Radiation-Induced Insufficiency Fractures after Definitive Prostate Cancer Radiotherapy

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To the Editor:

High-dose radiotherapy is a curative treatment of prostate cancer which is known to have side effects on intestinal, urinary and sexual life function. Radiation-induced changes in the pelvic bones are less well recognized. The present report describes such a case.

In February 1994 a moderately differentiated prostatic (T3B) was diagnosed in a 65-year-old healthy male without a prior history of skeletal disease (PSA 28 μg/l–48 μg/l). No lymph node metastases were found at bilateral pelvic lymphadenectomy. In particular, the bone scan was normal, without pathological isotope uptake in the pelvic bone. Routine MRI of the prostatic region did not reveal any abnormality of the bone structures. From June 1994 he underwent radiotherapy of the prostate (4-field box technique) (2 Gy $\times$ 33), without hormone treatment. No major acute toxicity was reported. In July 1995 he complained of increasing perineal and pubic pain and he had to use crutches when walking. Serum PSA was now 1.0 μg/l. The bone scan showed pathological isotope uptake in the pubic bones close to the symphysis, without any other hot spots, primarily interpreted as metastases. MRI of the pubic bones described microfractures and oedema, typical of sequelae after irradiation (see Fig. 1). No specific treatment was given. He recovered gradually from the pain and regained full activity (skiing, cycling) by April 1997, along with showing improvement on MRI and skeletal scan.

During definitive radiotherapy treatment of prostate cancer the pubic bones are included in the target volume and receive high-dose irradiation. The typical radiation-induced skeletal processes have been described in animal studies (1). After the first two days of irradiation the bone marrow becomes hypocellular, with vascular congestion and haemorrhage followed by an acute or subacute inflammation and occasionally necrosis. As has been shown in patients with other pelvic malignancies, these radiation reactions may lead to microfractures of the trabeculae and the weight-bearing cortical bone (2), visualized as a 'hot spot' on bone scan.

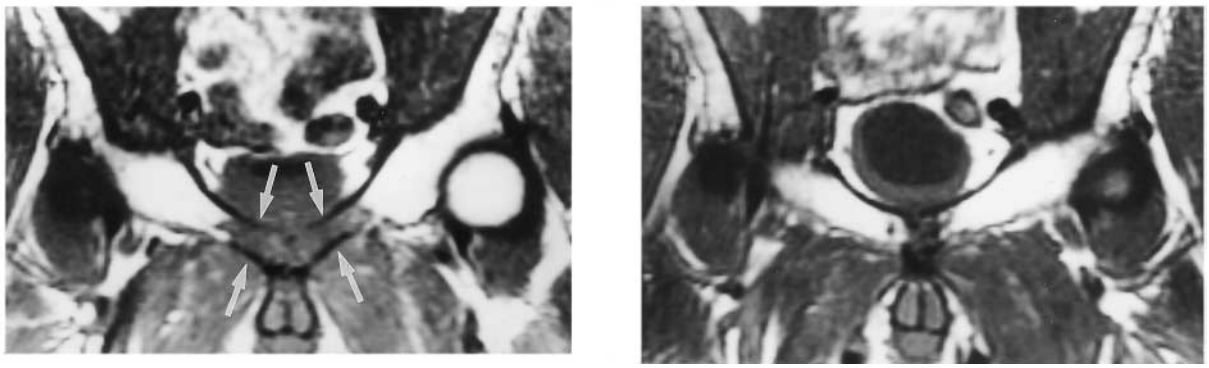

Fig. 1. MR Imaging of the irradiated pubic bones after radiation therapy in a 65-year-old male with cancer of the prostate. Coronal T1-weighted (600/20) images demonstrate the irradiated public bones at 12 months (a) and at 26 months (b) after radiation therapy. At 12 months post-treatment, abnormal signal intensity reflecting oedema can be seen (arrows). At 26 months after therapy, the oedema has almost completely disappeared.

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It is important that these radiation-induced insufficiency microfractures in a patient with prostate cancer are not mistaken for metastases, which erroneously could lead to additional radiotherapy and/or androgen deprivation. In the present case the normal serum PSA and the absence of other hot spots initiated MRI of the pubic bones, which demonstrated typical radiation-induced insufficiency microfractures. The favourable clinical course confirmed the radiological diagnosis.

After high-dose radiotherapy of prostate cancer, radiation-induced insufficiency microfractures of the irradiated bones may occur. The condition should not be mistaken for metastases.

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