

Vol 46 (2) June , 2022

Print: ISSN 0304-4904  
Online: ISSN 2305-820X



# PAKISTAN PEDIATRIC JOURNAL



**A JOURNAL OF PAKISTAN PEDIATRIC ASSOCIATION**

Indexed in EMBASE/Excerpta Medica, Index Medicus WHO, CPSP  
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## CASE REPORT

# Near-hanging Injury in a Pediatric Patient

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Pak Pediatr J 2022; 46(2): 233-36

### ABSTRACT

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Received 15<sup>th</sup> September 2021;  
Accepted for publication  
25<sup>th</sup> May 2022

Suicide is a public health problem. Suicide by hanging is seen in all ages, starting around the age of 10-12. "Hanging injuries" is the term used to refer to people who survive after hanging. We present the case of a pediatric patient who survived mechanical asphyxia by hanging.

A 12-year-old female patient who recently attempted suicide by hanging herself was admitted to the nearest hospital presenting "near-hanging injuries." She received ventilatory support and sedation-analgesia in the Pediatric Intensive Care Unit (PICU), treating cerebral edema with mannitol. Upon discharge, she presented neurological and structural sequelae.

Although suicide is one of the most common causes of death in the pediatric population, near-hanging injuries are rare in this setting. Patients with these injuries should be treated aggressively and early to avoid possible complications. In this case, the family's action and the late treatment influenced the lousy evolution of the patient.

**Key Words:** *Child, Neck injuries, Attempted suicide, Asphyxia, Resuscitation*

### INTRODUCTION

Suicide is considered a public health problem. The World Health Organization (WHO) estimates that 800,000 people commit suicide yearly.<sup>1</sup> This problem affects high-income countries and low-and middle-income countries.<sup>1</sup> In Peru, the suicide rate ranges from 5.0 to 9.9%.<sup>2</sup> The highest numbers are recorded in young people and adolescents; in fact, suicide is the third most common cause worldwide of deaths in children under the age of 10 to 14.<sup>2</sup> A multicenter study in Lima, Peru, determined that 17.5% of adolescents between the ages of 12 to 18 attempt to take their own life at least once.<sup>3</sup> The most common methods this age group uses are hanging (48-90% of all cases), firearms, and self-poisoning.<sup>4</sup> Suicide by hanging is observed at all ages. The starting period usually being around 10 to 12 years of age.<sup>5</sup> Hanging is considered an act of

violence in which the body is held by a loop or the like by the neck, suspended at a fixed point, and abandoned to its weight; traction exerted by this act can cause loss of consciousness, arrest of respiratory function and death. "Near-hanging injuries" is the term used to refer to people who survive after hanging. They can cause long-term mortality or morbidity, accounting for between 0.3 and 0.7% of admission to the Pediatric Intensive Care Unit.<sup>6</sup>

Feldman and Simms reported certain variations between the age of the patient and the causative agent of the hanging injuries. For example, injuries in infants were primarily developed while playing and were caused by toy strings or sheets; on the other hand, the causative agent of these injuries in school-age children were swing ropes and window cords.<sup>7</sup>

There are few reports of near-hanging injuries in the pediatric population in the literature. This case report will present a 12-year-old patient with late handling and neurological sequelae near-hanging lesions.

### CASE REPORT

A 12-year-old female patient, referred from a health facility with a time of illness of three hours, was admitted to the emergency service of the "Hospital de Emergencias Pediátricas" (HEP). A family member reported that after a family discussion, the patient locked herself in her room for approximately 10 minutes, later being found by her mother hanging from a beam of the bed; apparently, the object used to perform this act was a wrist band. She was transferred to the nearest health center and arrived 40 minutes later. On admission, she presented generalized tonic-clonic seizures with sphincter relaxation, superficial respiration (oxygen saturation 68%), and six on the Glasgow scale; that is why she was intubated and referred to the HEP.

She entered the Trauma Shock Unit with a heart rate of 144 beats per minute; a respiratory rate of

23 breaths per minute; 84% oxygen saturation; blood pressure of 157/26 mmHg, and a temperature of 38.5 °C. Immediately after her admission, she received positive pressure ventilation; on examination, horizontal purple erythematous injuries were observed in the anterior cervical region, and scars on the anterior section of her wrists.

Upon arrival at the hospital, the following tests were performed: hemoglobin 13 g/dL, 217,000 platelets per microliter, 11,100 leukocytes per microliter, 0% band neutrophils, 90% segmented neutrophils, 8% lymphocytes, and 2% monocytes. The renal profile showed 6.3 g/dL of total protein, albumin of 3.8 g/dL, globulin of 2.4, direct bilirubin at 0.25 mg/dL, and indirect bilirubin at 0.64 mg/dL. The hepatic profile: alanine-aminotransferase (SGPT) was 196 IU/L and aspartate-aminotransferase (SGOT) 224 IU/L. Upon admission, the beta subunit of human chorionic gonadotropin was not measured; This was carried out the following day, obtaining a value <100, classified as negative. The results of the additional laboratory tests are described in table 1.

**TABLE 1: Additional laboratory test results**

	Admission	Day 1	Day 2	Day 3
<b>Group &amp; Factor</b>	O positive			
PT (sec)	13			
PTT (sec)	33			
DHL (UI/L)	870			893
HVB Ag Sup		Negative		
HIV		No reaction		
Dosage of B-HCG (mUI/ml)		<100		
CPK Total (mcg/L)		593		
CPK-MB (ng/ml)		8		
Ex. Urine		Normal		
<b>Basic metabolic panel</b>				
Glucose (mg/dL)	102	75	79	
Cr (mg/dL)	0,57	0,67		0,35
Urea (mg/dL)	13	20	18	25
Na (mEq/L)	140,7	134,6	141,1	136,5
K (mEq/L)	3,4	4,53	3,97	4,56
Cl(mEq/L)	105	102,4	104,6	102,4
Ca (mg/dL)	7,5			
Ph	7,49			
CO <sub>2</sub> (mmHg)	25,5			
O <sub>2</sub> (mmHg)	335,7			
HCO <sub>3</sub> (mEq/L)	19,9			

A cervical chest radiograph was requested, finding signs of cervical trauma. The emergency

treatment was started with hydration (sodium chloride solution and potassium chloride). In

addition, 100 ml of 4% intravenous mannitol was administered every 4 hours.

One gram dose of intravenous phenytoin was given, and a subsequent prescription of 100 grams every 8 hours. In addition, the administration of 5 milligrams of midazolam and 50 micrograms of intravenous fentanyl were also given. After this, the patient was admitted to the Pediatric Intensive Care Unit (PICU), where ventilatory support and sedation-analgesia were provided. A cerebral computed tomography scan was performed, showing slight cerebral edema, and mannitol was continued

The patient was extubated 24 hours after admission to the PICU without difficulty. After extubation, she presented marked dysphonia and psychomotor agitation. She did not receive antibiotics and maintained a negative balance for the first three days. After this time, the liver profile test was repeated, and it was observed that the levels had dropped to 60 IU/L in the case of SGPT and 62 IU/L for the SGOT. The patient remained hospitalized in the PICU for four days. The cervical spine computed tomography showed a loss of physiological lordosis due to probable traumatic muscle contracture.

The neurological examination at discharge from the hospital describes the patient as awake, oriented in person, partially oriented in time and space, with amnesia from the event, lack of coordination for walking, and dysphonia. Subsequently, she was referred for treatment to the Psychiatry service.

## DISCUSSION

According to the literature reviewed, there are few case reports of pediatric patients with near-hanging lesions, and this is the first report from Peru in the last five years. Most of the available evidence of these injuries comes from studies conducted on adults. Digeronimo and Mayes published three cases, all of them with favorable results without neurological complications. The authors recommended aggressive management to avoid poor prognosis, with the most critical intervention being the performance of cardiorespiratory resuscitation (CPR) immediately before the transfer to the hospital.<sup>8</sup> Likewise, La Count et al. indicate that timely resuscitation

reduces the severity of anoxia, increases the probability of survival, and improves the neurological outcome of the patient.<sup>9</sup> In our report, the patient was initially attended by members of her family, who did not know the CPR technique, so the patient did not receive this assistance immediately, which could have increased the probability of neurological sequelae.

Feldman and Simms analyzed 22 pediatric patients admitted to the hospital for treatment with nearly hanging wounds. According to them, the variables of poor prognosis were a coma in the emergency room, seizures, the need for ventilatory support, and a pH below 7.2.<sup>7</sup> Of these, the patient had seizures and a decreased Glasgow scale upon admission to the hospital.

In contrast to what was described in the literature, despite the variables of poor prognosis and the delay in the application of CPR, the patient presented at discharge only mild neurological sequelae such as lack of coordination for gait and disorientation in space and time. Secondary ischemic hypoxia was raised as a supposed cause.

According to Gandhi et al. and Digeronimo et al., the therapeutic approach described in the literature is based on the recommendations of the advanced life support guidelines in trauma (table 2). In the early management of any near-hanging injury, it is recommended to immobilize the neck; secure the patient's airway by endotracheal intubation; apply positive pressure ventilation; and achieve euglycemic, normocapnic, and electrolyte balance.<sup>8,10</sup> According to the guidelines, the patient received early basic life support care, such as cervical protection, intubation, and venous access.

**TABLE 2: Caring for children with hanging injury**

### FIELD

Cervical spine protection.  
Basic life support.  
Intubation if GCS <8 or respiratory failure.  
Endogenous/intraosseous access  
Transportation to the emergency department

### DEPARTMENT OF EMERGENCY.

Continue with vital basic support. Radiography of the thorax and cervical column  
Screen toxicologically  
Admit to the pediatric intensive care unit.

**INTENSIVE CARE UNIT**

Mechanical ventilation/hyperventilation.  
 Adequate management of blood pressure.  
 Fluid restriction.  
 Parenteral antibiotics if you have any indication.  
 Sedation  
 EEG, CT scan of the brain  
 Consider PIC monitoring

**Available at:** Digeronimo R.J, Mayes T.C., Near-hanging injury in childhood

In this type of injury, there is also an increased risk of developing cerebral edema. Therefore, starting treatment with mannitol and maintaining it for 48–72 hours or until neurological recovery in all patients with neurological impairment and poor respiratory effort is advisable.<sup>8</sup> The patient had mild cerebral edema, receiving mannitol as treatment in our case, and she also presented mild neurological deterioration until her hospital discharge.

Pediatric patients have a lower risk of cervical fracture and are more likely to suffer upper airway injuries, so it is recommended to perform cervical imaging studies. An evaluation by laryngoscopy should always be performed.<sup>6,11</sup> In this patient, these examinations were performed, finding severe dysphonia and no fractures in the cervical vertebrae or larynx.

**Conflict of interest:** Nil

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