A 61-year-old woman was seen with diastasis of the symphysis pubis and insufficiency fractures of the wings of both ilia after irradiation for carcinoma of the cervix. The characteristics and treatment of these fractures are discussed.

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Stress fractures occurring in normal bones are termed fatigue fractures and are seen in young adults when healthy bones have been subjected to rigorous, recurrent physical activity. Insufficiency fractures are stress fractures in a bone already weakened by decreased mineralisation and with insufficient elastic resistance to withstand normal physiological stress. They are distinct from pathological fractures which are secondary to a localised lesion such as a cyst or neoplasm. Insufficiency fractures are usually found in older women and are subtle in their presentation. Late diagnosis may result in prolonged disability.

We describe a patient with postirradiation insufficiency fractures of the wings of the ilia associated with symphysitis leading to diastasis.

Case Report

A 61-year-old woman was referred with a six-month history of pain in the groin on weight-bearing. Eighteen months before the onset of these symptoms she had been treated by radical radiotherapy for carcinoma of the cervix. She had developed a small contracted urinary bladder and a stenosed vagina. When first seen she had no localised tenderness or discomfort on pelvic springing, and had a waddling gait. Radiographs showed pubic diastasis and bilateral stress fractures through the wings of the ilia (Fig. 1). Marked reciprocal movement was seen at the pubic symphysis on weight-bearing on either leg (Fig. 2). No further investigations were performed. She was managed conservatively with guarded weight-bearing within the limits of comfort and pelvic support, and was given hormone replacement therapy for her osteoporosis. She made remarkable progress and after six months had minimal discomfort and was walking without a support and with no limp. The radiological appearances were unchanged. After four years, she was totally free from symptoms. At seven years after diagnosis, the fractures were still visible radiologically, but were less distinct with surrounding sclerosis (Fig. 3).

Discussion

The following factors predispose to insufficiency fractures of the pelvis: irradiation, the use of corticosteroids, inflammatory arthritides such as rheumatoid arthritis, and postmenopausal osteoporosis. Most reported cases have followed local irradiation by external-beam radiation or brachytherapy for uterine cancer. The radiological appearance may be confused with that of metastatic disease, and familiarity with the characteristic features will help to avoid mismanagement. Abe et al studied 80 women who had received irradiation for uterine cancer and found pelvic insufficiency fractures in 27 (34%) and pelvic metastasis in only two (3%). In 76% of cases the initial symptoms of the fracture appeared within two years of the commencement of radiotherapy. The lesions are usually seen in the pubic bone, the wings of the ilia, the supra-acetabular region or in the alae of the sacrum.

Such patients may present with low back, hip or groin pain with no history of trauma; sometimes the pain may radiate down the leg. The reported incidence of these fractures after irradiation varies widely from 2.7% to 89% due to differing criteria of diagnosis and investigation (Table I). Plain radiographs have a low sensitivity, because of the delayed appearance of bony changes. The radiological appearance depends on whether cortical or cancellous bone is involved. In an insufficiency stress fracture cortical bone shows a linear lucency or the formation of periosteal new bone or both; cancellous bone develops a band of medullary sclerosis due to endosteal callus. All
these changes may be seen in the pelvis. Bone scintigraphy is non-specific although an increase in uptake may be seen early, but is particularly useful in identifying sacral lesions especially classical H-shaped fractures. A symmetrical area of increased uptake is characteristic of an insufficiency fracture, and is often multifocal. A typical triad of sacral, pubic and iliac lesions is a helpful sign in arriving at a correct diagnosis. Fractures of the sacrum and ilium often show a linear configuration on radionucleide bone scans in contrast with the more globular configuration of a metastasis. CT will confirm and differentiate the insufficiency fracture from a metastasis, showing the fracture line, cortical disruption, endosteal callus without a soft-tissue mass, and the absence of bone destruction. MRI has a high sensitivity: insufficiency fractures are shown by their characteristic oedema. Blomlie et al report MRI studies which showed the multifocal (81%) and bilateral (89%) nature of the lesions. Their patients with pain had two to six lesions with one or more larger than 1 cm. Bone biopsies to rule out malignancy have a low yield and the microscopic appearance is confused by radiation osteonecrosis.

Conservative management is the treatment of choice. Supervised early mobilisation with progressive weight-bearing helps to promote healing, as in our case, but
Blomlie et al. found that only 21% of the lesions had healed during 30 months of observation. Further study is needed of the healing of these fractures. We could find no report of the operative treatment of unstable pelvic insufficiency fractures.

Diastasis of the pubic symphysis may be seen in trauma, pregnancy, infection and a number of metabolic and congenital anomalies, but postirradiation symphysitis leading to diastasis appears to be rare.

The characteristic features of radiation-induced pelvic insufficiency fractures should lead to early diagnosis and successful management, but this requires awareness and a high clinical index of suspicion.

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Table I. Reported incidence of pelvic insufficiency fractures after irradiation

<table>
<thead>
<tr>
<th>Author/s</th>
<th>Number of patients</th>
<th>Symptomatic/asymptomatic</th>
<th>Diagnosis</th>
<th>Number of insufficiency fractures (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Konski and Sowers</td>
<td>75</td>
<td>20</td>
<td>Plain radiograph or CT</td>
<td>2 (2.7)</td>
</tr>
<tr>
<td>Abe et al.</td>
<td>80</td>
<td>21/6</td>
<td>Bone scan and CT</td>
<td>27 (34)</td>
</tr>
<tr>
<td>Blomlie et al.</td>
<td>18</td>
<td>10/8</td>
<td>MRI</td>
<td>16 (89)</td>
</tr>
</tbody>
</table>

References

Fig. 3
Seven years after diagnosis the radiograph still shows an iliac insufficiency fracture on the right. There is more sclerosis with a less distinct fracture line on the left.