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POST-TRAUMATIC ACUTE ANTERIOR SPINAL CORD SYNDROME

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Abstract. Thirteen patients with motor complete but sensory incomplete lesions following vertebral and spinal cord injuries are described. Sensory dissociation was present with more impairment of pain than touch or proprioception. The loss of pain sensation was complete in seven patients, but was incomplete in the other six subjects four of whom showed major motor recovery. The major point of interest of this study is to show that patients who retain not only touch but also pain sensation have a definitely better prognosis for neurological recovery.

Key words: Anterior spinal cord syndrome; Trauma.

Introduction

OCCLUSION of the anterior spinal artery results in infarction of the anterior part of the spinal cord. Pollock *et al.* (1953) noted recovery of tactile sensation in 29 of 60 cases of spinal cord injury, and the resulting neurological deficits resembled that of anterior spinal artery occlusion. Schneider (1955) felt that the syndrome of anterior spinal cord injury was the result of acute anterior spinal cord compression by a dislocated bone fragment or herniated disc material, or actual destruction of the anterior portion of the spinal cord. Apparently a clinical picture similar to the anterior spinal artery syndrome can be caused by contusion of the anterior part of the spinal cord.

Material and Method

From 1974 through 1979, 256 patients were admitted to our centre, the majority within 6 weeks of their lesion. Thirteen patients whose spinal cord injury was motor complete but sensory incomplete on admission were studied. They were classified into two groups on the basis of their sensory examination:

Group 1: Seven patients with complete loss of pain but incomplete loss of touch and proprioceptive sensation below the level of injury.

Group 2: Six patients with incomplete loss of pain, touch and proprioception; the sensation of pain was much more affected than that of touch or proprioception. This group includes two patients with complete loss of pinprick sensation except for sacral sparing.

These two groups of patients were compared in our centre, with respect to their vertebral injuries, and the evolution of their sensory and motor lesions.

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The neurological progress was graded from A to E according to the classification of Frankel *et al.* (1969). Sensory recovery was defined as the complete or partial return of sensory functions below the level of injury; descension of the sensory level by less than four segments was not considered as recovery. Other sensory incomplete patients with no sensory dissociation or with patchy areas of anaesthesia below the lesion were excluded, although their motor loss was complete.

Results

Because of the predominant veterans population of our centre, the great majority of the patients are male. The ages of the patients studied, 12 males and one female, were between 17 and 38 years except for one subject who was 73; the mean age was 28. They were admitted 16 hours to 33 days post-injury with the exception of one patient who came after 57 days. The mean interval between injury and admission was longer for the patients in Group 1 (24 days) than for the subjects in Group 2 (5 days). The injuries were mainly road and diving accidents. The spinal cord lesions were associated with vertebral damage in all the patients,

TABLE I

Vertebral lesion in 13 patients with acute traumatic anterior spinal cord syndrome

Vertebral lesion	Group 1	Group 2
Compression fracture	3	1
Other types of fracture	1	2
Fracture-subluxation	2	2
Fracture-dislocation	1	1
Total number	7	6

including a subject with a herniated cervical disc (Table I). All the fracture-displacements of the spine were reduced with skull traction within the first day of injury. In 12 of the 13 myelograms performed, the spinal cord was found to be normal or swollen. Cerebrospinal fluid examined within 1 week of the injury was clear in eight patients. Corpectomy followed by anterior bony fusion of the spine was performed in five patients 6 days to 2 months post-injury (mean: 21 days), including four patients in Group 1 and one patient in Group 2. Post-operative neurological recovery was noted in two patients, one each from Groups 1 and 2. Two of the operations were carried out before the patients were transferred to our centre. In one of the three patients upon whom we operated, herniated cervical disc material was removed from within the spinal canal; the other two subjects were operated on for the purpose of early mobilisation and rehabilitation.

The duration of hospitalisation varied from 1 week to 13 months (mean: 170 days). Grade D or sensorimotor recovery was noted in one of the seven patients (14·3 per cent) from Group 1, and in four of the six subjects (66·7 per cent) from Group 2, including two patients who had spinal surgery (Tables II and III). Sensory return preceded motor recovery in all these five patients who were ambulating with some walking aids at the time of discharge. In another two patients from Group 2, one showed pure sensory improvement and the other one had minor motor recovery only, 3 and 4 months after the injury, respectively

TABLE II

* Neurological evolution in 13 patients with acute traumatic anterior spinal cord syndrome

Neurological lesion	Admission					Discharge				
	A	B	C	D	E	A	B	C	D	E
Group 1		7					6		1	
Group 2		6					1	1	4	
Total number		13					7	1	5	

* Frankel's classification (1969)

TABLE III

Sensory and motor recovery in 13 patients with acute traumatic anterior spinal cord syndrome

Neurological recovery	Group 1	Group 2
Sensory only	0 (0%)	1 (16·6%)
Motor only	0 (0%)	1 (16·6%)
Sensory and motor	1 (14·3%)	4 (66·7%)

(Table III). Two patients in Group 1 expired without improvement 1 week and 7 months after the accidents, respectively.

Discussion

The progress after acute spinal cord injury depends on the extent of the neurological deficit, the initial management, and the availability of special care facilities. The potential for recovery is better if the spinal cord damage is incomplete. Useful neurological return is rare following complete sensorimotor paralysis, especially for dorsal cord lesions (Hardy & Rossier, 1975). By comparing two similar groups of patients except for the difference in the perception of the sensation of pinprick, we were able to evaluate the clinical implication of partial preservation of pain sensation below the level of injury. This study shows that motor complete patients who have some preservation of pain sensation, as minimal as unilateral sacral sparing, have a better prognosis for neurological recovery than the subjects with some preservation of touch only (Tables II and III). There is no indication that spine surgery improved the outcome of the injury; Grade D recovery was noted in three patients from Group 2 who were treated conservatively.

Grinker & Guy (1927) reported a case of anterior spinal artery syndrome following sprain of the cervical spine. Necropsy examination of the cervical spinal cord revealed thrombosis of a segment of the anterior spinal artery which was felt to be caused by reversible subluxation of the corresponding part of the cervical spine. It is apparent that, although rare, an acute traumatic anterior spinal cord syndrome may also be caused indirectly by occlusion of the anterior spinal artery.

The patients with an acute anterior spinal cord injury described by Schneider

(1955), and by Pick & Segal (1980) were in the younger age population (mean age: 29 years), and the spinal cord lesions were associated with vertebral damage, as in our patients. This is in contrast to the acute traumatic central cord syndrome which is usually caused by minor hyperextension trauma to the spine without bony injury in elderly individuals (Schneider *et al.*, 1958; Hardy, 1977).

The sparing of pain sensation below the level of injury is significant because it is associated with a higher incidence of useful motor recovery. This can be explained by the anatomical proximity of the spinothalamic and corticospinal tracts in the lateral columns of the spinal cord. Partial preservation of the perception of painful stimuli indicates some integrity of the spinothalamic tracts; it ensues that parts of the corticospinal tracts which lie posterior to the spinothalamic tracts in the lateral funiculi may have escaped damage from trauma to the anterior part of the spinal cord.

RÉSUMÉ

Les auteurs décrivent le cas de 13 patients avec déficit moteur complet mais sensitif incomplet à la suite d'un traumatisme vertébro-médullaire. La dissociation sensitive était manifeste avec déficit plus marqué pour la douleur que pour le toucher ou la proprioception. Il existait une perte complète de la sensation douloureuse chez 7 patients alors que 4 des 6 patients où ce déficit n'était que partiel montrèrent une récupération motrice importante. Cette étude met l'accent sur un fait d'importance primordiale, à savoir que les patients montrant non seulement une préservation pour le toucher mais aussi pour la douleur sont de bien meilleurs candidats à une amélioration neurologique.

ZUSAMMENFASSUNG

Die Autoren berichten ueber 13 Querschnittsgelähmten, die nach einer Wirbelfraktur eine vollständige motorische aber unvollständige sensorische Läsion erlitten. Dissoziierte Sensibilitätsstörungen waren vorhanden; der neurologische Ausfall war grösser für das Schmerz- als für das Berührungsempfinden und die Tiefensensibilität. In 7 Patienten gab es ein vollständiger Schmerzempfindenausfall, der doch in 6 Patienten, bei 4 von denen eine wichtige motorische Verbesserung einstellte, inkomplett war. In dieser Arbeit ist es bemerkenswert darauf hinzuweisen, dass Patienten, die nicht nur das Empfinden für Berührung sondern auch für Schmerz bewahren, eine viel bessere Prognose für neurologische Besserung zeigen.

Addendum

After our paper was submitted for publication, we encountered another case which is hereby briefly described:

A 19-year-old man sustained a motor complete but sensory incomplete traumatic C5–C6 tetraplegia from a fall. When he was seen half an hour after the accident, there was partial preservation of touch and proprioception, and complete loss of pain sensation except for partial sacral sparing. Two days post-injury, the patient was able to flex the left hip. One day later, he could move his right leg. In the ensuing 5 weeks, there was further motor improvement of all muscle groups in the lower extremities. The motor functions of the left leg were almost normal whereas on the right side, the motor power was within the range of grade 3 (on a scale of 0 to 5) 6 weeks after the injury.

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