Acute central cervical cord injury presenting with only upper extremity involvement

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Accepted: 3 February 1997

Summary. *Twenty-four patients with acute central cervical cord injury with motor and sensory impairment involving only the upper extremities are described; none had any abnormality in the lower extremities. They were all treated conservatively with one exception in whom an anterior decompression was performed. Seventeen had complete recovery of motor function; the remaining 7 had some weakness of the palmar interosseous muscles. The time to recovery was from 2 weeks to 4 months. Sensory recovery took from 4 to 6 months after injury. This type of injury is caused by damage to the anterior and posterior horn cells in the cervical cord.*

Résumé. *24 patients souffrant d'un traumatisme récent de la moelle cervicale avec atteinte motrice et sensitive limitées aux membres supérieurs sont présentés. Aucun n'a d'anomalie au niveau des membres inférieurs. Ils ont tous été traités conservativement à l'exception de l'un deux, chez qui une décompression antérieure a été faite. 17 ont une récupération motrice complète. Les 7 autres conservent un déficit partiel au niveau des muscles interosseux palmaires. Le temps de récupération s'étala de 2 semaines à 4 mois. La récupération sensitive s'effectua dans un délai de 4 à 6 mois après le traumatisme. Dans ce type de traumatisme, les lésions concernent les cellules des cornes antérieure et postérieure de la moelle cervicale.*

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Introduction

The central cervical cord syndrome is the commonest incomplete traumatic spinal cord lesion and is characterised by disproportionately greater motor impairment of the upper extremity compared to the lower, bladder dysfunction and variable sensory loss below the level of injury [6]. Occasionally, the upper extremities are involved without any abnormality in the lower limbs [5].

We report 24 patients with this type of lesion in order to draw attention to the variability of the syndrome in a wide range of injuries to the cervical spine. Such cases have been rarely reported in the literature of the English-speaking world.

Patients and methods

Between 1974 and 1994, 24 patients with acute central cervical cord injury presented with only upper extremity involvement. They made up 26.4% of the 91 acute central cord injuries during this period. There were 19 men and 5 women with an average age of 47 years (range 30 to 64 years). The time between injury and admission was from one hour to 2 days.

The injuries were caused by vehicle accidents in 8 and a fall in 11. Sixteen sustained in hyperextension injury, 4 a flexion injury and one a compression injury. The exact mechanism was not known in 3 patients.

Clinical findings

All the patients had pain in the neck, tenderness and limited movement. Fifteen had symmetrical motor loss, 6 asymmetrical and 3 had unilateral involvement of the upper extremities. The impairment was most severe in the hands combined with involvement of the wrist in 8, the elbow in 7 and shoulder in 6.

Sensory abnormalities were characterised by numbness and burning irritation of the middle, ring and little fingers, and was bilateral in 17 and unilateral in 4. Three patients had no

sensory loss. Loss of sensation to pain and temperature was in the cutaneous distribution of C8 with occasional loss of proprioception. Sensory loss extended to the cutaneous distribution cephalad of C6–C7, or caudal to T1–T2 in some cases. Five patients had sensory loss in the C8 area, 7 in C6–C8, 2 in C7–C8 and 4 in C8–T2. The sensory loss was not determined in 2.

Reflex changes were variable being either increased or diminished, although normal in some patients.

There were no symptoms or abnormal signs in the lower limbs.

Imaging

All the patients had anteroposterior, lateral and open-mouth radiographs and the abnormalities recognised included a fracture or fracture-dislocation in 5, prevertebral soft tissue swelling in 4, developmental spinal canal stenosis in 7, ossification of the posterior longitudinal ligament in 1, and degenerative changes in 5. Two or more of these conditions co-existed in some patients, so that only 9 patients showed radiographic abnormalities.

MR images were obtained in 4 patients, and intervertebral disc herniation at C5–C6 with cord compression was found in one.

Management

Glisson slings and Crutchfield tongs were used for traction in 19 and 5 patients respectively. Steroids were given in every case. Anterior fusion after discectomy was carried out in one patient.

Results

Seventeen patients have returned to normal, and the remaining 7 have some weakness of their palmar interosseous muscles. The average time from injury to full motor function was 2 months (range 2 weeks to 4 months). Sensory recovery followed in 4 to 6 months after injury.

Discussion

In incomplete injuries of the cervical cord, most damage is in the region of the central gray matter [6, 7]. Consequently the upper extremity fibres in the corticospinal tract, which are located medially, are most likely to be involved. The lower limb fibres are placed laterally and are less likely to be damaged. Motor impairment of the upper extremities, bladder dysfunction and motor impairment of the lower limbs occur successively depending on the degree of central cord involvement, so the upper extremities are usually more affected than the lower. As the oedema surrounding the injured cord diminishes, there is a gradual return of

function to the lower limbs, bladder and upper limbs in a definite sequence, the hand being the last to improve.

Some incomplete cervical cord injuries occur which only affect the upper extremities, the lower remaining normal. This is classed as a mild central cord injury to differentiate it from the more severe lesions with involvement of the lower limbs and bladder [10]. Our patients with this type of central cord injury only had a reduction of strength in their arms, especially in the hands, and the sensory involvement was not consistent with the motor weakness. Numbness and a burning sensation in the middle, ring and little fingers were noted and sensory loss was mainly in the C8 distribution, suggesting that the syndrome might be caused by lesions in the anterior and posterior horn cells. The lateral corticospinal tract and/or lateral spinothalamic tract is not involved, so there are no symptoms or abnormal signs in the trunk or lower limbs.

The central grey matter is more vulnerable to injury than white matter. The anterior and posterior horn cells are surrounded by white matter so stress concentration results in their injury. These cells are situated where the central artery, and perforating arteries from the cord, end; consequently they are liable to damage. The medial cells supply the muscles near the midline, while the lateral cells supply the distal muscles. The cells supplying the hands are in the area of the terminal branches of the central artery, explaining why hand function is the first to be affected. Similarly the posterior horn cells are susceptible to injury.

Merriam et al reported 77 cases of the acute central cervical cord syndrome [3] and found that 20 patients (26%) had typical neurological impairment as described by Schneider et al [7]. Roth et al examined 81 patients with the traumatic central cord syndrome and found that 33 (41%) had lower extremity weakness [4]. Kowalske et al recorded a patient with a spinal cord injury, who also had spinal stenosis; motor power was preserved, but there was no sensory sparing below C4 bilaterally [2]. Shaw described a patient with unilateral weakness, greater in the upper than lower extremity initially, but developed a typical central cord injury after 36 hours [8]. It has been suggested that this type of lesion might produce different features depending on the mechanism and degree of injury. All our patients had motor impairment in the upper extremities with either bilateral, symmetrical or asymmetrical, or unilateral involvement. Some had a variable degree of sensory loss below the level of injury, and others had no sensory loss. The central cord injury, therefore,

does not always follow the same pattern and this variability should be recognised when the diagnosis is being made.

A hyperextension injury was the commonest cause and when the cervical vertebrae are hyperextended the sagittal diameter of the canal is decreased. Posterior bulging of the disc and anterior buckling of the ligamentum flavum will pinch the cord producing the central type of cord injury [9].

Developmental or degenerative changes complicate the situation and our imaging techniques have identified the coexistence of these abnormalities and central cord injury in some patients. Severe cervical vertebral degeneration in elderly patients decreases the reserve of the spinal cord, so that the damage may be greater than the injury would suggest.

Central cervical cord injuries are not uncommon, and are not difficult to diagnose by their clinical presentation and by neurological examination. This subtype of injury was more common in younger patients compared to the typical central cord injuries, and is rare in patients over 60 years of age. Some disorders, such as cervical spondylosis, cruciate paralysis [1] and C8 root injury should be considered in the differential diagnosis. The prognosis is good with conservative treatment and most patients have recovered normal function, apart from weakness of the interosseous muscles in the hands.

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