



Management of Central Cord Syndrome

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Introduction

- Central cord syndrome (CCS) is the most common incomplete spinal cord injury.
- Typically occurs in older adults with degenerative spinal changes who underwent cervical hyperextension injury following a fall.¹
- Classic presentation is younger patients following high-energy trauma.¹
- Pathophysiology involves injury to corticospinal tracts and decussating lateral spinothalamic tract supplying the upper limbs, sparing lower limb pathways (Fig.1).²
- Characterized by disproportionately greater motor weakness in the upper extremities vs lower extremities and sacral sparing.²
- Paresis occurs more frequently distally than proximally.²
- Management remains controversial. Historically conservative, though increasing evidence supports early surgical decompression (<24 hours) as safe and effective treatment.³
- Patients with Parkinson's disease (PD) could be predisposed to CCS due to degenerative spinal changes and higher fall risk.⁴
- Limited literature on CCS in patients with PD.

Case Summary

- A 78-year-old woman with a history of Parkinson's disease presented to the ED after a low-energy fall resulting in neck hyperextension.
- On arrival, she was awake and alert with a GCS of 15.
- Physical exam was pertinent for bilateral upper extremity weakness (hands > arms), preserved lower extremity motor function, and intact sacral sensation.
- MRI of the cervical spine revealed multi-level cervical stenosis at C3/C4 and C5/C6, with osteophytes and disc bulge at C6/C7. No evidence of acute fracture or dislocation.
- Initially managed conservatively, admitted to SICU for observation.
- Motor deficits persisted, underwent C3-C7 decompression and C3-T1 posterior fusion on post-ED day 2 (>24 hours later).

Case Summary (continued)

- Postoperatively, she showed partial improvement in upper extremity strength, though weakness persisted in the C6-T1 distribution, particularly affecting fine motor control of the hands.
- Discharged to Mary Free Bed inpatient rehabilitation facility.
- Distal upper extremity weakness (particularly hand dexterity) shows a slower recovery, as demonstrated by the patient's persistent postoperative hand weakness.
- Four months postoperatively, the patient showed improving bilateral motor and sensory function according to Neurosurgery physical.

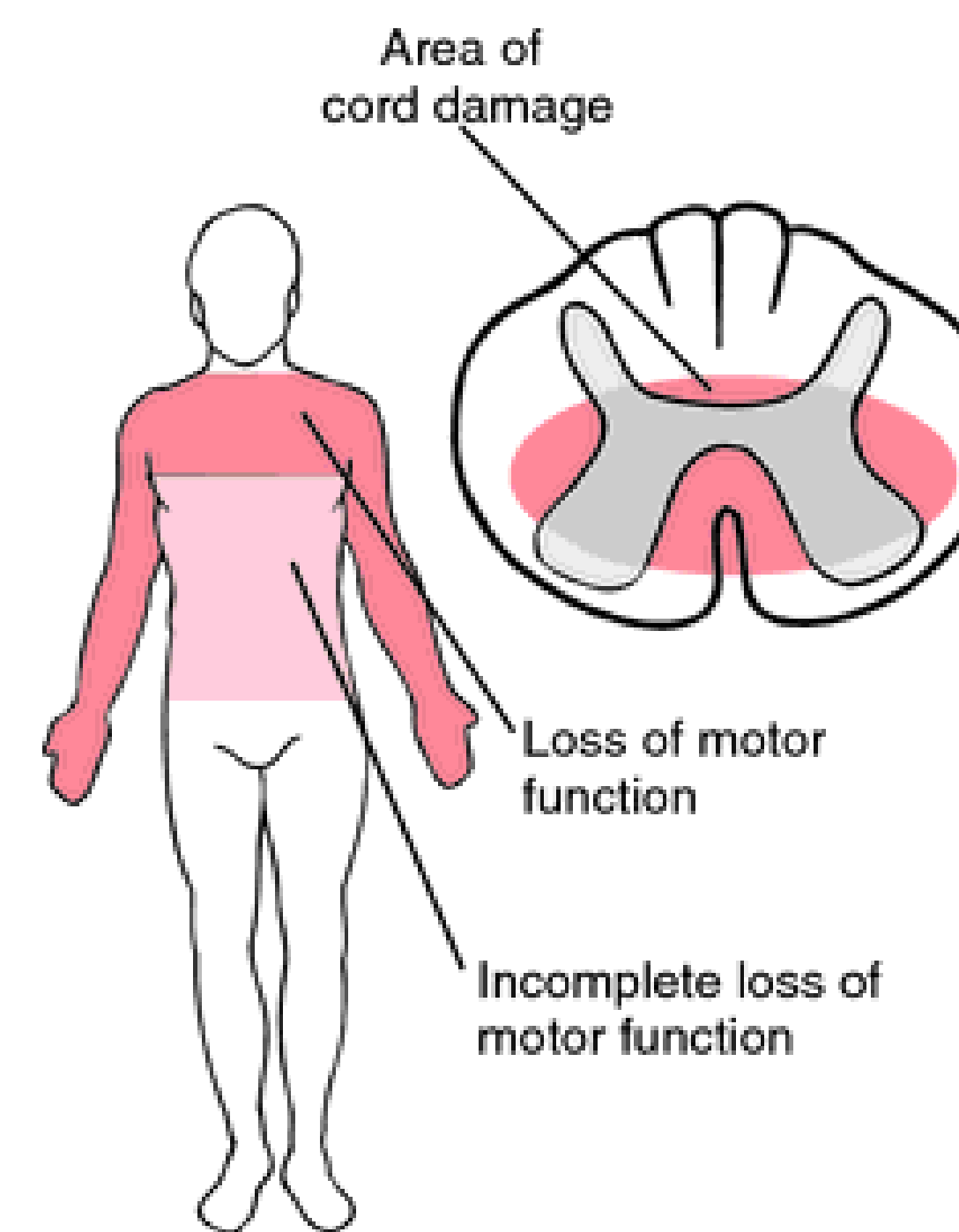


Figure 1: Central Cord Syndrome ⁹

Discussion

- CCS demographics have shifted over time.¹
- Once most common in younger patients after high-energy trauma, it is now frequently seen in older adults following low-energy hyperextension injuries, often from ground-level falls.¹
- CCS has traditionally been managed conservatively based on early reports of spontaneous recovery and concerns for iatrogenic injury during surgery.¹
- However, these conservative protocols were developed for a different injury pattern and demographic than those seen today.¹
- Current guidelines require revision to reflect new mechanisms, comorbidities, and outcomes data.

Discussion (continued)

- Recent studies demonstrate that surgery within 24 hours can improve outcomes by limiting secondary injury and relieving mechanical compression.
- Early decompression is associated with significantly improved upper limb motor recovery, both immediately and at one-year post-op.^{5,6}
- A meta-analysis of 13 studies found that early surgery substantially improved American Spinal Injury Association Motor Score (AIMS/AMS) and reduced complication rates compared to delayed intervention.⁷
- Parkinson's disease (PD) contributes to axonal degeneration and neuronal loss and increases the risk of cervical sagittal malalignment and spinal stenosis.⁴
- While PD is not directly linked to CCS, rigidity, postural instability, and degenerative spinal changes heighten the risk of injury and can impair postoperative recovery.⁴
- Baseline neurologic function, injury severity, age, and comorbid neurological disease remain the strongest predictors of outcome.⁸
- These patients benefit from early multidisciplinary rehabilitation following acute stabilization to maximize functional recovery.
- This case highlights the need for individualized management and coordinated rehabilitation for patients with neurological comorbidities.

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