GRAND ROUNDS IN RHEUMATOLOGY

SACRAL INSUFFICIENCY FRACTURES: AN UNSUSPECTED CAUSE OF LOW BACK PAIN

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SUMMARY

We describe 10 cases of sacral fractures diagnosed within the rheumatology department at Southend Hospital over the last 5 yr. All presented with sudden-onset low back pain. The majority were elderly, frail, with chronic inflammatory disease (six with rheumatoid arthritis, one with polymyalgia rheumatica, one with vasculitis) and had received steroids. Diagnosis was delayed by the inability of plain radiographs to show these fractures and was ultimately demonstrated by technetium scintigraphy/computed tomography scan. We feel that this diagnosis should be considered in elderly patients with rheumatoid arthritis or other risk factors for osteoporosis who present with low back pain and sacral tenderness. Further clues may be parasymphyseal tenderness (suggesting associated pubic ramus fracture), elevated alkaline phosphatase and plain radiograph showing pubic ramus fractures or parasymphyseal sclerosis. Patients with this complication generally have a poor prognosis and two of our patients have died. Seven required in-patient stay (mean 20 days; range 14–41). The mortality, morbidity and costs incurred in management may be comparable to those of femoral neck fractures.

KEY WORDS: Sacral fractures, Severe low back pain, Imaging, Sacral tenderness.

PELVIC insufficiency fractures occur when normal stresses are placed on abnormal bone. Predisposing factors include post-menopausal osteoporosis, pelvic radiotherapy, inflammatory arthritides, prolonged corticosteroid therapy and metabolic bone disease. Despite a few reports in radiology [1], specialist [2] and general medical journals [3], these fractures are still not well recognized.

We report 10 cases occurring in our district in the past 5 yr. We discuss the difficulties in imaging and outline a management strategy in order to promote prompt recognition of this condition.

CASE HISTORY 1

In November 1992, this 70-yr-old woman with a 43 yr history of rheumatoid arthritis (RA) complained of several weeks spontaneous-onset severe low back pain unrelated to trauma. Her previous anti-rheumatic therapy included i.m. gold, penicillamine, sulphasalazine, methotrexate, non-steroidal anti-inflammatory drugs (NSAIDs) and occasional i.m. methylprednisolone acetate injections. She had mild maturity-onset diabetes mellitus. On examination, there was severe tenderness over the sacrum. She had an elevated erythrocyte sedimentation rate (ESR) of 33 mm/1st h, serum alkaline phosphatase 215 IU/l (25–105), low corrected serum calcium 2.19 mmol/l and elevated serum creatinine 194 mmol/l (44–120).

Pelvic X-ray showed sacral sclerosis around both sacroiliac joints. Serum alkaline phosphatase 215 IU/l (25–105), low corrected serum calcium 2.19 mmol/l and elevated serum creatinine 194 mmol/l (44–120).

Pelvic X-ray showed sacral sclerosis around both sacroiliac joints and the right superior pubic ramus. CT scan of the sacrum revealed bilateral fractures of the sacral alae and one in the right superior pubic ramus (Fig. 2).

In the presence of impaired renal function with bone chemistry abnormalities, a diagnosis of renal bone disease was considered and she was commenced on alpha-calcidol 500 µg, calcium supplements and analgesics. She improved, but was re-admitted in August 1993 complaining of severe pain in the left hip. A left superior pubic ramus fracture was demonstrated on plain X-ray (Fig. 3). Thereafter, she suffered increasing immobility and frailty, and died 1 yr later.

CASE HISTORY 2

This 54-yr-old woman with 30 yr severe RA, on cyclosporin and prednisolone, was admitted in May 1996 with 5 weeks of unremitting pain in her right groin. The pain was severe and led to complete loss of mobility. She had tenderness over the pubic symphysis and sacrum.

Biochemistry showed raised serum alkaline phosphatase (205 IU/l). Pelvic X-ray showed osteopenia, fracture of the right pubic ramus and sclerosis of the left sacral ala. 99Tc bone scan showed increased activity around both sacroiliac joints and in the right pubic ramus. CT scan of the sacrum showed sclerosis and fracture of the left wing of the sacrum.

She commenced on calcium, analgesia and calcitonin 100 IU s.c. × 3/week. Her oral steroid dose was reduced. Eight weeks later, she was mobile with remarkable improvement in pain. However, in 1997, she had a stormy course with recurrent deep vein thromboses and femoropopliteal arterial occlusion requiring above-knee amputation.

CASE HISTORY 3

This 76-yr-old woman was known to have osteoporosis, but was not on any specific treatment for it. She...
developed severe pain in the back in May 1997. There was no history of trauma. X-ray of the pelvis was normal. In August 1997, she developed left groin pain. On examination, she was tender over the left pubic ramus. X-rays repeated in October 1997 showed fractures of the left superior and inferior pubic rami (Fig. 4). Isotope bone scan showed increased uptake in the sacrum and left pubic ramus consistent with fractures at these sites (Fig. 5). She was treated with etidronate and analgesics with improvement in her symptoms.

**DISCUSSION**

We have described three cases presenting with a hitherto under-recognized cause of back pain, i.e. sacral fractures. In addition, over the last 3 yr, we have seen
seven other cases with similar presentation (Table I). All were women, the majority elderly with mean age 71 yr (54–83 yr), eight had inflammatory disease [six RA, one polymyalgia rheumatica (PMR), one vasculitis] requiring corticosteroids, more than five had pubic ramus fractures and four had hip disease (one hip osteoarthritis, three hip replacements). Nine of the 10 patients had spontaneous fractures. In cases 1 and 3, we were able to document a temporal progressive course with initial back pain (due to sacral fractures) and normal radiographs followed by a presentation a few months later with groin pain and obvious pubic fractures on radiographs.

The occurrence of 10 cases of sacral fractures over 5 yr within just the rheumatology department of a district general hospital suggests that these fractures are relatively common. However, they are under-diagnosed primarily due to the inability of plain radio-
RHEUMATOLOGIST'S VIEW (BD)

Sudden spontaneous severe low back pain in the elderly, in long-standing RA or in groups at risk for osteoporosis, such as steroids users, should arouse suspicion of sacral fractures. Hip disease may be a predisposing factor. Further clues are sacral tenderness, tenderness over the parasympyseal area (suggesting associated pubic ramus fracture) and elevated alkaline phosphatase. Plain radiographs showing pubic ramus fractures or parasympyseal sclerosis further strengthen the clinical suspicion. Sclerosis around the sacral alae, if present, is very suggestive, but may be difficult to ascertain, especially in the presence of bowel gas.

Of the well-known osteoporotic fractures, the incidence of hip and wrist fractures is well documented. Spinal fractures are underestimated since many may not undergo a spinal radiograph. Sacral fractures are even more elusive due to invisibility on plain radiographs and lack of clinical suspicion. They appear to be an important complication of RA in the setting of refractory disease and advanced physical disability. Osteoporosis due to disease, disuse and steroid treatment, hip disease, and inadequate fall prevention related to joint damage, muscle wasting and age may be the predisposing factors.

The management of these cases is difficult. Seven out of our 10 cases required in-patient care. The mean length of hospital stay was 20 days (range 14–41). This was due to a delay in diagnosis and pain, disability or complications of prolonged immobility. The cost of management (£110–150 per in-patient day stay) is comparable to that of femoral neck fractures (the mean length of stay at Southend Hospital is 38 days).

TABLE I
Clinical features and imaging in seven other patients with sacral fractures seen in the rheumatology department at Southend Hospital

<table>
<thead>
<tr>
<th>Age (yr)</th>
<th>Sex</th>
<th>Underlying diagnosis</th>
<th>Clinical features</th>
<th>Imaging</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 78</td>
<td>F</td>
<td>Right total hip replacement for osteoarthritis</td>
<td>Acute back pain with sacral tenderness, elevated alkaline phosphatase 174 IU/l</td>
<td>X-rays: osteopenia, height loss D12 vertebra; 99Tc scintiscan: bilateral uptake over sacral alae; CT scan: right sacral ala fracture</td>
</tr>
<tr>
<td>2 73</td>
<td>F</td>
<td>Long-standing RA with chronic airways obstructive disease</td>
<td>Acute back pain with sacral tenderness, elevated alkaline phosphatase 214 IU/l</td>
<td>X-rays: osteopenia; CT scan: left sacral ala &amp; transverse process L5 fractures</td>
</tr>
<tr>
<td>3 84</td>
<td>F</td>
<td>Polymyalgia rheumatica on steroids with right hip osteoarthritis</td>
<td>Acute right hip &amp; back pain after a fall with sacral &amp; pubic tenderness, elevated alkaline phosphatase 164 IU/l</td>
<td>X-rays: right pubic ramus fracture with bilateral hip OA with right hip protrusio; CT scan: right sacral ala fracture</td>
</tr>
<tr>
<td>4 75</td>
<td>F</td>
<td>Long-standing RA, polymyalgia rheumatica and osteoporosis on steroids</td>
<td>Severe low back pain on standing &amp; walking, elevated alkaline phosphatase 236 IU/l</td>
<td>X-rays: osteoporosis with loss of height of several vertebral bodies; 99Tc scintiscan: uptake right sacral ala</td>
</tr>
<tr>
<td>5 63</td>
<td>F</td>
<td>Long-standing RA with left total hip replacement on steroids</td>
<td>Acute left hip &amp; back pain with sacral &amp; pubic tenderness, elevated alkaline phosphatase 224 IU/l</td>
<td>X-rays: left hip replacement; 99Tc scintiscan: bilateral uptake over sacral alae and left parasympyseal region</td>
</tr>
<tr>
<td>6 66</td>
<td>F</td>
<td>Vasculitis on steroids</td>
<td>Acute-onset low back pain with sacral tenderness, elevated alkaline phosphatase 159 IU/l</td>
<td>99Tc scintiscan: bilateral uptake over sacral ala</td>
</tr>
<tr>
<td>7 67</td>
<td>F</td>
<td>Long-standing RA with left hip replacement</td>
<td>Marked sacral and left pubic ramus tenderness; normal alkaline phosphatase</td>
<td>99Tc scintiscan: bilateral sacral alar and left pubic ramus uptake</td>
</tr>
</tbody>
</table>

Fig. 5.—99Tc bone scan (case 3) showing sacral uptake and uptake in the left pubic ramus compatible with fractures.
Management includes rest and analgesia. Calcitonin has been tried and in our series five out of 10 had an initial good response. The long-term prognosis may be poor because of fracture progression, disability and co-morbid conditions. Two of our patients have died.

GERIATRICIAN’S VIEW (JAM)

Insufficiency fractures are all too common in the Department of Medicine for the Elderly (DME), yet I am not aware of a sacral fracture being diagnosed in the DME of our hospital over a 10 yr period during which 30,000 admissions took place. The cases described in this paper, along with these personal observations, illustrate how frequently geriatricians must fail to diagnose sacral fractures since it is clear that the majority occur in elderly patients. Only one of the cases was diagnosed in my department and would certainly have been missed had we not been aware that colleagues (BD) were specifically interested in this clinical problem.

Parasymphyseal insufficiency fractures of the pubis are much more commonly recognized, but it is clear that co-existing sacral fracture is frequently present but missed on pelvic radiographs [5]. We found nine elderly patients presenting with fractures of the pubis during a 2 month period (October/November 1997). Six were female, median age 87 yr, and all were associated with a relatively minor fall. Associations included intermittent oral steroids (uncertain duration and quantity) taken by two of the nine for respiratory disease, two had severe cognitive impairment and two patients died during their admission. The mean length of stay was 23 days (range 10–45 days, median 20 days). Evidence of co-existing sacral fractures was not sought, but the quality of the pelvic X-rays taken in the accident centre was poor and it is recognized that plain radiography is insensitive for sacral fracture [5, 6]. Using isotope bone scans and/or CT, Davies et al. [5] demonstrated nine sacral fractures in 11 post-menopausal women presenting with pubic fracture.

These data suggest that osteoporotic patients with pubic fractures are likely to have sacral fracture which is missed due to the insensitivity of the routine pelvic radiograph. Intuitively, this is an attractive concept as a sacral fracture might well impart a torque effect to the pelvic girdle which then fractures in the mechanically less sound portion, i.e. the pubic ramus.

RADIOLOGIST’S VIEW (ABT)

Some of our patients had bilateral sacral fractures, others unilateral ones, often associated with other fractures of the pelvic ring. The latter usually do not present a diagnostic problem as fractures of the pubic bone are readily visible on plain radiography. The sacrum is not well seen on plain radiographs, particularly in these patients whose bones are poorly mineralized due to osteoporosis or other metabolic bone disease. The sacral fractures were not visible on plain films in any of our patients and CT was used to demonstrate these in a number of cases. In the standing position, weight transfer occurs from the vertebral column through the sacral ala to the acetabulum. This may explain our CT scan findings of fractures over the sacral alae and strong association with hip disease.

Isotope scanning is a sensitive way to pick up these fractures [4], but it is non-specific, rarely showing the classic ‘Honda’ sign (‘H’-shaped sacral uptake) described in the literature and the sacral fractures must be distinguished from sacroilitis. We believe that clinical suspicion combined with associated plain film findings and associated isotope scanning is sufficient to make the diagnosis, with CT being reserved for equivocal cases.

REFERENCES

Sacral insufficiency fractures: An unsuspected cause of low back pain
B. Dasgupta, N. Shaw, H. Brown, T. E. Gordon, A. B. Tanqueray