REMODELLING OF THE SPINAL CANAL AFTER BURST FRACTURE

A PROSPECTIVE STUDY OF TWO CASES

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Two cases of burst fracture of the upper lumbar spine are reported. In both cases the narrowing of the spinal canal shown by CT scans was progressively relieved by natural remodelling. The need for operative decompression should be assessed clinically and not from CT scans only.

When the management of spinal fractures is being considered a decision to operate may be influenced by the presence of large bone fragments in the spinal canal. Two such cases are reported.

CASE REPORTS

Case 1. A 41-year-old slim-built woman fell three metres from a wall, landing on her heels. She immediately experienced back pain, but there were no neurological symptoms. Radiological examination including CT scanning revealed a burst fracture of the L1 vertebra (Fig. 1). The anteroposterior diameter of the spinal canal was reduced to 55% of normal. She was nursed flat in bed for four weeks and then gradually mobilised while her

spine was supported in extension by a three-point fixation brace. Twelve weeks after the accident the brace was progressively discarded and the patient was symptom free.

Radiographs taken 14 and 33 months after injury showed a minimal decrease in the height of the disc space above the fractured vertebra. CT scans showed progressive remodelling of the fractured vertebra and reconstitution of the spinal canal (Figs 2 and 3). The anteroposterior diameter had improved to approximately 75% of normal and the inter-pedicular distance had remained normal.

Case 2. A 39-year-old woman fell nine metres and sustained fractures of her left wrist and right ankle and a

Fig. 1a

Fig. 1b

Case 1. Lateral radiograph and CT scan at the time of injury. There is a burst fracture of L1 with a large bone fragment retropulsed into the spinal canal. The anteroposterior diameter of the spinal canal has been reduced to about 55% of normal.

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burst fracture of L2 which reduced the anteroposterior diameter of the spinal canal to 40% of normal (Fig. 4). She had minimal weakness of the right iliopsoas and slight reduction of the right knee reflex. Her ankle fracture was treated by operation and the wrist and lumbar spine conservatively. After six weeks flat in bed,

Fig. 2

Fig. 3a

Fig. 3b

Case 1. Figure 2 – CT scan 14 months later. Resorption of the bone fragment and remodelling of the spinal canal has begun. Figure 3 – Two adjacent CT scans at 33 months after injury. One view (3a) is just cranial to, and the other (3b) is just caudal to the level in Figure 1b. The slices are 4 mm thick with 1 mm between them. Further remodelling has occurred and the anteroposterior diameter of the spinal canal is now about 75% of normal.

Fig. 4a

Fig. 4b

Case 2. Lateral radiograph and CT scan at the time of injury. There is a burst fracture of L2 with a large bone fragment in the spinal canal. The anteroposterior diameter of the spinal canal has been reduced to 40% of normal.

Fig. 5a

Fig. 5b

Fig. 5c

Case 2. Lateral radiograph and two adjacent CT scans, taken two-and-a-half-years later. There has been some increase in the wedging of L2 so that the scans are not in exactly the same plane as in Figure 4. Two adjacent tomograms (5b cranial to 5c) are shown, to ensure that the region of the spinal canal shown in Figure 4 is included. Considerable remodelling has occurred and the anteroposterior diameter of the spinal canal is now about 75% of normal.

she was allowed up in a spinal brace providing three-point stabilisation, which she retained for a further three months.

One year after the injury, radiographs showed an increase in the anterior wedging of L2, but 18 months after this, there had been no further radiological deterioration (Fig. 5) and the neurological disturbance had completely recovered. At this time, CT scans showed considerable remodelling of the fractured vertebra (Fig. 5).

It was not possible to measure the normal anteroposterior diameter of the spinal canal at the level of the burst fracture, but the diameter at L2 is normally slightly less than at L1 (Eisenstein 1977). Comparing the CT scans of L2 (Figs 5b and 5c) with those of L1, it then appeared that the anteroposterior diameter of the spinal canal had been reconstituted to about 75% of normal while its transverse diameter had remained normal. This remodelling had occurred in spite of further collapse which might have further compromised the spinal canal.

DISCUSSION

Operative treatment for spinal fracture is becoming more rational and more common (Bohlman 1985). CT scanning has done much to increase our knowledge of spinal fractures (Handelberg et al. 1981; Denis 1983; McAfee et al. 1983), but it may have caused unnecessary apprehension by showing clearly the gross distortion of the spinal canal produced by large bone fragments. Even in the absence of neurological disturbance, it might be assumed that such narrowing may cause symptoms of spinal stenosis at a later date, and therefore that the offending fragments should be removed. This fear seems to be unfounded, for, in the two patients described, CT scans have also shown that, like other bones, the vertebrae may undergo substantial remodelling so that

the size and shape of the spinal canal improves with time. This remodelling (which in Case 2 occurred despite further wedging of the vertebral body) is compatible with one of the findings of McEvoy and Bradford (1985) – “non-surgical treatment of patients with burst fractures and normal neurologic function is not likely to result in neurologic deterioration”. It seems, therefore, that when the neurology is normal, or only slightly impaired as in the second case, operation to remove even large bony fragments from the spinal canal is unnecessary. However, this remodelling is slow, and of little or no importance when considering whether or not early operative decompression is desirable in the treatment of burst fractures associated with a significant neurological lesion.

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REFERENCES

- Bohlman HH.** Current concepts review: Treatment of fractures and dislocations of the thoracic and lumbar spine. *J Bone Joint Surg [Am]* 1985;67-A:165–9.
- Denis F.** The three column spine and its significance in the classification of acute thoracolumbar spinal injuries. *Spine* 1983;8:817–31.
- Eisenstein S.** The morphometry and pathological anatomy of the lumbar spine in South African negroes and caucasoids with specific reference to spinal stenosis. *J Bone Joint Surg [Br]* 1977;59-B:173–80.
- Handelberg F, Bellemans MA, Opdecam P, Casteleyn PP.** The use of computerised tomographs in the diagnosis of thoracolumbar injury. *J Bone Joint Surg [Br]* 1981;63-B:336–41.
- McAfee PC, Yuan HA, Fredrickson BE, Lubicky JP.** The value of computed tomography in thoracolumbar fractures: an analysis of one hundred consecutive cases and a new classification. *J Bone Joint Surg [Am]* 1983;65-A:461–73.
- McEvoy RD, Bradford DS.** The management of burst fractures of the thoracic and lumbar spine: experience in 53 patients. *Spine* 1985;10:631–7.