

Accidental Hanging Leading to Spinal Cord Injury without Radiological Abnormality - A Case Report from Rural India

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Abstract

Spinal cord injury without radiographic abnormality (SCIWORA) is rare in adults. It is of considerable importance owing to the potential problem of management inherent in the diagnosis.

We report a rare case of young female who developed quadriplegia as an outcome of accidental hanging. Her initial radiological investigation were normal but subsequent magnetic resonance imaging revealed intramedullary signal changes from C2 vertebral body level extending up to C3 level without vertebral or ligamentous involvement. The patient was recuperated near completely with traditionalist treatment measures including bed rest and methylprednisolone. Routine radiographs and sometimes even computerized tomography can miss this injury and SCIWORA ought to be suspected in these instances of spinal damage giving neurological deficit.

Keywords: SCIWORA; Accidental hanging; Cervical spine injury

Introduction

Spinal cord injury without radiological abnormality (SCIWORA) is a syndrome of cervical spinal cord trauma, without any radiological evidence of vertebral fracture or mal-alignment. We report a rare case of a young female who developed SCIWORA as an outcome of accidental hanging which is also quite uncommon.

Case Report

A 17-year-old female had accidental hanging when her scarf got stuck in the harvest cutting machine. Her neck got tilted backwards for approximately 5 minutes. After transient unconsciousness, she noticed weakness in all limbs with bladder and bowel involvement. Brought to our hospital after 2 hours, external examination showed a 3 cm wide ligature mark, incomplete and oblique (Figure 1).

The general physical and systemic examination was normal apart from the ligature mark. Neurological examination for cranial nerves including fundus were normal with generalized hypotonic. Proximal and distal power in all limbs were 0/5 and 0/5 (MRC grade) respectively. All deep tendon reflexes were absent, plantar response was flexor and multimodality sensory deficit level from C3 (second cervical vertebrae) dermatome downwards. Abdominal and anal reflex were absent.

MRI showed a bulky spinal cord with abnormal hyper intense signal on the T2 weighted (T2W) imaging from C2 vertebral body level extending to C3 level (Figure 2).



Figure 1: Ligature mark on right side of neck.

Repeat MRI after 6 months showed resolution of cord edema, but persistent signal changes suggested myelomalacia (Figure 3).

She was given intravenous methylprednisolone 30 mg/kg bolus followed by 5.4 mg/kg/h infusion over next 23 hours as per NASCIS 3 (national acute spinal cord injury) protocol and DVT prophylaxis. She was given external immobilization with a cervical collar (four weeks) and rehabilitated by active-assisted range of motion exercises of the lower and upper limb and robotic assisted lower limb exercise (erigo).

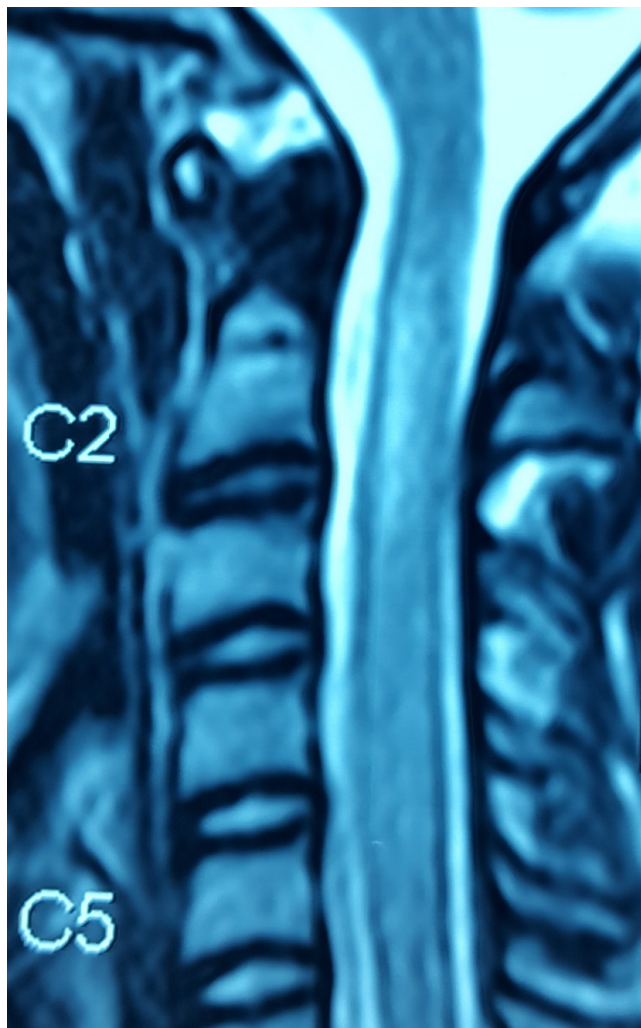


Figure 2: MRI T2 sagittal image of the spinal cord shows increased signal intensities from C2 to C3 level. Vertebrae and ligaments are normal.

The first neurological recovery noted was movement of left big toe after two weeks followed by right big toe then gradually improvement in power in all limbs. In follow up after six months, there was incomplete and asymmetric improvement in her power, which was 5/5 on the left and 4/5 on the right side and she was able to walk without support. The sensation recovery started after one month in form of paraesthesia in both lower limbs and significant improvement was noted at six months. Concomitantly bladder and bowel control started at 3 months and regained normal control at six months.

Discussion

Accidental hanging is rare in all age groups particularly in adults and only represents 2% of the 250 cases of hanging autopsied at the department of Legal Medicine of Sousse (Tunisia) during 15 years [1].



Figure 3: MRI T2 sagittal image of the spinal cord shows increased signal intensities from C2 to C3 level after six months with no cord edema.

The concept of SCIWORA was proposed by Lloyd [2] in 1907, but the acronym was coined by Pang and Wilbarger in 1982 [3] as “objective signs of myelopathy as a result of trauma” with no evidence of fracture or ligamentous instability on plain spine radiographs and tomography. They cautioned, “If the early warning signs of transient symptoms could be recognized and promptly acted upon before the onset of neurological signs, the tragic fate of some of these children might be duly averted”.

Cervical spinal cord can infrequently be injured without an attending damage to either disco corporeal or discoligamentous structures. Such damage is portrayed in youngsters, in whom the cervical spine has increased range of movement, including hyperflexion, hyperextension and distraction. Spinal cord is a viscoelastic tissue displaying versatile properties taking after stretch or

compression of the cord. Equally important is the reciprocal behavioral adaptation of the meninges to neutralise the stretching of the cord. The osteoligamentous sheath represented by the spinal canal is deformable in normal mechanics of movement. The movements are thus naturally and passively sustained by the spinal cord and nerve roots. During non-physiological movements of excessive amplitudes, which exceeds their capacity to adapt the nervous structures can be subjected to strain. It is thus likely that SCIWORA represents those cases where the force was sufficient to cause cord damage but was unable to damage the discocorporeal or discoligamentous structures. The injury is predominantly documented in children, probably due to an increased elasticity of pediatric spine. In young children, vertebral column can withstand stretching without any evidence of deformity while the spinal cord is harmed. This mismatch of elasticity between the spinal column and spinal cord is the major factor contributing to the high incidence of SCIWORA injuries in young children. It creates the impression that strain of the cervical spine in any course can harm the cord [4].

MRI indicated five classes of post-SCIWORA cord findings: complete transection, major hemorrhage, minor hemorrhage, oedema only (most common) and normal [5]. MRI is extremely useful for the assessment of the cord injury and prognosis [6-8].

Strict rules with respect to treatment of this damage are missing. The mainstay of treatment has been immobilization and avoidance of activity that may either lead to exacerbation of the present injury. External immobilization of the spinal segment of injury is recommended for up to 12 weeks.

This a rare case report of accidental hanging in which a young female had hyperextension of neck for 5 minutes, leading to quadriplegia. Her initial x ray cervical spine was normal and subsequent MRI showed intra-medullar signal changes. She was treated with steroid and physiotherapy and there was a marked improvement in her weakness and was able to walk without support.

Conclusion

Finally, SCIWORA is rare in adults with normal spinal canals. This ought to be suspected where spinal damage causes neurological deficit. In hyperextension, the cord gets damaged due to compression, while in hyper flexion, rotator acceleration, injury occurs due to a combination of stretching, tethering and vascular compromise. Management is essentially conservative, and prognosis is better than that seen in patients with fracture or dislocation of cervical spine.

References

1. Zemni M, Dhiab BM, Souguir MK, Ben Abdallah E, Chebaane N (2000) La mort par strangulation: Étude de 28 cas. *J Med Leg Droit Med* 43: 583-588.
2. Lloyd S (1907) Fracture dislocation of the spine. *Med Rec* 71: 465-470.
3. Pang D, Wilberger JE (1982) Spinal cord injury without radiographic abnormalities in children. *J Neurosurg* 57: 114-121.
4. Pang D, Pollack IF (1989) Spinal cord injury without radiographic abnormality in children - The SCIWORA syndrome. *J Trauma* 29: 654-664.
5. Pang D (2004) Spinal cord injury without radiographic abnormality in Children, 2 decades later. *Neurosurgery* 55: 1325-1343.
6. Marciello MA, Flanders AE, Herbison GJ, Schaefer DM, Friedman DP, et al. (1993) Magnetic resonance imaging related to neurologic outcome in cervical spinal cord injury. *Arch Phys Med Rehabil* 74: 940-946.
7. Kulkarni MV, McArdle CB, Kopanicky D, Miner M, Cotler HB, et al. (1987) Acute spinal cord injury. MR imaging at 1.5 T. *Radiology* 164: 837-843.
8. Schaefer DM, Flanders AE, Osterholm JL, Northrup BE (1992) Prognostic significance of magnetic resonance imaging in the acute phase of cervical spine injury. *J Neurosurg* 76: 218-223.