SINGLE PHOTON BONE DENSITOMETRY IN MULTIPLE MYELOMA

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The study was performed in 45 patients with multiple myeloma. There was found significant correlation between diminished bone mineral density of forearm and duration of the disease. No correlation between bone mineral density and biochemical markers of osteolysis (pyridinoline and deoxypyridinoline in urine) and serum levels of cytokines was found.

INTRODUCTION

Demineralisation and lytic bone lesions are common features of patients with multiple myeloma and are usually assessed by conventional radiography. Bone mass can recently be measured by bone densitometry, which provides useful information for the management of patients with various bone diseases[1,3,7,9]. To evaluate bone densitometry in multiple myeloma (MM) we performed single photon densitometry of forearm. We were interested if evaluation of bone density in patients with multiple myeloma can provide usefull information and correlation with biochemical markers of osteoresorption and serum levels of cytokines involved in pathogenesis of osteolysis (IL-6, IL-l-beta, TNF–alfa)[4,5,11,12].

SET OF PATIENTS AND METHODS OF EXAMINATION

Fourty five patients (23 women and 22 men), the mean age 63 years (range 32 to 80). Twenty one (47%) had IgG phenotype, 19 (42%) had IgA phenotype and 5 (18%) were light chain disease. In I. clinical stage according Durie-Salmon classification were 8 (18%)[6,10], in II. stage were l9 (49%) and in III. stage were 18 (40%) of patients. Patients were treated by cytotoxic regimes VMCP (vincristine, melphalan, cyclophosphamid, lomustine and prednison) or by VAD regime (vincristin, adriablastin a dexamethason). Involvement of bones by osteolytic proces was assessed by conventional radiography. Degree of bone involvement was classified according to Durie-Salmon[6].

Single photon bone densitometry was performed by densitometer DTX-100 (Osteometer). Bone mineral density (BMD) was measured in non dominant forearm.

Results were expressed as z-score. As osteopenic were considered patients with z-score less than –1 SD, mild osteoporosis z-score –1.1 –2.0, as severe osteoporotic with z-score less than –2.1–3.0 SD.

Biochemical markers of osteoresorption, pyridinolin and deoxypyridinolin in urine, were evaluated in all patients. Evaluation was done by ELISA method (Metra). Normal levels of pyridinoline in women were 10–28 nM/mmol creatinine in men 8–24 nM/mmol creatinine. Normal levels of deoxypyridinoline in women were 2.0–6.0 nM/mmol creatinine and 2.0–6.0 nM/mmol creatinine in men[8].

At the same time serum levels of interleukines involved in osteolytic proces (IL-6, IL-l-beta, TNF-alfa) were determined by ELISA method (Immunotech, Marseille, France)[11,12]. Normal serum levels of IL-6 was up to 10 pg/ml, of IL-l-beta up to 5 pg/mland of TNF-alfa up to 5 pg/ml. Duration of disease multiple myeloma was calculated from date of diagnosis to date of examination by bone denstitometry and biochemical markers of osteoresorption. Statistical analysis was done according Persons' test ($p < 0.05$).

RESULTS

Conventional radiography of skeleton (tab. 1) showed normal bones only in 2 (4%) of MM patients, osteopenia in 24 (53%) patients, multiple osteolytic lessions in 12 (27%) of patients and multiple osteolytic lessions and pathological fractures in 7 (16%) of patients.

Single photon bone densitometry of forearm (tab. 2) showed osteopenia in 5 (11%) of patients with MM, mild osteoporosis was found in 13 (29%), severe osteoporosis in 5 (11%) and very severe osteoporosis in 1 (2%) of patients.

Normal bone mineral density of forearm was found in in 22 (47%) of MM patients.

Statistical analysis found correlation between decreasing bone mineral density of forearm and duration of disease MM ($r = –0.299$). We did not found statistical

correlation betwen bone mineral density of forearm and biochemical indices of bone resorption (pyridinoline and deoxypyridinolene in urine). We also did not found correlation between bone mineral density of forearm and clinical stage of MM classified according Durie–Salmon classification.

Table 1. Evaluation of bone involvement by conventional radiography in MM

	score	n	%
Normal finding	0	2	4
Osteoporosis, or solit. lesion	1	24	53
Multiple osteolytic lesions	2	12	27
Multiple osteolytic lessions and pathol. fractures	3	7	16

Table 2. Bone mineral density of forearm measured by single photon densitometer.

	z-score	n	%
Normal density	0–0.5	7	16
Osteopenia	–0.6–1.0	5	11
Mild osteoporosis	–1.1–2.0	13	29
Severe osteoporosis	–2.1–3.0	5	11
Very severe osteoporosis	–3.1..	1	2
Increased bone density	0	14	31

DISCUSSION

Osteolytic involvement of forearm in myeloma is not very common[6]. Bones of forearm are mainly formed by cortical bone[1]. Osteoporosis and osteolytic involvement of spine is more frequently found[2]. This site is mainly formed by cancelous bone. In development of osteopenia of forearm in multiple myeloma can play role not only disease of myeloma but also corticosteroid therapy which is part of cytotoxic regimes used for therapy of myeloma[2]. Significant correlation between duration of disease and decreasing bone mineral density of forearm can be in assotiation with high cumulative dose of corticosteroides used for therapy during course of myeloma. Activity of osteolytic proces expressed as increased levels of pyridinoline and deoxypyridinoline in urine is changinch during course of disease and reflects actual state. On the other side decreased bone mineral density is result of complex osteolytic mechanismus. Changes of bone mineral density are very slow[8,9].

In our study was not found correlation between bone mineral density of forearm and serum levels of cytokines involved in bone resorption in MM. One of the possible reasons is that serum levels of cytokines are involved also by other pathological conditions, e.g. by inflammation to which are patients with MM more liable.

CONCLUSION

Evaluation of bone mineral density of forearm in MM by single photon densitometry found correlation between decreasing mineral density and duration of disease. No correlation was found between bone mineral density of forearm and markers of osteoresorption and serum levels of cytokines IL-6, IL-l-beta and TNF-alfa. According current experiences from the literature better results can be obtained by performing double photon densitometry (DEXA) which can examine spine, which is more frequently involved in MM than peripheral skeleton[3].

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