Case Report

# Complete dislocation at the level of C2-C3 vertebra with vertebral artery rupture in a multitrauma patient

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**Abstract**

When 9-year-old boy victim has arrived at emergency department, he was multitrauma patient, pulseless, and was not breathing. He had a complete dislocation at the level of cervical vertebra 2-3. We report that effective and early cardiopulmonary resuscitation established return of spontaneous circulation although intervertebral complete luxations always result in sudden death.

**KEY WORDS:** Multitrauma, vertebra dislocation, resuscitation, cervical vertebra

## Introduction

Cervical spine (C-spine) lies between the occiput and thorax. Upper C-spine injuries are about 24% of the fractures and dislocations of the C-spine injuries.[1] Specific cervical joint articulations authorize the movement in the plane of flexion, extension, lateral bending, and rotation. Injury occurs when forces applied to head and neck result in loads that exceed the ability of the supporting structures to dissipate energy. Jefferson[2] found that injuries to the C-spine involve two particular areas C1 to C2 and C5 to C7. There is very limited muscular support around C-spine area. It supports the weight of head, placing it at higher risk of sudden movements and whiplash injuries, which can cause damage to bones, ligaments, arteries, and more seriously to the cervical cord and the exiting nerve roots. Injuries to the C-spine cause neurological deficit in approximately 40% patients; 10% traumatic spinal cord injuries have no obvious roentgenographic evidence of vertebral injury.[3]

Spine injuries may be associated with the cord injuries, complete or incomplete, which can manifest as total motor or sensory loss distal to the injury level or presence of some such functions, respectively. Occipitocervical dislocations often results in death.[4] The latter may present as Brown-Sequard syndrome, central cord syndrome, anterior cord syndrome, and posterior cord syndrome or rarely as monoparesis of upper or lower extremities.

Intervertebral complete luxations often result in sudden death so no cervical imaging is performed in these cases. Significant ligamentous disruption in occipito–atlanto–axial complex results in craniocervical instability. While the vast majority of patients will not survive, those who do, they present a wide variety of neurological findings ranging from no deficit to quadriparesis with cranial nerve palsies. Here, we report the cervical computerized tomography (CT) findings including C2-C3 vertebral separation of a multitrauma patient who responded to early and effective cardiopulmonary resuscitation (CPR).

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## Case Report

A 9-year-old boy was admitted to the emergency room as a result of a pedestrian accident. At the arrival time, he was unconscious with no pulse and breathing thus an immediate CPR has been started. Normal sinus rhythm was accomplished approximately after 7-minute CPR and then he was intubated. After the return of spontaneous circulation (RSOC), vital signs were normal. Vertebral dislocation was observed at level of C2-C3 at lateral cervical X-ray [Figure 1].

Brain CT showed brain edema with diffuse subarachnoid hemorrhage located at the basal cistern and intraventricular

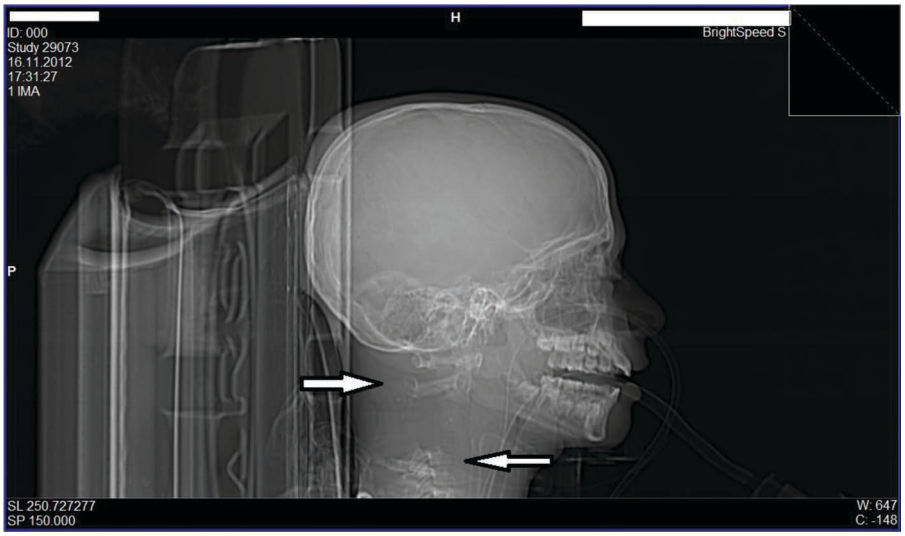


**Figure 1:** Vertebral dislocation at level of C2-C3 at lateral cervical X-ray.

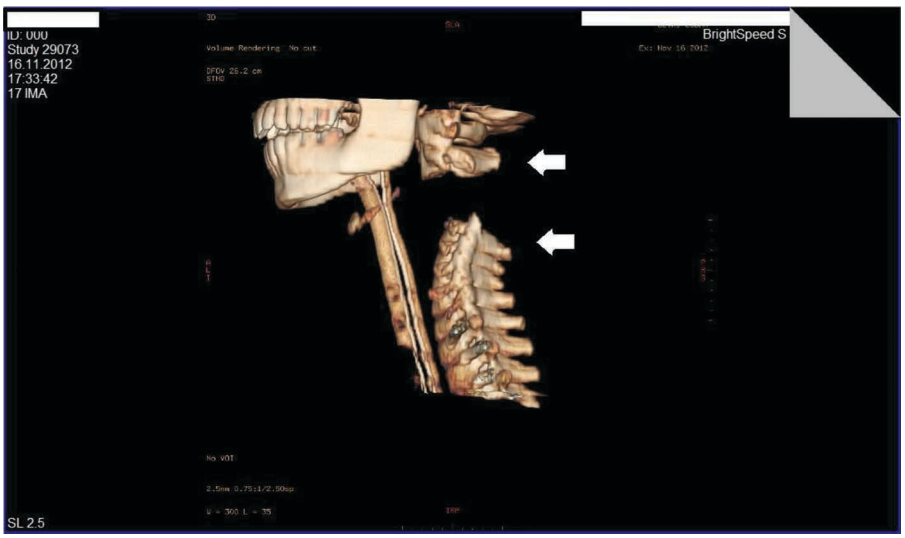


**Figure 2:** C2-C3 separation with a rupture of the vertebral artery on cervical CT scan.

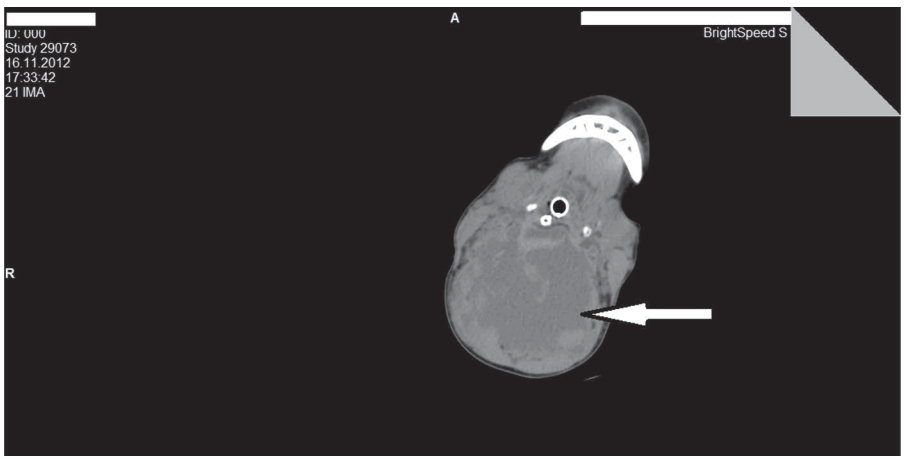


**Figure 3:** Hematoma due to the vertebral luxation on CT scan.

area. Cervical CT scan also showed C2-C3 separation with a rupture of the vertebral artery [Figure 2]. Hematoma was observed resulting from the vertebral luxation that leads to rupture and bleeding of vertebral arteries [Figure 3].

The patient's thorax CT revealed diffuse parenchymal contusion. Abdominal CT revealed lacerations of the spleen and liver in addition to perirenal hematoma and left acetabular fracture.

The patient was transferred to the intensive care unit. However, the patient died of cardiopulmonary arrest with no response to CPR within an hour following his transfer.

## Discussion

Mechanisms of injury are age related, with younger children sustaining C-spine injuries as a result of motor vehicle accidents and older adolescents commonly injured during sporting activities. Complete lesions of the cord in children are associated more frequently with lower C-spine injuries, but C-spine injuries in children most commonly involve the upper C-spine. C-spine dislocations most commonly result from motor vehicle accidents (especially among pedestrians), and C-spine fractures occur most commonly as a result of falls and dives.[5]

A study of Brown et al.[5] presented that the most common mechanism of C-spine injury was motor vehicle related (52%), followed by sporting injuries (27%). Also in the same study, the mean age of C-spine-injured children was reported as 10.3.[5] Another study showed that motor vehicle accident was the most common mode of injury in 70% patients followed by fall from height in 23% patients, fall of heavy object over the head in 3.5% patients, and train accident in 3.5% patients.[6] Knox et al.[7] and Leonard et al.[8] also detected that motor vehicle collision was the most common cause of spine trauma in children. Our patient had distraction trauma through the motor vehicle accident and was 9 years old.

Most fatal C-spine injuries occur in upper cervical levels, at either craniocervical junction C1 or C2. The most common site of cervical dislocation is between C5 and C6. Brown et al.[5] found that 68% of all children sustained injuries to C1 to C4 in the retrospective analysis of 103 consecutive C-spine-injured children. We report dislocation at the level of C2-C3 vertebra with the vertebral artery rupture. Age distribution of the cervical injuries has shown bimodal distribution in adults.[9] In the pediatric population (up to 9 years old), the upper C-spine is more susceptible to injury.[10] Our patient was in the same age group who had injury at the level of the C2-C3 vertebra.

Reports on dislocations at C2-C3 level are limited in literature since typically these dislocations are considered to be noncompatible with survival but rather result in sudden death. However, there is a case report of hypotonia and weakness associated with C2-C3 dislocation in the literature that was presumed to have taken place at birth.[11] In addition, a 57-year-old patient with a history of laminectomy, a complete cervical dislocation at the level of C2-C3 with mild neurological signs was also reported.[12]

Generally, high spinal vertebral traumatic dislocations result in loss of life at the scene, but here the aim was to share CT findings of a patient who survived briefly after high spinal vertebral traumatic dislocation. We could establish an RSOC with the aid of an effective CPR . Our case report showed that even in mortal trauma cases like this, the early and effective CPR has provided the RSOC.

## Conclusion

Effective and early CPR established RSOC although intervertebral complete luxations always result in sudden death.

## References


1. Bohlman HH. Acute fractures and dislocations of the cervical spine. An analysis of three hundred hospitalized patients and review of the literature. J Bone Joint Surg Am 1979;61:1119–42.
2. Jefferson G. Fracture of the atlas vertebra. Report of four cases, and a review of those previously recorded. Brit J Surgery 1919; 7:407–22.
3. Montazeri A. Road-traffic-related mortality in Iran: a descriptive study. Public Health 2004;118:110–3.
4. Adams VI. Neck injuries: I. Occipitoatlantal dislocation—a pathologic study of twelve traffic fatalities. J Forensic Sci 1992; 37:556–64.
5. Brown RL, Brunn MA, Garcia VF. Cervical spine injuries in children: a review of 103 patients treated consecutively at a level 1 pediatric trauma center. J Pediatr Surg 2001;36:1107–14.
6. Kamal Y, Khan HA, Gani N, Gupta A, Singh D, Gul S. A study to analyses pattern and treatment of upper cervical spine injuries experience from developing world. Trauma Mon 2015;20:e19174.
7. Knox JB, Schneider JE, Cage JM, Wimberly RL, Riccio AI. Spine trauma in very young children: a retrospective study of 206 patients presenting to a level 1 pediatric trauma center. J Pediatr Orthop 2014;34(7):698–702.
8. Leonard JR, Jaffe DM, Kuppermann N, Olsen CS, Leonard JC. Pediatric Emergency Care Applied Research Network (PECARN) Cervical Spine Study Group. Cervical spine injury patterns in children. Pediatrics 2014;133(5):e1179–88.
9. Uhrenholt L, Charles AV, Hauge E, Gregersen M. Pathoanatomy of the lower cervical spine facet joints in motor vehicle crash fatalities. J Forensic Leg Med 2009;16:253–60.
10. Eleraky MA, Theodore N, Adams M, Rekate HL, Sonntag VK. Pediatric cervical spine injuries: report of 102 cases and review of the literature. J Neurosurg 2000;92:12–17.
11. Jones ET, Hesinger RN. C2-C3 dislocation in a child. J Pediatr Orthop 1981;1:419–22.
12. Machinis TG, Fountas KN, Kapsalaki EZ, Kapsalakis I, Grigorian AA. A rare case of complete C2-C3 dislocation with mild neurological symptoms. Eur Spine J 2006;5:585–9.


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