

Case Report

Accidental partial hanging by door curtain causing ischemic encephalopathy in a child: a rare case report

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Received: 01 September 2020

Accepted: 15 September 2020

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ABSTRACT

Accidental strangulation is an uncommon injury in children, however it may lead to neurological disability or death. Various modes of injuries have been reported in such accidents. Children might get strangled while playing if they are wrapping any cord or cloth like material around their neck. Caregivers of the children should be aware of the potential sources around and mechanisms of such injuries to avoid such accidents.

Keywords: Accidental partial hanging, Door curtain, Child, Ischemic encephalopathy

INTRODUCTION

Strangulation and hanging are important causes of homicidal and suicidal injury in adults but these kinds of injuries are rare and accidental in children. Indian data on hanging in children is very less and incidents are mostly under-reported. In western countries, accidental strangulation ranks fourth among the causes of unintentional injuries in children younger than 1 year after roadside accidents, drowning, and burns.^{1,2}

Many modes of accidental strangulations have been reported in available literatures. These injuries have been caused by: rope swing, window blind cords, pacifier cord, head scarf, clothesline cord and non-release plastic garden ties.³⁻⁵ These kinds of injuries cause various degrees of physical damage to the structures passing through neck like airway, large vessels, esophagus and spinal cord. The resulting brain ischemia and spinal cord injury lead to various degrees of neurological deficit or death. We report a case of accidental partial hanging of a child when the door curtain tied around his neck while he was playing. The uniqueness of the mode of injury in this case has prompted us to report. While counselling parents regarding prevention of injuries in children, they should be made aware of the household objects which might cause

accidental strangulation, so that they take due precaution to avoid such serious injuries in children.

CASE REPORT

A 6-year-old male child was brought to the emergency room of our hospital with an alleged history of hanging with the door curtain tied around his neck accidentally. The child was playing in his home with his younger sibling unattended for about half an hour, when his parents had gone to visit his neighbours' house. When returned back to home, they saw that the child was in kneeling position with door curtain tied around his neck. The child was unconscious, with tightening of his all four limbs and had noisy breathing with drooling of saliva. He was then taken to a private medical practitioner within half an hour. After initial stabilization, he was referred to our facility. He reported to our emergency room within three hours of the incidence. He was unconscious at admission with Glasgow coma scale (GCS) of 5/15 [no eye opening (E1), no verbal response (V1) and normal flexion (M3)]. Other vital parameters were: pulse rate- 116 beats per minute with good volume, respiratory rate- 54 breaths per minute, oxygen saturation (SpO₂)- 84% at room air, temperature- 101°F, blood pressure- 100/78 mm Hg, capillary refill time (CRT)- 2 seconds and random blood sugar (RBS) of 166

mg/dl. He had no any petechial/purpuric spots over the face. There was bleeding in the oral cavity. He had mild edema over anterior aspect of the neck without any distinct ligature mark. There was no any other injury mark over the body besides bleeding from nose and oral cavity. On examining of central nervous system, his pupils were bilaterally mid dilated and equally reacting to light. Tone was increased in upper and lower limbs bilaterally with brisk deep tendon reflexes. There was subcostal retraction with bilateral coarse crepitations probably due to aspiration. The child was put on mechanical ventilation in view of poor GCS and respiratory distress. He was started on maintenance intravenous fluids, antibiotics and tranexamic acid. Anti-epileptic was started in view of history of abnormal movements suggestive of seizures. Investigations revealed haemoglobin 13.8 g/dl, total leucocyte count was 3449/mm³, platelet count 4.59 lakh/mm³, serum sodium 137 meq/l, serum calcium 9.2 mg/dl, serum potassium 3.6 meq/l, prothrombin time (PT) 15.3 seconds, international normalized ratio (INR) 1.23 and activated partial thromboplastin time (aPTT) 25.4 seconds. Arterial blood gas revealed uncompensated respiratory acidosis. Computed tomography (CT) brain, performed within 12 hours of admission, was normal without any bony fracture or dislocation of vertebrae. There was recurrence of seizures for which anti-epileptics dose was increased. The neurological status improved gradually. The child was extubated after 6 days of admission. Oxygen supplementation was continued by non-invasive continuous positive airway pressure (CPAP) which was gradually weaned off. At discharge the child had stable vitals but he had neurological impairment and was bed ridden, disoriented and unable to follow any commands. 3 months after the injury, the child was still disoriented but he was able to walk with support.

DISCUSSION

Hanging can be defined as suspension by the neck, resulting in asphyxia and death. It is the most common method of completed suicide in adolescent males. The total rate of suicides in the paediatric population in the UK is around 2.25 per 100 000, with hanging comprising 58-72% of these deaths.⁶ 'Near hanging' is used to refer to survival following a hanging incident, which remains a potentially devastating injury which can lead to eventual death, or serious long-term morbidity. The exact incidence of near hanging is unknown, but older studies suggest that they comprise 0.3-0.7% of paediatric intensive care unit admissions.⁷ In contrast to the suicidal nature of injury in older children, younger children sustain hanging and partial hanging injury accidentally, in absence of their caregivers.

The mechanism of injury involves obstruction or compression of cervical blood vessels leading to ischemia and cerebral hypoxia. The jugular veins are superficial and susceptible to trauma and compression. Obstruction of the jugular vessels leads to venous pooling, hypoxia and unconsciousness. As a consequence, the body loses muscle

tone and becomes flaccid, which further tightens the ligature around the neck, causing complete carotid arterial obstruction. There is complete loss of airway as the base of the tongue is pushed towards the roof of the pharynx. The resulting cerebral hypoxia finally causes death. Another mechanism of injury or death results from the vagal reflex secondary to the external pressure and stretching of the carotid sinus; this trigger extreme bradycardia leading to cardiac arrest.^{8,9} Risk of laryngeal or vertebral fractures is lower in children than adults because of the lack of ossification of these structures, and the relative elasticity of the hyoid bone, laryngeal cartilage and trachea.¹⁰ Clothing and personal belongings were found to be the most common ligature materials. Children sleeping unattended in rocking cradles and suffering asphyxiation have been reported. Children may tie clothing or rope like articles around their neck while playing. The child in our case report also tied door curtain around his neck while playing (Figure 1). Unfortunately, the family members were not present that time and he suffered partial hanging injury.



Figure 1: Demonstration of the mechanism of hanging injury by another child.

Duration of hanging is the most important determinant of outcome. While some children are brought dead, others may be brought in conscious state. Other clinical conditions at presentation are- undergoing active resuscitation, cardiac arrest (asystole or pulseless electrical activity), unconscious, stridor, cyanosed, nonreactive pupils, seizures, tachypnoeic and hypotensive. There could be ecchymosis over face due to venous engorgement. The management is supportive and depends on clinical condition. It ranges from simple observation to management in intensive care unit. All such children should be presumed to have injury to the cervical vertebra and due care should be taken to protect spinal cord while doing resuscitation and initial stabilization. Maintaining airway could be a challenge due to laryngeal injury. Early intubation may be needed if airway compromise is suspected. There is high risk of developing cerebral oedema. Diffuse cerebral oedema from anoxia can precipitate hyponatremia and hypocalcaemia. Hypocalcaemia can affect cardiac functioning and

myocardial contractility.¹¹ Hypertonic saline should be used for cerebral edema. Cerebral autoregulation of brain perfusion may be lost due to cerebral ischemia. There could be left ventricular dysfunction due to myocardial ischemia. Blood pressure should be maintained within normal range with inotropic support. Nearly one-third of cases have seizures due to neurological damage as in our case.^{6,12} Cerebral edema is the most common CT abnormality.⁸ Although our case had a normal CT scan at presentation, magnetic resonance imaging (MRI) revealed ischemic changes in bilateral cerebral cortices and temporal lobes (Figure 2). Overall survival rates in those who show signs of life on admission following near hanging can vary from 70-100%.⁹ Davies et al reported hanging injuries and partial hanging injuries in 41 children. 19 (46%) were found pulseless and received cardiopulmonary resuscitation, 16 (39%) died and the three survivors were severely disabled with two out of the three being in a persistent vegetative state. 18 (44%) made a full recovery.¹³ Long-term prognosis depends on the duration of unconsciousness, extent of neurological involvement, and metabolic derangements at admission.¹⁰ Prevention is preferable as overall mortality and severe neurological disability rates are high. These injuries are preventable and the risk could be reduced by a combination of educational, environmental and legislative interventions. The preventive measures include identifying and avoiding objects with potential risk to cause hanging injury like window blind cords, cradles and swings and not leaving smaller children unsupervised. If children were found wrapping clothing, cord or any other object around their neck which have potential to cause strangulation injury, they should be stopped doing so and its potential problem should be explained to them.



Figure 2: MRI brain showing prominent sulci and gyri in bilateral frontal and temporal lobes.

CONCLUSION

Accidental hanging are rare in children but it can be fatal or leave permanent neurological impairment. There is a wide range of household objects which have potential to cause hanging injury. These should be identified and avoided in and around places where smaller children reside

and they should not be left unattended to avoid any such injury.

ACKNOWLEDGEMENT

The authors are thankful to father of the child in the case report whose good description of case history and mechanism of injury helped them in composing this manuscript.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: Not required

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Cite this article as: Prasad A, Tiwari L, Kumar P, Yankappa N. Accidental partial hanging by door curtain causing ischemic encephalopathy in a child: a rare case report. *Int J Contemp Pediatr* 2020;7:2061-4.