CASE REPORT

Occult spinal cord injury sustained by high velocity automobile collision

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INTRODUCTION

Medical education, by necessity, frequently emphasizes the resuscitation and relief of life-threatening conditions in the severely injured patient. The increased use of seat-belt restraints has meant that high speed automobile collisions may not necessarily result in major external injury if the occupants are well supported (Dudley, 1986). In such instances, trauma may be sustained as a result of the spine and viscera continuing to move forward following impact. Examples of such injuries are mesenteric detachment of the gut, ruptured solid organs and distraction fractures of the lumbar spine (Dudley, 1986).

A case history illustrating several features which may alert the attending clinician to the presence of underlying, initially occult, clinically significant injury is described.

CASE REPORT

A 21-year-old female presented following a high velocity, head-on, automobile collision. She complained of left sided chest pain and low back ache. She had been one of three occupants in the vehicle, sitting in an upright position on the front passenger seat while wearing a seat-belt, with her legs folded up beneath her at the moment of impact. Her two co-passengers sustained facial and multiple bony injury. Initial examination revealed some lumbo-sacral tenderness and diminished breath sounds over her left chest wall. No neurological deficit was elicited at this time. Chest radiography demonstrated a left sided pulmonary contusion while lumbo-sacral views revealed a fractured transverse process of the 1st lumbar

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vertebra. Blood gas examination taken on admission revealed a lowered PO_2 . She was admitted for observation, analgesia and supplementary oxygen.

During the hours following admission, she developed leg spasms and was noted by the nursing staff not to have voided urine. This was associated with a palpably distended, painless bladder half way up to her umbilicus. A urological opinion was sought at which time neurological re-examination revealed reduced ankle and equivocal plantar reflexes on the right side, loss of anal reflex and a patulous anal sphincter. Peri-anal sensation was intact however. Reviewing the original radiographs, taken at the time admission, an anteriorly displaced transverse sacral fracture was suspected on the lateral sacral radiographs (Fig. 1), but not AP views. An urgent pelvic CT scan confirmed a sacral fracture involving the 1st, 2nd and 3rd sacral segments with compression of the sacral canal (Fig. 2). Initial management consisted of urethral catheterization and, based on neurosurgical advice, bed rest and high dose steroids. After a period of 3 weeks she was gradually mobilized. Her neurological signs failed to resolve and she remained unable to void spontaneously, requiring intermittent self-catheterization. Operative reduction of the fracture and decompression were not undertaken.

Fig. 1. Lateral sacral view.

Fig. 2. CT scan of pelvis, taken through S2.

DISCUSSION

The clinical assessment of the patient involved in a high velocity collision must incorporate a careful enquiry as to the mechanism of injury (Snook, 1986; Cope & Stebbings, 1990). Specific features relating to extent of vehicular distortion, nature of impact, existent injuries, whether the patient was wearing a seat belt and to the nature of injuries sustained by co-passengers should be considered when estimating the degree of violence involved in the impact. In this particular case, the mechanism of injury was one of rapid deceleration, severe enough to severely injure the two co-passengers in the vehicle and to lead to the patient herself sustaining pulmonary contusion.

Reports of isolated transverse sacral fractures without associated pelvic ring injury are infrequent (Kane, 1984), partly because they are difficult to diagnose and in part as they are rarely suspected (Fountain *et al.*, 1977). They are usually secondary to a violent force applied onto the flexed lumbar spine from behind, consequent upon slight anterior angular displacement combined with flexion of the spine. The violence thus displaces the entire vertebral column forward on the pelvis, which is locked in position. With our patient, the precise mechanism of injury leading to the sacral fracture was most probably one of the back seat passenger being propelled forcibly against the patient whilst in her semi-flexed

attitude. In this position, the sacrum would be stabilized, both by the posture of the patient and also by the seat-belt, stopping any forwards movement and thereby denying bony compensation to the impact.

Sacral fractures are difficult to detect on the antero-posterior views, partly because they are often sited at the level of the lower aspect of the sacro-iliac joint and, in addition, owing to the relative thinness of the sacral cortical bone and difficulty visualizing this cortex only at the upper margin of the sacral foramina. Oblique views are of greater value (Shanks & Kerley, 1971). Fractures of the transverse process of lumbar vertebrae are associated with transverse sacral fracture (Bucknill & Blackburne, 1976) as with our patient, often associated with otherwise apparently minor injury (Fountain *et al.*, 1977).

Following a high velocity impact, the development of a painless retention of urine in a previously fit and healthy patient must alert the clinician to the possibility of an underlying neurological deficit (Bickerstaff & Spillane, 1989). Previous reports have indicated that a high proportion of patients with transverse sacral fractures experience neurological complications (Bucknill & Blackburne, 1976; Fountain *et al.*, 1977) involving not only the bladder, but also the bowel and sexual function. The spinal cord injury that follows sacral fractures produces a deficit at the level of the terminal conus medullaris or sacral roots, leading to detrusor paralysis and acontractility. Immediately following injury the bladder neck is closed, except at high volumes (Thomas, 1984) and hence the patient initially develops painless urinary retention (Gibbon, 1986). The accompanying neurological deficit may not become apparent until following an interval of time (Fountain *et al.*, 1977). After some weeks, the bladder neck becomes increasingly incompetent, ultimately allowing some bladder emptying, as a result of either voiding by manual compression or, if this is not possible, by intermittent self-catheterization (Thomas, 1984), as was the case with this patient. Bladder sensation, mediated by autonomic afferents, is usually preserved enabling the patient to appreciate bladder distension (Gibbon, 1986).

Treatment options for sacral fractures range from bed rest alone, for uncomplicated and undisplaced fractures, to operative reduction and sacral decompression for displaced fractures associated with a persistent neurological deficit (Fountain *et al.*, 1977; Cane, 1984).

There are a number of lessons to be learned from this infrequent injury, that may assist in the clinical evaluation of patients following high velocity vehicular collision. Each occupant is potentially subjected to the same violence. Where co-passengers sustain multiple injuries, the attending clinician should be alerted to the possibility of remaining passengers harbouring significant injuries, despite their apparent well-being. The development of painless urinary retention in a previously healthy patient must elicit a high index of suspicion for a neurological cause, requiring careful neurological re-evaluation, even where initial examination proved unremarkable.

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