

# Vertebra critica in a case of near-hanging



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## Abstract

**Objective:** To demonstrate the significance of fused cervical vertebrae in emergency medicine practice.

**Case Presentation:** A 35-year-old male was brought to the emergency department (ED) who attempted suicide by hanging and was later found to have congenital fusion of cervical vertebra C2 and C3, a condition referred to as - vertebra critica. This is the only case report of a patient with vertebra critica admitted for near hanging. The patient was intubated with a Portex® North Polar endotracheal tube (ETT) through the nasal route. This proved to be a critical decision as it helped early airway control avoiding any complication.

**Conclusion:** As the victims of near-hanging should have cervical spine restriction, judicious use of flexible portex® ETT may help in early intubation and resuscitation without aggravating the neurological injuries. It must be noted that nasal intubation is contraindicated in base of skull fractures and it should be avoided in patients with obvious traumatic injury to the neck including laryngeal trauma, tracheal disruption and vessel injuries.

**Keywords:** Emergency medicine, Traumatic spinal injury, Resuscitation, Trauma, Neurology

## Introduction

The first two cervical vertebrae assist the cranium in movements and are thus referred as 'cervico-cranium' along with the latter. The cervico-cranium unit has mobility and is attached to 3<sup>rd</sup> cervical vertebra which works as a critical point between the upper mobile segment and the relatively static rest of the spine. The weight bearing nature of the 3<sup>rd</sup> cervical vertebra gives it a propensity to fuse with the axis forming a "Cervical Sacrum" to give additional strength to the spine while transmitting weight (1). Fusion of C2-C3 is rare with an incidence of 0.4% to 0.7% in either sex (2).

## Case Presentation

A 35-year-old male was brought with alleged history of suicide attempt by hanging. He was found unconscious and a short period of cardiopulmonary resuscitation (CPR) was given by the bystanders. On arrival he had a Glasgow Coma Scale (GCS) of 7, spontaneous but labored breathing and oral secretions. Philadelphia collar was applied and he was intubated nasally with Portex North Polar endotracheal tube (ETT). His vitals were stable and pupils were bilaterally normal size reacting to light. There

was no obvious trauma to the neck.

According to his companion, the patient had attempted hanging by using a rope over the ceiling fan in his house. There was no account of factors like the duration of hanging, whether he suffered a jerk (drop force), the length of drop, etc. He received a short period of bystander CPR. Apart from chronic alcohol use there was no significant history in the past.

He had fusion of C2 and C3 vertebra and no injuries radiologically in x-ray and CT. Both his CT and MRI brain were unremarkable and MRI cervical spine with whole spine screening also did not reveal any abnormalities (Figures 1-4). When the patient was shifted back from MRI suite to ED, he started regaining consciousness and was completely awake after 4 hours of admission and had no neurological deficits. The patient was successfully extubated. All his blood work came to be within normal limits except a minimally deranged liver profile. Neurology and neurosurgery consult was sought. With the absence of any signs or symptoms of injury further workup was abandoned. The patient was transferred to the psychiatry ward the next day. He opted for leave against medical advice on the 5<sup>th</sup> day. The patient is still in follow-up and





**Lateral and AP view Cervical Spine**

**Figure 1.** X-ray cervical spine with AP and lateral radiographs showing fusion of C2 and C3 vertebra. Note the presence of North-Pole ETT.



**Figure 2.** Normal MRI brain of the patient (diffusion weighted scan).

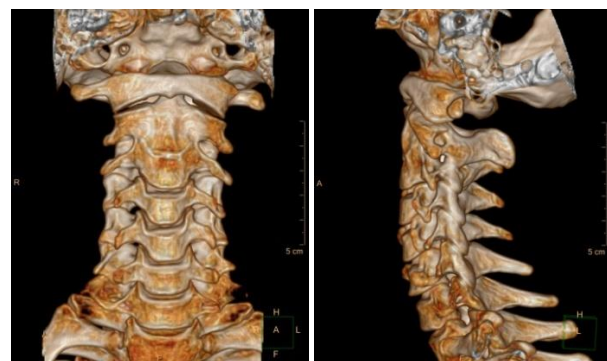
is completely asymptomatic.

**Discussion**

Hanging is by far the most common mode for suicide in India. 51.5% (69 306 of 134 561 cases) of individuals opted for hanging during 2018 (3). Hanging is also the most common method of judicial executions worldwide. The procedure is considered the most humane method (4). Mechanism of death in hanging includes asphyxia, apoplexy and fracture of cervical vertebra or a combination of these. Early resuscitation of these patients in the ED may reduce mortality and improve neurological outcome. Prognosis mainly depends on the GCS at arrival, hypotension, anoxic brain injury and hanging time (5).



**Figure 3.** Normal MRI spine of the patient.



**Figure 4.** 3D reconstruction of cervical spine showing the fused cervical vertebra.

The most common injury to the cervical column is the fracture displacement of axis (C2) leading to spinal cord disruption. This condition is referred to as the Hangman’s fracture although being a Hangee’s fracture. The disruption of the spinal cord leads to a state of hypotonia which along with the weight of the victim accentuates the force of ligature. This force causes the constriction of the neck vessels leading to cerebral anoxia and death. The presence of vertebra critica was the uniqueness of our case, which may have protected the impact of ligature force and may have avoided apoplexy and eventually asphyxia and fatal injury. This is the only case of vertebra critica till date admitted for near hanging. There have been cases of people who survived even judicial hanging but they were not studied clinically and radiologically to know the reason why they survived (4).

Another factor that may have helped in survival was

the use of North-pole ETT for intubation in this patient. Victims of near hanging suffer the effects of airway obstruction and hypoxia which lead to pulmonary edema (6). It is advocated to negate this by early institution of mechanical ventilation in these patients. Considering the importance of maintaining spine stability and as the victim was breathing spontaneously and had no signs of basilar skull fracture, we intubated the patient nasally with a pre-lubricated north-pole ETT. The north-pole ETT is a soft flexible tube as compared to regular ETT and it can be used blindly in a spontaneously breathing patient. This also limits the hyperdynamic and raised intracranial response seen in direct laryngoscopic intubation. Patients with vertebra critica should be intubated orally with extreme caution to avoid injury to the cord. Nasal intubation successfully bypassed this risk and may also have provided a survival advantage to the patient. Judicious use of North-pole ETT may be used in near-hanging victims.

### Conclusion

Cervical vertebral anomalies are rare but have serious implications during emergency interventions. Cautious and judicious use of inventory helps avoid tragedies.

### Authors' Contribution

All authors contributed to the study conception and design. Material preparation, data collection and analysis were performed by ZAS and VSS. The first draft of the manuscript was written by ZAS and all authors commented on previous versions of the manuscript. All authors read and approved the final manuscript.

### Competing Interests

None.

### Ethical Approval

Written consent of the patient was taken for participation in the case report.

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