CASE REPORT

Complex sacral fracture

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SUMMARY

We reported a case of a patient with suspected *cauda equina* syndrome secondary to sacral fracture, after sustaining a fall. The difficulty in early diagnosis of complex sacral fractures and the lack of clearly defined guidelines for treatment are highlighted. Thorough clinical examination is mandatory, in order to make an adequate initial assessment and follow symptoms progression and response to treatment. The threshold for performing CT imaging (or MRI, if advised), when suspecting sacral fracture and neurological compromise, should be low. A multidisciplinary approach, with contributions from orthopaedic and/or neurosurgical surgery and physiatry, should be the gold standard of treatment. In this particular case, conservative management and close follow-up led to a significant improvement of problems and a good final outcome, showing that surgical decompression is not the only valid option and that further prospective studies are needed, regarding patient selection and timing of intervention.

BACKGROUND

Sacral fractures are a rare entity, resulting from a wide range of injury mechanisms, with an incidence as low as less than 2% of all spinal fractures.[1 2] Commonly transversely orientated, isolated or mostly combined with other injuries, its reported low incidence can be in part explained by the fact they go many times clinically unrecognised in major pelvic fractures and can even be obscured by pelvic bones on initial radiological evaluation.[3 4] Neurological injury can range from incomplete injury of a single nerve root to involvement of the entire *cauda equine*.[5] Despite its epidemiological and clinical relevance, with possible devastating neurological consequences, there is still no consensus regarding ideal treatment. While some authors advocate early surgical decompression of affected sacral nerve roots, recent literature stresses the importance of a careful clinical assessment and use of specific criteria for conservative management, with good results on long-term follow-up.[5] This case report illustrates this last treatment option, as a multidisciplinary conservative approach by neurosurgery and physiatry led to a good final outcome in a rather severe initial clinical picture.

CASE PRESENTATION

A 56-year-old man sustained an accidental fall from the stairs (about 3 m) and suffered a direct impact injury in the left buttock, being brought to our hospital within 4 h of the initial trauma. The patient had no other contributory history, no other major injury or major illness relevant to this particular traumatic context. The patient reported of pain in the left sacroiliac joint and around the perineum, along with paresthesia in the left groin and perineum. On observation, the patient reported of considerable tenderness affecting lumbar and sacral region. Specifically, the patient had no major motor deficit or hypoesthesia. The patient had no obvious pelvic injury and the rest of the physical examination was unremarkable. During the first hours of his stay in the emergency room, the patient experienced urinary retention, for what he was catheterised.

INVESTIGATIONS

CT scan and plain X-rays were obtained, which showed fractures of the L1 and L2 left transverse processes+multiple fractures of the entire sacral vertebral complex (figures 1 and 2) with vertical, transverse and oblique components traversing several vertebral bodies (starting in S2 and below; figure 3) and the three first vertebral foramina +subluxation S1–S2+fracture of the first portion of the coccygeal bone. The fracture lines involved the three zones described in Denis Classification, and were accompanied by small bony fragments inside the vertebral canal (level S2) (figure 1).

TREATMENT

The patient was treated conservatively (in cooperation with physiatrist) in bed for several weeks, with proper pain management and progressive mobilisation when tolerated. After being discharged home, with careful follow-up, prolonged outpatient physical therapy and rehabilitation, along with periodic neurological assessment.

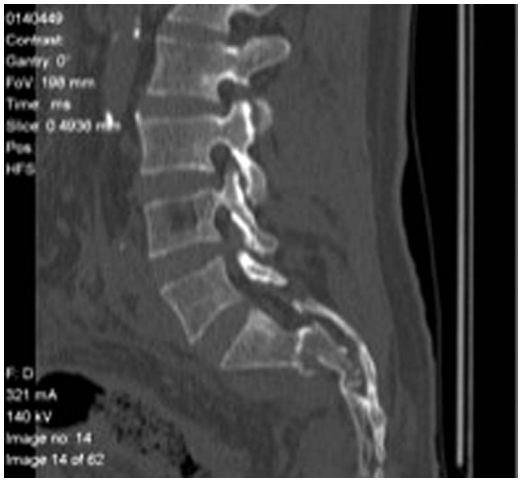

Figure 1 Sagital view of the injured lumbosacral complex.

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Figure 2 Anterior view of the sacral complex, showing multiple lines of fracture.

Figure 4 A 6-month follow-up of CT scan digital reconstruction, showing partial consolidation.

OUTCOME AND FOLLOW-UP

Five months after initial trauma, the patient showed no symptoms or signs of neurological deficit and/or urinary malfunction. There was discrete and persistent paresthesia referred to the left anterior upper thigh. Control CT scan showed the expected partial consolidation of the traumatic injuries, with no complications (figure 4).

DISCUSSION

The fractures of the sacrum are commonly associated with major fracture and/or dislocation of the pelvic ring, posing a treatment challenge for the neurosurgeon/orthopaedic surgeon.[1 2] However, in our case, there was no associated pelvic injury, being the sacral fractures probably due to direct trauma. Instead, stable minor lumbar fractures at two different levels were detected, a rather rare association according to the literature. Another remarkable aspect of this case is the major trauma in the sacral bone itself, somehow, unexpected for the severity of the fall, stressing the importance of suspicion for sacral fracture in the presence of local pain and tenderness.[5] Denis *et al* described sacral fractures according to their location: Zone I in alar region, Zone II in foraminal region and Zone III with involvement of the central canal. This classification took into consideration the potential for neurological injury. The multiple lines of fracture in this particular case, reaching the three zones, are unusual,[6] as most transverse fractures present as an isolated injury.[7] The sporadic case reports on isolated sacrum injury mention a typical angulation, instead of pure vertebral displacement. The proposed mechanism for this relies on the levering action of lower sacrum on an upper level of fixation in the sacroiliac joint, mainly at the transition between S1 and thinner S2 segment.[6] Regarding ideal treatment, the results from operative decompression versus conservative treatment in stable fractures remain debatable,[7 8] with few studies and isolated reports based on small patient populations. Many series show significant improvement and functional restitution (although seldom complete) with non-operative measures, such as prolonged bed rest up to 2 months, allowing osseous healing and helping prevent pseudoarthrosis.[8 9] This kind of approach, by a multidisciplinary team (Neurosurgery, Orthopaedics, Physical Medicine and Rehabilitation), seems appropriate in a majority of cases,[8–10] as described in this report.

Figure 3 Digital reconstruction of the initial CT scan.

Learning points

- A thorough physical examination and proper degree of suspicion, in the presence of sacral pain and tenderness, is mandatory.
- CT is obligatory in case of suspected sacral fractures, namely with compression injury mechanism.
- Conservative management is a valid option and should be considered in properly selected patients.
- Close follow-up and prolonged rehabilitation are fundamental for a good long-term outcome.

Contributors JLA was responsible for the patient and their follow-up, wrote the manuscript and revised current literature. All other authors helped with discussion of clinical case and reviewed the manuscript.

Competing interests None.

Patient consent Obtained.

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REFERENCES

1 Denis F, Davis S, Comfort T. Sacral fractures: an important problem. Retrospective analysis of 236 cases. *Clin Orthop* 1998;227:67–81.
2 Vaccaro AR, Kim DH, Brodke DS, *et al*. Diagnosis and management of sacral spine fractures. *J Bone Joint Surg* 2004;86:166–75.
3 Murthy NS. Imaging of stress fractures of the spine. *Radiol Clin North Am* 2012;50:799–821.
4 Lehman RA Jr, Kang DG, Bellabarba C. A new classification for complex lumbosacral injuries. *Spine J* 2012;12:612–28.
5 Bodkin PA, Choksey MS. Management of a sacral fracture with neurological injury. *J Orthop Sci* 2006;11:524–8.
6 Sasso RC, Vaccaro AR, Chapman JR, *et al*. Sacral fractures. *Instruc Course Lect* 2009;58:645–55.
7 Bilgic S, Kilincoglu V, Yurttas Y, *et al*. Isolated zone I vertical fracture of first sacral vertebra: case report. *Cases J* 2009;2:6254.
8 Hak DJ, Baran S, Stahel P. Sacral fractures: current strategies in diagnosis and management. *Orthop* 2009;32:752.
9 Longhino V, Bonora C, Sansone V. The management of sacral stress fractures: current concepts. *Clin Cases Miner Bone Metab* 2011;8:19–23.
10 Sembler Soles GL, Lien J, Tornetta P III. Nonoperative immediate weightbearing of minimally displaced lateral compression sacral fractures does not result in displacement. *J Orthop Trauma* 2012;10:563–7.