

# Spinal cord injury without radiological abnormality manifested as self-limited brown-sequard syndrome

Yudha Mathan Sakti, Marda Ade Saputra, Tedjo Rukmoyo,  
Rahadyan Magetsari

## ABSTRACT

**Introduction:** Combination between spinal cord injury without radiological abnormality (SCIWORA) and Brown-Sequard syndrome in a patient is a rare condition. In SCIWORA, there is usually a delay in neurologic deficits which can potentially lead to misdiagnosis. Therefore, the clinician should have a good understanding of the course of the disease to make a good diagnosis and treatment. **Case Report:** Reporting a case of female 20-year-old with chief complaint of severe neck pain and delayed limbs weakness. The mechanism of injury was fall with the head hit the ground in left lateral flexion position. The physical examination showed zero motor power of the right limbs and contralateral pain and temperature deficit one hour after the injury. We diagnosed the patient with incomplete spinal cord injury at C4 level with associated Brown-Sequard syndrome. We gave soft collar neck for immobilization, medication with NSAID for analgetic and Methylprednisolon. We found dramatic improvement in 10 hours

after the injury with motor improvement from 0–5 and normal sensory function. The patient was then discharged with good functional outcome and with no sequelae. **Conclusion:** Incomplete cervical spinal cord injury without radiological abnormality that manifested as Brown-Sequard syndrome is a rare case and potentially confusing condition. Better understanding of the course of the disease may help the clinician to make a right diagnosis and plan for management.

**Keywords:** Brown-Sequard syndrome, Spinal cord injury, Spinal cord injury without radiological abnormality

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Yudha Mathan Sakti<sup>1</sup>, Marda Ade Saputra<sup>2</sup>, Tedjo Rukmoyo<sup>1</sup>,  
Rahadyan Magetsari<sup>3</sup>

**Affiliations:** <sup>1</sup>Staff of Orthopaedic & Traumatology Department, Gadjah Mada University, Sardjito Hospital, Yogyakarta; <sup>2</sup>Resident of Orthopaedic & Traumatology Department, Gadjah Mada University, Sardjito Hospital, Yogyakarta; <sup>3</sup>MD, PhD, Orthopaedic and Traumatology Department, Faculty of Medicine, Gadjah Mada University, Yogyakarta, Indonesia.

**Corresponding Author:** Marda Ade Saputra, Resident of Orthopaedic & Traumatology Department, Gadjah Mada University, Sardjito Hospital, Yogyakarta; Email: marhoochi@gmail.com

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## INTRODUCTION

Spinal cord injury without radiological abnormality (SCIWORA) is defined as the occurrence of acute traumatic myelopathy despite normal plain radiographs and normal computed tomography (CT) studies. This occur predominantly among pediatric population with incidence range from 4–66% of all spinal cord injuries (10–20% of all pediatric spinal trauma) [1]. In young children, the pathogenesis of SCIWORA may be related to the mismatch in the elasticity of the tissue of the

vertebral column and spinal cord [1–3]. The mechanism of injury could be direct or indirect spinal cord traction or compression and vascular or ischemic injury [1, 3, 4]. SCIWORA have a large spectrum of neurologic deficit, ranging from mild, transient until complete spinal cord injuries. The neurologic deficits can happen in delayed form, ranging from hours to days after the injury [1, 3, 5].

Brown-Sequard syndrome is an anatomic hemisection of the cord, resulting in ipsilateral motor and proprioception loss and contralateral pain and temperature deficit. It is a rare condition, as the trauma or something should damage the nerve fibers on just one half of the spinal cord. Fortunately, the prognosis for significant motor recovery is good and the most important prognostic variable relating to neurologic recovery is completeness of the lesion [6].

Combination between SCIWORA and Brown-Sequard syndrome is a rare condition that can lead to misdiagnosis. Therefore the clinicians should have a good awareness and understanding of the disease to make a right diagnosis and therapy for the patients.

## CASE REPORT

A 20-year-old female presented with chief complaint of severe neck pain and delayed limbs weakness after suffering from sport injury in martial arts competition. The mechanism of injury was fall with the head hit the ground first in left lateral flexion position. No history of loss of consciousness. After the accident, the patient felt neck pain and about one hour after the accident she could not move her right limbs.

From physical examination, the general condition was good, the vital signs were within the normal limits. The motor functions of the right upper and lower extremities from C5 – S1 level were decreased to zero with no muscle tone and the sensory functions of the left side (contralateral side) below the C4 level were decreased with loss of pain and temperature sensation. The ASIA scores were 56 for sensory functions and 50 for motor functions and the functional score was 4 for Nurick scale that means unable to walk without assistance. We performed thorough diagnostic approach including X-ray, CT scan and MRI investigation (Figures 1 and 2). From plain X-ray and CT scan there was no visible fracture or dislocation and the alignment was good. The patient was diagnosed with incomplete spinal cord injury at C4 level with associated Brown-Sequard syndrome manifestation. The patient was observed and managed with soft collar neck for immobilization, medication with NSAID for analgesia and Methylprednisolon 30 mg/kg in 15 minutes followed by maintenance with 5,4mg/kg/h for the next 23 hours, and we found dramatic improvement in 10 hours after the injury with motor improvement from 0–5 in both affected extremity and normal sensory function in the contralateral side. The nurick scale improved to 1 that means the patient had no difficulty in walking. The

patient was observed for the next 24 hours and given rehabilitation program. The patient was then discharged with good functional outcome and with no sequelae.

## DISCUSSION

Spinal Cord Injury Without Radiographic Abnormality (SCIWORA) was first introduced by Pang and Wilberger and was first reported by Burke in 1974. It is used to define clinical symptoms of traumatic myelopathy with no radiographic or CT abnormality. The symptoms have a broad spectrum from mild and transient paresthesia in fingers to quadriplegia. The symptoms can appear at the time of injury but can also be delayed upto several days of injury. The main therapeutic treatment is external immobilization of the spine for up to 12 weeks [5]. Incomplete cervical spinal cord injury without radiological abnormality could be potentially confusing and frustrating because there could be a delay in neurologic deficit and the course of the disease can

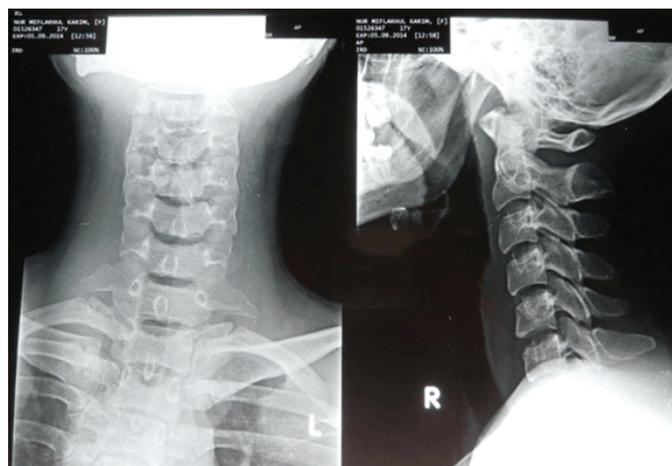


Figure 1: Anterior-posterior and Lateral view of Cervical Spine X-ray. There was no fracture and dislocation. The alignment and pretracheal soft tissue even looks normal.

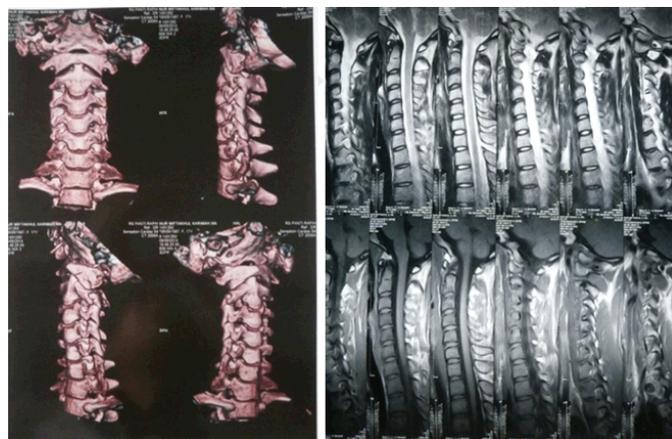


Figure 2: Cervical CT scan and MRI. There was no fracture and dislocation found in the CT scan. From sagittal view of the cervical MRI the spinal cord looked good.

be very dramatic. In this case, SCIWORA manifested as Brown-Sequard syndrome, which is a rare condition. The neurologic status and the imaging studies of the patient were initially normal but suddenly worsened very fast placing the patient and families in a big worry. And then, without any surgical intervention, there was surprisingly fast recovery time and excellent functional outcome. The delay in neurologic deficit needs full and thorough observation. We used soft collar neck for immobilization, high dose of intravenous corticosteroid, intravenous NSAID agents, and rehabilitation as the management approach. The prognosis is related to the severity of the spinal cord dysfunction. Outcome after incomplete injuries in older children is excellent [1]. The patient age and the first clinical presentation after the injury might be the clinical predictors for this patient to have a good recovery.

## CONCLUSION

Incomplete cervical spinal cord injury without radiological abnormality that manifested as Brown-Sequard syndrome is a rare case and potentially confusing condition because of the delay in neurologic deficit and the course of the disease that was very dramatic. Better understanding of the course of the disease may help the clinician to make the right diagnosis and plan management with better explanation and education to the patient and the frustated families.

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## Author Contributions

Yudha Mathan Sakti – Substantial contributions to conception and design, Acquisition of data, Analysis and interpretation of data, Drafting the article, Revising it critically for important intellectual content, Final approval of the version to be published

Marda Ade Saputra – Substantial contributions to conception and design, Acquisition of data, Analysis and interpretation of data, Drafting the article, Revising it critically for important intellectual content, Final approval of the version to be published

Tedjo Rukmoyo – Substantial contributions to conception and design, Revising it critically for important intellectual content, Final approval of the version to be published

Rahadyan Magetsari – Substantial contributions to conception and design, Revising it critically for important intellectual content, Final approval of the version to be published

## Guarantor of Submission

The corresponding author is the guarantor of submission.

## Source of Support

None

## Consent Statement

Written informed consent was obtained from the patient for publication of this case report.

## Conflict of Interest

Authors declare no conflict of interest.

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