, Revised: 13-02-2017, Accepted: 27-02-2017

Access this article online

Website: www.ijmrp.com	Quick Response code 
DOI: 10.21276/ijmrp.2017.3.2.063	

unconscious with generalized tonic and clonic convulsions. Echymotic ligature mark approximately 04 cm wide encircling the neck was present (Figure 1). Primary survey revealed patent airway with shallow respiration with a rate of 42 per minute and accessory muscles of respiration in use, peripheral oxygen saturation (SPO₂) of 80 percent on room air, Glasgow coma scale (GCS) of 6 (E2V2M2), blood pressure of 90/50 mmHg and heart rate of 40 per minute. Pupils were bilaterally dilated and sluggishly reactive to light and accommodation. Facial suffusion and bilateral subconjunctival petechiae were present (Figure 2). Tongue bite, urinary incontinence and defecation were evident. Jugular venous pressure was raised; chest auscultation revealed bilateral equal air entry with crepitations over both lower lung zones. At ED wide bore intravenous cannulas were secured; with Atropine 0.01mg.kg⁻¹ intravenously (I.V), heart rate improved and blood pressure improved. Seizure control was attempted initially with Lorazepam 0.1 mg.kg⁻¹ I.V, failing which, definitive airway was secured utilizing 125 mg of Thiopentone I.V with due attention at cervical spine stabilization and shifted to intensive care unit (ICU). Phenytoin 20 mg.kg⁻¹ over 20 minutes was administered as second phase management, perceiving no relief in the ongoing seizures; Thiopentone infusion 3 mg.kg⁻¹.hr⁻¹ was initiated to

terminate the same. Twenty percent Mannitol at the rate of 1 gm.kg⁻¹ was started I.V and injection Frusemide 20 mg was added to address the cerebral edema and pulmonary edema. Basic monitoring included non-invasive blood pressure, electrocardiography, pulseoximetry and temperature recording. Surprisingly temperature recorded was 103°F hence in addition to Paracetamol 1gm I.V 6 hourly, external cooling measures were instituted immediately. Mechanical ventilation was initiated with synchronized intermittent mandatory ventilation (SIMV) mode using tidal volume (V_t) of 6 ml.kg⁻¹, positive end expiratory

pressure (PEEP) of 10 cm water, inspired fraction of oxygen (FiO₂) 0.4 and respiratory rate of 16 per minute. Urgent blood investigations, biochemistry, electrolytes and electrocardiography were obtained and found essentially normal other than raised leucocytes with predominant neutrophilia. Bedside cervical spine imaging ruled out cervical and laryngo-tracheal injuries, chest imaging revealed bilateral diffuse infiltrates suggestive of pulmonary edema with probable aspiration pneumonitis. Sample for blood culture obtained and broad spectrum antibiotics and fungal coverage added empirically.



Figure 1: Echymotic ligature mark approximately 04 cm wide encircling the neck.



Figure 2: Facial suffusion and subconjunctival petechiae.

Table 1: Summary of patient's Socioeconomic and demographic and other pertinent details

	Case 1	Case 2	Case 3	Case 4
Age	21 years	30 years	58 years	32 years
Sex	Female	Female	Female	Female
Previous Psychiatric Illnesses	Nil	Nil	Nil	Nil
Any previous suicidal attempts	Yes	Nil	Nil	Nil
Marital Status	Married	Married	Married (Widow)	Unmarried
History of Marital disharmony / Familial discontentment/ Interpersonal conflicts	Present (Trivial quarrel between wife and husband)	Present (Quarrel with mother in law)	Present (Discontentment with daughter in law)	Present
Mode of hanging	Suicidal	Suicidal	Suicidal	Suicidal
Material employed to hang	Scarf (Dupatta)	Scarf (Dupatta)	Bed sheet	Scarf (Dupatta)
Socioeconomic strata	Middle class	Middle class	Middle class	Middle class
Resident of	Hills	Hills	Plains	Hills
Duration of hanging (History as obtained from Next of kin)	Uncertain	Between 1 to 2 minutes	Approximately 1 minute	Less than 1 minute
Drop height (History as obtained from Next of kin)	Partial Hanging with Knees folded, Height not ascertained	Definite Measurement Unavailable	Definite Measurement Unavailable	Definite Measurement Unavailable
Approximate time to reach hospital (As informed by the Next of kin)	45 minutes	35 minutes	40 minutes	30 minutes

Considering cerebral and airway edema, Dexamethasone was added 8 mg I.V stat followed by 4 mg 6 hourly also urinary output guided judicious fluid management considered. Over next eight hours a remarkable improvement in her body temperature, hemodynamic status, oxygen saturation and seizure activity were noticed, hence external cooling measures withheld, Thiopentone infusion progressively tapered to 1.5 mg.kg⁻¹.hr⁻¹ and finally ceased. Sedation was substituted with Midazolam infusion at the rate of 0.1 mg.kg.hr⁻¹ and ventilation continued for approximately 36 hours; in absence of arterial blood gas (ABG) analysis end tidal

carbon di oxide (EtCO₂) monitoring employed as a surrogate to observe and maintain normocarbica. Reassessment at 36 hours revealed adequate hemodynamic and respiratory stability, seizure control, spontaneous eye opening, good tidal volume generation and oxygen saturation of 99 percent at a FiO₂ of 0.21. Weaning off trial was given via T- piece, meeting the criteria she was weaned off the ventilator and extubated, chest physiotherapy was considered. Cervical injury was reassessed; her ability to carry out flexion, extension and rotation of neck voluntarily without pain or tenderness, clinically excluded the same.

Table 2: Clinical presentation and findings of cases on arrival at emergency department

Pulse (per minute)	40	64	118	106
Blood pressure (mmHg)	90/50	104/58	140/ 94	116/64
Glasgow coma Score	6 (E2V2M2)	8 (E2V3M3)	7 (E2 V2 M3)	10 (E3V2M5)
Respiratory rate (per minute)	42	38	32	24
Respiratory pattern	Shallow rapid, accessory muscle of respiration in use	Shallow rapid, accessory muscle of respiration in use	Shallow rapid, accessory muscle of respiration in use	Rapid
Oxygen saturation at room air	80 percent	84 percent	85 percent	93 percent
Pupils	Bilaterally dilated, sluggishly reactive to light and accommodation	Bilaterally dilated and reactive to light and accommodation	Bilaterally equal and reactive to light and accommodation	Bilaterally equal and reactive to light and accommodation
Facial suffusion	Present	Present	Present	Unremarkable
Subconjunctival Petechiae	Present	Absent	Absent	Absent
Seizures on arrival	Present Refractory to antiepileptics	Present Terminated with antiepileptics	Present Terminated with antiepileptics	Present Terminated with antiepileptics
Urinary incontinence and defecation	Present	Present	Urinary incontinence	Urinary incontinence
Tongue bite	Present	Present	Present	Absent
Jugular venous pressure	Raised	Raised	Normal	Normal
Chest auscultation	Coarse crepitations over both middle and lower lung zones	Crepitations over both lower lung zones	Crepitations over both lower lung zones	Fine crepitations over both lower lung zones
Chest Imaging	Evidence of Pulmonary edema and aspiration pneumonia present	Evidence of Pulmonary edema present	Evidence of Pulmonary edema present	Evidence of Pulmonary edema present
Cervical injuries	Nil	Nil	Nil	Nil
Raised body temperature	Present (104 ° F)	Nil	Nil	Nil
Complications	Chest infection, fever, dysphagia and husky voice	Fever, Difficulty in swallowing and throat pain	Dysphagia and throat pain	Throat Pain and husky voice
Neurological deficit	None	None	None	None
Hours of ventilation	36 hours	28 hours	24 hours	Nil
Mode of ventilation	SIMV	SIMV	SIMV	None
ICU stay	96 hours	72 hours	72 hours	48 hours
Hospital stay	08 days	06 days	05 days	03 days
Psychiatrist evaluation	Obtained	Obtained	Obtained	Obtained

Being clinically stable and afebrile by day four, patient was shifted to high dependency unit (HDU). For her complaints of difficulty in swallowing and husky voice, four hourly steam inhalation and saline nebulization added; indirect laryngoscopy was also carried out which suggested a normal study. Injuries to anterior neck structures and cerebral cause of refractory seizures were ruled out by computed tomography (CT) scan neck and head respectively. Antibiotics, nebulization, steam inhalation and chest physiotherapy were continued for next four days; Phenytoin was continued for a week and stopped. Thorough psychiatric evaluation and counselling was carried. She was discharged on eighth day of admission with complete clinical recovery.

Demographic and other peculiarities of all the cases are tabulated in Table 1. Since the management offered in all the cases were almost akin, pertinent changes in the management are mentioned in respective cases. Clinical presentation and findings are tabulated in Table 2.

CASE 2

On arrival patient was convulsing with SPO₂ of 80 percent. In addition to the management as offered in previous case, injection Lorazepam 0.1mg.kg⁻¹ and Phenytoin 20 mg.kg⁻¹ I.V were used to terminated the convulsions; mechanical ventilation was continued for 28 hours on SIMV mode with a V_t of 8 ml.kg⁻¹, PEEP of 08 cm water, FiO₂ 0.4 and respiratory rate of 18 per minute. Meeting

clinical stability and weaning off criteria, she was weaned off and shifted to HDU on day three. Finally discharged on sixth day after thorough psychiatric evaluation and counselling.

CASE 3

Presented unconscious having ligature mark approximately 07 cm wide placed anteriorly (Figure 3) with generalized seizures and GCS 7 (E2 V2 M3). Airway was secured immediately using Thiopentone 100 mg and Lorazepam 4 mg I.V with due attention at cervical stabilization. Phenytoin 20 mg.kg⁻¹ followed by 100 mg 8 hourly was added. Mechanical ventilation on SIMV mode provided with almost similar settings as other two cases for 24 hours. On achieving desirable clinical stability, she was weaned off ventilation and extubated. Patient was discharged on fifth day without any neurological sequelae.

CASE 4

Brought in semiconscious state with convulsions, GCS of 10 (E3 V2 M5) and ligature mark of approximately 03 cm extending from chin encircling the nape of neck (Figure 4). In addition to management as mentioned above, Lorazepam 4 mg I.V, Mannitol 1 gm.kg⁻¹ and injection Frusemide 20 mg patient was added, keeping a low threshold for intubation. She was shifted to HDU after 24 hours and discharged on third day with complete recovery.



Figure 3: Ligature mark approximately 07 cm wide placed anteriorly.



Figure 4: Ligature mark of approximately 03 cm extending from chin encircling the nape of neck.

DISCUSSION

Hanging as a modality of execution and capital punishment has been in vogue since medieval ages. Broadly subdivided in to judicial and non-judicial hanging, judicial hanging in contrast to non-judicial hanging involves a drop height lengthier than the body, sufficient enough to cause transection of the spinal cord and almost instantaneous death. An attempt at suicidal hanging which is not fatal is called near hanging.⁴ With average fatal period in hanging being approximately 3 to 5 minutes, chances of survival relatively increases amongst the near hanging individuals who reach the medical setup alive.⁵ The immediate fatality is due to array of associated pathophysiological changes, of which

inadequate cerebral perfusion due to compression of major neck vessels and carotid sinus stimulation induced reflex vagal inhibition thereby leading to cardiac arrest, are the main.⁶ High sympathetic tone mediated or post obstruction induced pulmonary edema, aspiration pneumonitis, respiratory infection and acute respiratory distress syndrome are the key determinants of delayed or in hospital death amongst the survivors.^{7,8} As high percentage of mortality is associated with near hanging injuries, many authors have independently tried to correlate the clinical factors with the outcome. Karanth et al retrospectively analysed 37 cases of suicidal hanging suggested that GCS of less than 7 was associated with a poor outcome, in another study

carried out by *Ali et al*, anoxia on CT scan was found to be independently associated with poor outcome.^{9,10} Despite the cartel of predictors for poor outcome like cardiac arrest, cervical injury, need for intubation, greater drop height, poor respiratory rate, type of ligature etc, nonetheless survival has been reported even after a hanging of duration more than 5 minutes.¹¹ Survival have been reported even with a GCS of 3, hence by all means these patients needs to be resuscitated and managed judiciously. In absence of any specific guidelines on managing near hanging victims, we resuscitated them early and managed judiciously based on advanced trauma life support (ATLS) guidelines, and tailored intensive and supportive care accordingly addressing all the eminent complications which may have arisen out of strangulation per se, as bradycardia, laryngeal injury, cervical injury, respiratory arrest, cerebral edema, seizures and pulmonary edema, and could be life threatening in absence of immediate addressal. Progressing airway edema can jeopardize the airway rapidly and may turn the intubation difficult; moreover as the sensorium was critically depressed, we secured the airway early in three of our cases.

Cervical injuries though uncommon, mandate neck stabilization till excluded radiologically and clinically. In our cases besides imaging, patients were able to voluntary flex, extend and rotate their neck after being stable, thereby clinically excluding any injury.¹² Advanced imaging was considered for excluding injuries to anterior neck structures and cerebral cause of refractory seizures after achieving clinical stability. Atropine was used to terminate vagal tone mediated bradycardia in one of the cases. Seizures a known sequelae of cerebral insufficiency if longstanding may lead to a long-term neurological deficit by triggering a cascade of necrosis and apoptotic changes, however three of our cases, responded effectively to benzodiazepines and Phenytoin. Case 1 unusually had refractory status epilepticus which continued for almost four hours; considering neuroprotection, pre-empting ventilation and to exploit its sedative and antiepileptic action, we consciously used Thiopentone to intubate and terminate ongoing seizures; though Propofol was a viable alternative with equal *pros* and *cons*.¹³

Hyperthermia being rare in near hanging was surprisingly seen in one of our case, probably as sequelae to refractory status epilepticus.¹⁴ Pre-empting its potential to complicate the neurological outcome, we used antipyretics and rapid external cooling measures targeting a temperature between 35 to 36°C.

In absence of hypertonic saline, osmotic and loop diuretics were used to address cerebral and pulmonary edema, supplemented by judicious fluid management. Positive pressure ventilation to combat pulmonary edema and hypoxia was challenging in absence of ABG, however we used EtCO₂ as surrogate to target normocarbica and maintain normal intracranial pressure.

Dysphagia and husky voice a known sequelae of near hanging, was seen in all of our cases which responded to nebulisation and short term steroids. Psychiatrist review and counselling was offered to all the patients before discharge, periodic follow up was carried out for six months at our centres and none had any residual neurological sequelae.

We agree to have witnessed just a fraction of the suggested plethora of clinical presentations with some unusual clinical findings too, our attempts at early resuscitation and judicious management, with utter disregard to the presentation and clinical

predictors on arrival inspite of resource constraints paid off an excellent outcome, hence we suggest considering the same while attending to such patients.

REFERENCES

- Farmer R, Rohde J. Effect of availability and acceptability of lethal instruments on suicide mortality. An analysis of some international data. *Acta Psychiatr Scand* 1980;62:436–46.
- Gunnell D, Bennewith O, Hawton K, Simkin, S, Kapur N. The epidemiology and prevention of suicide by hanging: A systematic review. *International Journal of Epidemiology* 2005. 34: 433–442.
- Ritika Gandhi, Neeta Taneja, Paritosh Mazumder. Near hanging: Early intervention can save lives. *Indian J Anaesth*. 2011 Jul-Aug; 55(4): 388–391.
- Howell MA, Guly HR. Near hanging presenting to an accident and emergency department. *J Accid Emerg Med*. 1996 Mar;13(2):135-6.
- Adams N. Near hanging. *Emerg Med* 1999;11:17-21.
- Iseron KV. Strangulation: a review of ligature, manual, and postural neck compression injuries. *Ann Emerg Med* 1984;13:179–85.
- Kaki A, Crosby ET, Lui ACP. Airway and respiratory management following non-lethal hanging. *Can J Anaesth* 1997;44:445–450.
- Fischman CM, Goldstein MS, Gardner LB. Suicidal hanging: an association with the Adult Respiratory Distress Syndrome. *Chest* 1977; 71:225–27.
- Karanth S, Nayyar V. What influences outcome of patients with suicidal hanging. *J Assoc Physicians India*. 2005 Oct; 53:853-6.
- Salim A, Martin M, Sangthong B, Brown C, Rhee P, Demetriades D. Near-hanging injuries: a 10-year experience. *Injury*. 2006 May; 37(5):435-9.
- Vander Krol L, Wolfe R. The emergency department management of near-hanging victims. *J Emerg Med* 2003;12:285–92.
- Chapleau W, Al-khatib J, Haskin D et al. Advanced trauma life support (ATLS®): the ninth edition. *J Trauma Acute Care Surg*. 2013 May; 74 (5):1363-6.
- Simon S, Monica F. The treatment of Super-refractory status epilepticus: a critical review of available therapies and a clinical treatment protocol. *Brain* 2011; 134 (10): 2802-2818.
- J C Calvanese, M H Spohr. Hyperthermia from a near hanging *Annals of Emergency Medicine* 1982, 11 (3): 152-5.

Source of Support: Nil. **Conflict of Interest:** None Declared.

Copyright: © the author(s) and publisher. IJMRP is an official publication of Ibn Sina Academy of Medieval Medicine & Sciences, registered in 2001 under Indian Trusts Act, 1882.

This is an open access article distributed under the terms of the Creative Commons Attribution Non-commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

Cite this article as: Chitragupta Atma Prakash, Singh Dharmendra, Phool Kanwar Singh Brar, Pandey Amit. Early Resuscitation and Judicious Management Irrespective of Clinical Presentation and Predictors May be Life Saving in Near Hanging Victims. *Int J Med Res Prof*. 2017; 3(2):296-300. DOI:10.21276/ijmrp.2017.3.2.063