Rare disease

Lower thoracic spinal cord injury without radiographic abnormality in an amateur rugby player

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Summary

A 37-year-old man, amateur rugby player sustained a hyperextension injury to his lower thoracic spine during a scrum collapse. The patient developed extreme hyperpathia in the T10-12 dermatome, and parasthesia from T12 to S1 in the left lower limb. Medical Research Council grade 5 power was regained rapidly within minutes of the accident, and the hyperpathia resolved within a week. MRI showed contusion of the spinal cord at T10 level but no associated osseoligamentous injury. Six months later, parasthesia and subjective weakness remained in the left lower limb. To our knowledge, this is the first description of a lower thoracic spinal cord injury without radiographic abnormality following an isolated low-energy injury in a skeletally mature patient.

BACKGROUND

Spinal cord injury without radiographic abnormality (previously known as SCIWORA) is exceedingly rare in skeletally mature individuals, with very few previous case-reports,²⁻⁴ most of which occurred in the context of high energy poly-trauma. To our knowledge, this is the first reported case occurring in the lower thoracic spine as an isolated injury following a low-energy mechanism. Interestingly, the patient was noted on MRI to have asymptomatic spinal canal stenosis due to significant ligamentum flavum hypertrophy and facet joint arthropathy. This variant may have rendered him more susceptible to this type of injury. The patient had extreme hyperpathia at T10-12 as a prominent clinical feature; this has not previously been reported in association with SCIWORA. The patient made a moderate but not complete neurological recovery.

CASE PRESENTATION

A 37-year-old amateur rugby player sustained a hyperextension injury to his lower thoracic spine during the collapse of a scrum. On scene, he reported inability to feel or move his legs. He was transported by road ambulance to a level 1 trauma centre with standard (triple) spinal immobilisation. His airway, breathing and circulation were normal and his Glasgow Coma Score 15 throughout. He had no significant medical history, regular medication or known allergies. On arrival, he described extreme hyperpathia in the distribution of T10-12, severe enough that he was unable to tolerate clothes or bedsheets over the area and even the slightest air movement caused severe pain. On examination, there was tenderness to palpation over L3/4/5. Neurologically, power was normal (Medical Research Council grade 5¹) in both lower limbs. Knee and ankle reflexes were brisk, and plantar reflexes downgoing bilaterally. Parasthesia was present from T12 to S1 on the left side to both light touch and pin prick stimulation. He developed urinary retention and was therefore catheterised, 'catheter tug' sensation

was intact. Anal tone and perianal sensation were normal. Subsequently, the patient reported normal erectile function following injury. The hyperpathia persisted for 7 days before subsiding. The parasthesia gradually improved, although did not completely resolve. On discharge 10 days later the patient reported 90% of normal sensation to light touch and pin-prick stimuli.

INVESTIGATIONS

Plain radiographs of the thoraco-lumbar-sacral spine at admission showed no evidence of bony injury and lateral flexion/extension views showed no suggestion of vertebral column instability.

Figure 1 Sagittal T2 scan showing high signal changes in the cord at T10.

Figure 2 Axial T2 scan at T10 showing high signal changes in the cord indicative of oedema and injury and degenerative changes of the facet joints and hypertrophy of the ligamentum flavum.

MRI of the lumbar/sacral spine confirmed alignment of the lower thoracic and lumbar spine was maintained. There was an area of signal change within the cord at the T10 vertebral body level suggestive of a cord contusion (figure 1). Axial MRI at this level surprisingly showed a stenotic spinal canal due to significant ligamentum flavum hypertrophy and facet joint arthropathy distorting the cord posteriorly (figure 2). There was no evidence of injury to the vertebral bodies, or the posterior elements, nor any evidence of haemorrhage on any views.

TREATMENT

The patient was managed conservatively, on bed rest for the first 4 days and then subsequently mobilised on crutches. He underwent intensive inpatient physiotherapy.

OUTCOME AND FOLLOW-UP

The patient recovered full power bilaterally in both lower limbs by the time he arrived at the receiving hospital. His T10-T12 dermatomal hyperpathia resolved in 7 days. Paraesthesia of the left lower limb in the distribution of L1 to S1 gradually improved but had not resolved on discharge. Unfortunately, at 3 months postdischarge the patient fell down some steps resulting in a recurrence of his symptoms of paraesthesia and weakness in the left leg. Repeat MRI of the spine at 4 months postinjury showed persistent cord injury with no evidence of radiographic improvement (figure 3). At 6 months follow-up, he reported difficulty mobilising and with activities of daily living. The lower limbs remained bilaterally hyper-reflexic with downgoing plantars and the L1 to S1 paraesthesia persisted.

DISCUSSION

SCIWORA in the paediatric patient is well recognised. The comparatively large size of a child's head, combined with the flexibility of an immature vertebral column renders the paediatric spinal cord particularly vulnerable to these injuries.⁵ In adults, this is a rare injury, particularly in the intrinsically stable thoracic spine. Previous cases of thoracic SCIWORA in adult patients have been reported at T4 and above.^{3 4} One case report describes SCIWORA at T10

Figure 3 Sagittal T2 scan at 4 months follow-up showing persistence of the high signal changes at T10 in keeping with cord injury.

in a severely poly-traumatised patient but following significant high energy lower limb injuries.² The authors proposed that sudden bilateral traction on the sciatic nerves accounted for the observed cord injury in this particular case. This case highlights that lower thoracic SCIWORA can occur following an isolated low energy injury in a skeletally mature patient.

Hyperpathia is an uncommon clinical sign in spinal cord injury of any aetiology, seen in 3% of patients in one large case series.⁶ None of the existing case reports describe this phenomenon as a prominent clinical feature in association with SCIWORA. In this case, hyperpathia completely resolved within 7 days.

As there is no osseoligamentous injury in SCIWORA and the spinal column is therefore presumed to be stable, there is no need to restrict the early mobilisation of these patients. Patients should be encouraged to mobilise as their pain and function allows to minimise the well-known risks associated with prolonged immobility.⁷

The role of steroids in the management of SCIWORA is controversial. A recent Cochrane review⁸ advocates the use of high dose intravenous methylprednisolone in acute spinal cord injury, which has been shown in at least one study to be effective if administered within 8 h of injury. No data is available on its use in SCIWORA patients and the benefits in this group remain unclear. SCIWORA occurs with sufficient rarity in adults to make it difficult to assess any potential recovery benefit to be gained from the administration of steroids.

Predicting neurological outcome from SCIWORA is a further challenge. A case series of adults with cervical SCIWORA⁹ reports that parenchymal cord injury on MRI is the most important factor in determining the long-term neurological outcome. The presence of cord oedema on MRI heralds the best prognosis for complete recovery and the presence of cord haemorrhage the worst. The authors commented that longitudinal signal extension on MRI and

the presence of extra-neural injuries were also associated with worse outcomes.

A further large case series¹⁰ of 100 adult patients with cervical SCIWORA who underwent expansive laminoplasty for co-morbid cervical canal stenosis showed that increased intramedullary signal intensity and prevertebral hyperintensity were present in more than 90% of patients with SCIWORA. The former was significantly associated with symptom severity and neurological prognosis ($p < 0.0001$). These results are exclusively from patients with cervical SCIWORA and as such their generalisability to injuries located in the thoracic spine should be viewed with caution as they may manifest differently on MRI. At present no data exists on MRI findings in thoracic SCIWORA, neither in terms of characterising severity nor as a predictor of prognosis.

Learning points

- ▶ Lower thoracic SCIWORA is possible in the adult patient as an isolated injury with a low-energy mechanism.
- ▶ The presence of previously asymptomatic spinal canal narrowing may contribute to the pathogenesis of this injury.
- ▶ Unusually, hyperpathia was a prominent clinical feature in this patient and has not previously been described following SCIWORA.
- ▶ These patients should be mobilised early and the use of steroids is controversial.

Competing interests None.

Patient consent Obtained.

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