CONCISE REPORTS

Differential involvement of the dorsal and lumbar spine in osteoporosis

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Abstract

The presence of normal bone density values in the lumbar spine is often assumed to exclude osteoporosis. Eleven cases are reported in which normal lumbar spine bone density and radiology were associated with one or more dorsal spine fractures; the diagnosis was postmenopausal osteoporosis in eight patients and corticosteroid induced osteoporosis in three. These findings suggest that spinal osteoporosis may sometimes be a focal disorder and emphasise the need for dorsal spine radiology in addition to bone densitometry in patients with strong risk factors for osteoporosis or with clinical evidence of the dorsal spine being affected.

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Bone densitometry is widely used in the diagnosis and clinical management of osteoporosis¹ and its use has been advocated by some workers as a means of screening for the disease. Dual photon absorptiometry, quantitative computed tomography and, most recently, dual energy x ray absorptiometry (DEXA) have all been used to measure bone mineral density in the spine²; for technical reasons these are applied to the lumbar rather than the dorsal spine. A normal bone mineral density value in the lumbar spine, particularly when combined with normal radiological appearances, is often assumed to exclude osteoporosis and hence the need for treatment. We report 11 patients in whom evidence of dorsal spine osteoporosis was found in association with a normal lumbar spine as assessed by plain radiology and bone densitometry.

Subjects and methods

Records from 300 alphabetically consecutive patients referred from the outpatient clinic to the bone density unit between September 1989

and June 1991 were examined and from these 165 with a lumbar spine bone mineral density within one standard deviation below or two standard deviations above the mean age and sex matched reference value supplied by the manufacturers (Hologic or Lunar) were obtained. Lateral dorsal and lumbar spine radiographs performed within six months of bone density assessment were available in 96 patients. In addition, patients attending the weekly bone disease clinic between March and June 1991 were entered into the study if the spinal bone density was normal and radiographs were available. Bone mineral density was measured by DEXA (Lunar DPX or Hologic QDR 1000). Vertebral fracture was defined as a reduction of 20% or more in the anterior height of a vertebra relative to its posterior height, or a similar reduction in height affecting the whole vertebra, relative to the adjacent vertebra.

Results

Eleven patients were found to have one or more dorsal spine fractures in association with a normal lumbar spine radiograph (table). Five patients gave a history of severe localised pain at the site of fracture, four had chronic back pain of gradual onset with no acute episodes and two did not report a past or present history of back pain. Lumbar spine bone density was between the age and sex matched mean value and the mean minus one standard deviation in eight patients, the mean and the mean plus one standard deviation in one, and between one and two standard deviations above the mean in the remaining two. The diagnosis was postmenopausal osteoporosis in eight patients and steroid induced osteoporosis in the remaining three. Other known causes of secondary osteoporosis were excluded in all subjects. None of the 11 patients had a past history of severe trauma which could account for the fractures.

Discussion

This study shows that dorsal spine osteoporosis may occur in the absence of any radiological or densitometric abnormality of the lumbar spine. An artificial increase in lumbar spine bone density values as a result of vertebral collapse or due to osteophytes or extraskelatal calcification was excluded by examination of the DEXA image and lateral radiographs of the spine. The selection procedure used in this study does not allow any estimation of the prevalence of differential dorsal and lumbar spine disease and the high proportion of affected patients with

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Clinical details of patients with normal lumbar spine and dorsal spine fractures

Patient No	Age (years)	Sex	Dorsal spine fracture	Cause of osteoporosis
1	69	F	T ⁶ , T ⁷ , T ⁸	Postmenopausal
2	53	F	T ⁹	Steroid induced
3	73	F	T ⁷	Postmenopausal
4	64	F	T ⁸ , T ¹¹	Postmenopausal
5	58	F	T ⁷ , T ¹¹	Postmenopausal
6	69	F	T ⁷ , T ¹¹	Postmenopausal
7	71	F	T ⁷ , T ⁸ , T ⁹ , T ¹⁰ , T ¹¹	Postmenopausal
8	60	F	T ⁶ , T ⁷	Postmenopausal
9	53	F	T ⁷	Steroid induced
10	74	F	T ⁸	Postmenopausal
11	69	M	T ¹¹ , T ¹²	Steroid induced

postmenopausal osteoporosis may reflect the referral patterns of the bone disease clinic.

A number of studies have shown that fracture risk is related to bone mass,³⁻⁶ though there is a considerable overlap in the distribution of bone density values between patients with and without fractures.⁷⁻⁸ These observations emphasise the importance of factors other than bone mass in the pathogenesis of fracture and support the arguments for distinguishing between osteopenia (low bone mass) and osteoporosis (fracture). The combination of normal bone mass and fracture could arise for several reasons including major trauma and changes in bone architecture or quality, or both. Alternatively the spinal distribution of osteopenia may be heterogeneous, leading to the combination of dorsal spine osteoporosis and a normal lumbar spine as judged by radiology and densitometry. This latter explanation appears to be most likely in the patients described here, most of whom had two or more fractures with no history of major trauma. A number of different radiological criteria for the presence of vertebral fracture have been suggested⁹⁻¹⁰; the 20% reduction in height ratio used in this study was chosen to favour specificity rather than sensitivity.

The increasing use of bone densitometry in the diagnosis of osteoporosis is likely to lead to a reduction in radiological evaluation of the skeleton, particularly in asymptomatic subjects. At present there are no established treatment criteria based on bone density values, but values greater than one standard deviation below the reference age and sex matched value are usually considered to be 'normal' and hence exclude the need for treatment. Although in

most instances such values in the lumbar spine do exclude osteoporosis, in a small number of patients the dorsal spine only is affected and in these the diagnosis requires dorsal spine radiology. On the basis of our findings we suggest that spinal osteoporosis in some patients may be a focal disorder and that dorsal spine radiology should be carried out in addition to bone densitometry in patients with strong risk factors for osteoporosis, for example long term treatment with corticosteroids, or with clinical evidence of dorsal spine disease.

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