

# Brachial Plexus Injury Disguised By Central Cord Syndrome

## Santral Kord Sendromu Altında Gizlenen Brakial Pleksus Lezyonu

Yasin Demir, Ümüt Güzelküçük, Ümmügülsüm Doğan Duran, Arif Kenan Tan

Gülhane Military Medical Academy, Turkish Armed Forces Rehabilitation Center, Department of Physical Medicine and Rehabilitation, Ankara, Turkey

### ABSTRACT

Both central cord syndrome (CCS) and brachial plexus injury (BPI) cause upper extremity weakness and concomitant presence of these syndromes may challenge diagnosis. A man with three-month-history of motor impairment of upper extremities following crush injury was admitted to clinic for rehabilitation. Nerve conduction studies and needle electromyography revealed BPI. BPI, which accompanies with cervical spinal cord injury, might be overlooked because of similar clinical features with CCS. Therefore, the physicians have to consider the possibility of BPI in patients with CCS.

**Keywords:** Brachial plexus injury, central cord syndrome; spinal cord injury, rehabilitation

### ÖZET

Hem santral kord sendromu (SKS) hem de brakial pleksus lezyonu (BPL), üst ekstremitelerde kas güçsüzlüğüne yol açar ve bu sendromların birlikteliği tanının zorlaşmasına sebep olabilir. Üç ay önce ağırlık altında kalma sonrası üst ekstremitelerinde kuvvet kaybı gelişen erkek hasta rehabilitasyon amacıyla kliniğimize başvurdu. Sinir ileti çalışmaları ve iğne elektromyografisi neticesinde BPL tanısı kondu. Servikal spinal kord hasarına eşlik eden BPL tanısı, SKS ile klinik benzerlik nedeniyle gözden kaçabilir. Bu yüzden, klinisyenler SKS'li hastalarda BPL tanısını akıllarında tutmalıdırlar.

**Anahtar sözcükler:** Brakial pleksus lezyonu, santral kord sendromu, spinal kord hasarı, rehabilitasyon

### Corresponding Author Yazışma Adresi

Yasin Demir  
Gülhane Military Medical Academy,  
Turkish Armed Forces Rehabilitation  
Center, Department of Physical  
Medicine and Rehabilitation,  
Ankara, Turkey

**E-mail:** ydemir@gata.edu.tr

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## Introduction

Central cord syndrome (CCS) is characterized by the cervical spinal cord injury (SCI) on the account of cervical spinal trauma or degenerative process and is the most frequently encountered incomplete SCI (1,2). Patients with CCS have disproportionately more motor impairment of the upper extremities than the lower extremities, bladder dysfunction, and varying degrees of sensory loss below the level of the lesion (3).

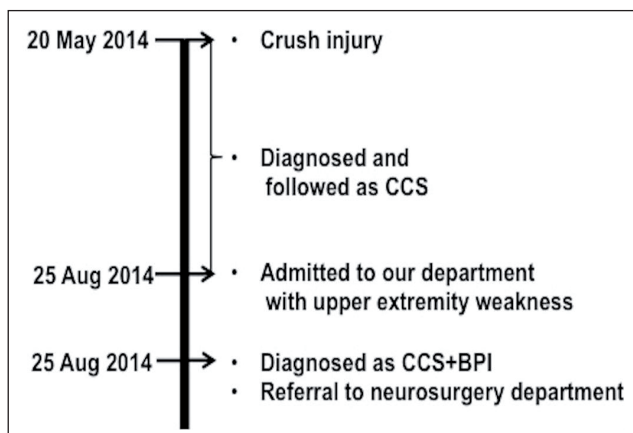
Similarly, brachial plexus injury (BPI), which is caused by damage to the cervical and thoracic nerves, can induce severe neurologic deterioration, leading to paralysis of the arm and can deteriorate daily activities and function (4). Concomitant CCS can complicate the diagnosis because both disorders generally present with upper extremity weakness.

We present the case of a man with motor impairment of upper extremities and sparing of lower extremities following crush injury.

## Case Report

A 57-year-old man was referred to our department on account of the weakness of the both upper extremities. In medical history, he was diagnosed as CCS because of cervical crush injury under heavy construction equipment three months ago and he was followed with non-operative management in a rehabilitation center (Figure 1).

On physical examination, touch and pain sensations at all levels and anal sensation were preserved. On motor assessment, C5-C6-C7 levels were 4/5 on the left and 2/5 on the right; C8 and T1 levels were 4/5 bilaterally and both



**Figure 1.** Timeline of the progress.  
CCS: Central cord syndrome, BPI: Brachial plexus injury

lower extremities motor strength were normal. There were no fecal or urinary incontinence. Biceps, triceps and brachioradial reflexes in right upper limb were reduced whereas these reflexes were assessed as increased on the left in addition to Hofmann sign. Urinary bladder and bowel function were normal. According to American Spinal Injury Association Impairment Scale (AIS), his injury was categorized as C4 AIS D incomplete SCI.

T2-weighted magnetic resonance imaging scan of the cervical spinal cord showed high-signal intensity at C2 to 4 levels, suggestive of myelomalacia. Nerve conduction studies and needle electromyography, which were arranged due to clinical disparity with prior diagnosis, showed partial severe axonal degeneration of middle brachial truncus and partial moderate axonal

Sensory Conduction Velocity				
	Side	Amplitude (µv/mv)	Distal latency (msec)	Conduction velocity (m/s)
Median	Right	10	3,8	58
Ulnar	Right	14	2,9	57
Radial	Right	10	3,5	50

Motor Conduction Velocity					
	Side	Amplitude (µv/mv)	Distal latency (msec)	Proximal latency (msec)	Conduction velocity (m/s)
Median	Right	6	3,2	8	48
Ulnar	Right	6	2	7,2	42
Radial (EDC)	Right	6	1,5	5,8	43
Radial (Triceps)	Right	-	5,1	-	-
Axillary	Right	-	Not obtained	-	-
Musculocutaneous	Right	-	5,9	-	-

Needle EMG				
	Side	Decreased Recruitment	Polyphasia	Denervation potential
ADM	Right	+	+	-
APB	Right	+	+	-
Biceps	Right	+++	+	+++
Triceps	Right	+	+	-
Deltoid	Right	-	-	+++

**Figure 2.** Nerve conduction studies and needle EMG.  
EDC: Extensor digitorum communis, EMG: Electromyography, ADM: Abductor digiti minimi, APB: Abductor pollicis brevis

degeneration of upper truncus (Figure 2). Since then patient was referred to neurosurgery department after three months from crush injury with delayed diagnosis, BPI.

## Discussion

CCS is the most commonly encountered type of incomplete SCI, comprising nearly 9% to 25% of all cases and typically seen in elderly patients with preexisting cervical spondylosis (3,5). The etiologies of CCS are mostly high-impact injuries such as motor vehicle accident and falls and non-traumatic causes are rarely infection, tumor, and spinal stenosis (6). In addition, crush injuries could lead to CCS as in the current case.

In the spinal column, the fibers that control the upper extremities, bowel, and bladder are located in the middle of the spinal column (7). When an injury occurs at this part, disproportionate motor weakness in the upper extremities other than lower parts, a variable amount of sensory loss below the level of injury and bladder dysfunction may develop.

CCS and BPI, have similar but different clinical features. Both disorders cause motor weakness in the upper extremity and the deficit may easy to dismiss unless the examiner maintains a high index of suspicion. The potential for failure to diagnose BPI exists in patients with CCS. In case of unusually delayed motor recovery, asymmetric healing or reduced reflexes, clinicians should be alerted as regards additional problem like BPI. In the current case there were differences between left and right upper extremity muscles. In addition presence of decreased deep tendon reflexes helped us to reveal disguised diagnosis of BPI.

## Conclusion

This case showed a CCS caused by crush injury under heavy construction equipment. BPI, which accompanies with cervical SCI, might be overlooked because of similar clinical features with CCS. Therefore, the physicians have to consider the possibility of BPI in patients with CCS.

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