CASE REPORT

Spontaneous tetraplegia during weight training

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A case of tetraplegia due to weight training is presented. Emergency surgery revealed a huge C5/6 disc sequestration trapped within the canal by the posterior longitudinal ligament. The disc was removed and C5–C7 were fused using an iliac crest tricortical graft and stabilised. The patient made a good recovery and returned to sporting activity.

Tetraplegia in a sports injury is usually caused by a flexion injury resulting in facet dislocation. We had not seen a sports tetraplegia without external injury in over 40 years. We present the first such injury to our unit sustained during weight training.

CASE REPORT

A 31 year old man presented with sudden onset progressive tetraplegia. He had received a “whiplash” type injury to his neck while heading a football 18 months before presentation, suffering short lived right arm paraesthesia. He subsequently suffered intermittent “neck spasms”.

He regularly weight trained four times a week. On the morning of presentation, he had been performing his usual shoulder exercise routine, comprising four repetitions of eight shoulder presses (27.5 kg) and shoulder shrugs (90 kg). After eight shoulder shrugs, he developed severe neck pain without radiation. He therefore stopped training and went home to rest.

Two hours later he developed paraesthesia in his right arm. This progressed over 3–4 h. His arms and legs became weak and he found it difficult to walk. There was no urinary incontinence or perineal numbness.

On arrival, 8 h after symptom onset, neurological assessment was Frankel C below the C7 level. Sensation to light touch and pin prick was absent from C7 to S4 dermatomes, but joint proprioception was preserved. Tone was normal in the arms but increased in the legs. Muscle strength was preserved only in the shoulders (table 1). Rectal examination revealed normal anal tone but complete paraesthesia of the perineum. Deterioration to Frankel B occurred during preparation for emergency surgery.

A magnetic resonance scan (fig 1) showed C5/6 and C6/7 disc prolapses with cord compression at C5/6. The C5/6 disc was sequestered behind C6. The C5/6 disc prolapse was probably acute on chronic. The C6/7 prolapse was considered chronic due to annulus calcification. Disc material and epidural haematoma extended superiorly behind the C5 vertebra and inferiorly to the C6/7 disc. Although clearly compressed, the cord signal was uniform. The right C5/6 facet joint was subluxed.

Emergency surgery revealed a huge C5/6 disc sequestration trapped within the canal by the posterior longitudinal ligament. The disc was removed and C5–C7 were fused using an iliac crest tricortical graft and stabilised.

Next day, the patient’s neurological deficit had almost completely recovered. There was some diminished sensation

over the tips of the left fingers and grade 4 strength of left little finger abduction and right hip flexion. Perineal sensation was normal. These minor deficits improved, and at the 6-week review the only complaint was of weakness of left elbow flexion, biceps brachialis grade 4+ (Frankel D). By 3 months after surgery, he had returned to sporting activity.

DISCUSSION

Tetraplegia in a sports injury is virtually always a consequence of a flexion injury resulting in a facet dislocation. There may be an associated disc prolapse but usually the tetraplegia is a direct consequence of the dislocation. Such injuries are always a consequence of an external direct contact force, and, in our experience, are most commonly seen in rugby union. In our unit, rugby union is the only contact sport to produce tetraplegia, and in 1991 we had four complete tetraplegics from rugby union.^{1 2} No other contact sport has resulted in presentation of tetraplegia to the Oswestry Spinal Unit in 40 years. Non-contact sports such as equestrian sports, diving and mountain biking can also produce tetraplegia.³ Repetitive head-on-collisions, when the head is used as an offensive weapon as in American football, result in spinal stenosis and tetraparesis rather than tetraplegia.^{4 5}

Disc prolapses in the ordinary population are a consequence of disc degeneration and are not related to trauma.^{6 7} Disc prolapses take the line of least resistance laterally to produce a radiculopathy. Central disc prolapses that burst through the posterior longitudinal ligament centrally to produce a myelopathy are uncommon. The line of least resistance is followed in sports injury too; more radiculopathies are seen than myelopathies. Massive central disc prolapses in direct flexion injuries may occur when the force

Table 1 Myotomal muscle strength (according to the Medical Research Council grading) and reflex examination findings on admission

Level	Right	Left
C5	5	5
C6	5	5
C7	4	1
C8	1	1
T1	0	0
Hip flexion (L2, L3)	0	1
Hip extension (L4, L5)	3	3
Knee extension (L3, L4)	4	4
Knee flexion (L5, S1)	2	2
Ankle plantar flexion (L4, L5)	4	4
Ankle dorsiflexion (S1, S2)	0	0
EHL (L5)	0	0
Biceps	Weak	Absent
Triceps	Absent	Absent
Knee	Brisk	Brisk
Ankle	Brisk	Brisk
Plantar	Equivocal	Equivocal

EHL, Extensor hallucis longus.

Figure 1 Sagittal T2 weighted MRI scan images revealing prolapse of the C5 intervertebral disc and compression of the cervical cord. Permission for publication of this figure has been received.

falls short of producing a dislocation. There is no direct force on the neck in weightlifting and nor is there a flexion force. The compressive muscle forces on the discs in our case were not acting on normal discs. It would be virtually impossible to rupture a normal disc in weightlifting. Disc degeneration is common in the fourth decade and in later life. There are many weightlifters with degenerative necks, but it is rare to see them in a spinal clinic suffering from symptoms as a result of weightlifting, let alone tetraplegia, although cases of radiculopathy and idiopathic non-compressive quadriplegia have been reported with weightlifting and resistance training respectively.⁸⁻¹⁰

Rapidly progressive tetraplegia from a cervical disc will respond only to emergency surgery. Our patient was lucky to live near a unit ready to react accordingly.

What is already known on this topic

- Very little is actually known about massive disc herniations in weightlifters, particularly those of the cervical spine

What this study adds

- Although there are reports of cervical disc herniations as a result of contact sports, as far as we are aware, this is the first report of tetraplegia as a result of a cervical disc herniation during weightlifting exercise

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