Bone Mineral Density in Patients with Ankylosing Spondylitis

Ankilozan Spondilit Hastalarında Kemik Mineral Yoğunluğu

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Abstract

Objective: Patients with inflammatory arthritis are at risk for osteoporosis and bone fractures. Inflammation and immobility contribute to bone loss in patients with ankylosing spondylitis (AS). The aim of this study was to determine bone mineral density (BMD) in patients with AS, and to compare the data of the AS patients with matched healthy controls. In addition, we sought to determine whether BMD values are related to disease activity in patients with AS or not.

Patients and Methods: BMD measurements were performed with the use of Dual-Energy X-Ray Absorptiometry (DXA) in 62 AS patients and 36 healthy controls. BMD was measured in spine L2-4 (anterior-posterior view) and femoral neck by DXA.

Results: The study showed that patients with AS have lower BMD values and t scores than healthy controls ($p<0.001$). Furthermore, total lomber BMD value negatively correlated with the length of disease duration in patients with AS ($r=-0.322$, $p=0.01$).

Conclusion: We thought that evaluation and treatment of osteoporosis was helpful in especially late stages of AS. *(Rheumatism 2008; 23: 42-5)*

Key words: Ankylosing spondylitis, osteoporosis, bone mineral density

Özet

Amaç: İnflamatuvar eklem hastalığı olanlarda, osteoporoz ve kırık riski artmıştır. Ankilozan spondilitte (AS), kemik kaybının immobilizasyon ve inflamasyon ile ilişkili olduğu düşünülmektedir. Bu çalışmanın amacı, AS'li hastalarda kemik mineral yoğunluğunun (KMY) sağlıklı kontrol grubu ile karşılaştırılarak araştırılmasıydı. Çalışmada ayrıca AS'li hastalarda KMY'nun hastalık aktivitesiyle ilişkisini araştırıldı.

Hastalar ve Yöntem: 62 AS hastası ve 36 sağlıklı gönüllüde Dual Enerji X-Ray Absorbsiyometri (DXA) yöntemiyle L2-4 ve Femur boyun bölgesi KMY değerleri ölçüldü.

Bulgular: Çalışma sonuçlarımız, AS'li hastalarda KMY'nun, sağlıklı kontrollerden daha düşük olduğunu gösterdi ($p<0.001$). Ayrıca, lomber bölge KMY hastalık süresi ile negatif korelasyon gösteriyordu ($r=-0.322$, $p=0.01$).

Sonuç: Bu sonuçlara göre osteoporozun araştırılması ve tedavi edilmesinin özellikle ilerlemiş AS'de faydalı olacağı düşüncesindeyiz. *(Romatizma 2008; 23: 42-5)*

Anahtar kelimeler: Ankilozan spondilit, osteoporoz, kemik mineral yoğunluğu

Introduction

Secondary osteoporosis is bone loss caused by a specific disease or by medications, common in men and in premenopausal women. Inflammatory, erosive arthritis classically rheumatoid arthritis (RA), systemic lupus erythematosus (SLE), polymyalgia rheumatica, and ankylosing spondylitis (AS) are accompanied by focal bone destruction and progressive generalized bone loss (1). Patients with inflammatory disease are at increased risk for osteoporosis, probably due to systemic inflammation as well as corticosteroid use and periods of immobilization during disease flares (2).

The presence of osteoporosis in AS has been confirmed by several researchers. The cause of osteoporosis in AS is most likely multifactorial. Abnormal bone remodeling is present in AS with both excess bone formations at extra-osseous sites, as well as osteoporosis at the spine. There are descriptions of the local or systemic osteopenic action of bone cytokines produced in chronic inflammatory axial or peripheral joint lesions. In early disease, inflamma-

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tion and in the chronic phase of the disease mechanical factors including decreased mobility and stooped posture may play an important role in bone loss. Inflammation of the entheses and synovium may result in increased release of proinflammatory cytokines, whose deleterious effects on bone metabolism have been established in AS (3,4).

A role for inflammatory cytokines has received support from several studies, although measurements of bone turnover markers have yielded highly conflicting results. Inflammation of the entheses and synovium may result in increased release of proinflammatory cytokines, whose deleterious effects on bone metabolism have been established. Tumor necrosis factor alpha (TNFa), interleukin-1, and interleukin-6 are thought to play a pivotal role in inflammation (5,6). Thus, in several studies, significant correlations were found between bone turnover markers (pyridinoline, deoxypyridinoline, C- and N-telopeptide crosslinks, and osteocalcin) and the levels of proinflammatory cytokines or their markers (erythrocyte sedimentation rate and C-reactive protein) used in clinical practice

Multiple skeletal sites including the spine, peripheral joints, periarticular structures, or all three sites can potentially be affected. Synovial pathology within diarthrodial joints recapitulates many of the same histopathological features that are associated with the joint pathology in RA, including synovial hyperplasia, lymphoid infiltration, and neovascularization. The pathological hallmark of the AS is inflammation of the enthesis, especially in the axial spine, and this feature distinguishes this group of disorders from other inflammatory arthritides (7,8).

The aim of this study was to investigate bone mineral density in patients with AS using Dual-Energy X-Ray Absorptiometry (DXA).

Patients and Methods

Sixty-two patients with AS based on the modified New York criteria, and 36 healthy controls were included in the study. In a 24 month period, among the 147 cases, referred for the first assessment, 70 did not meet inclusion criteria and 15 subjects refused to participate. Patients with arthritis due to other disease, such as gout, Reiter's syndrome, psoriasis, inflammatory bowel disease, systemic lupus erythematosus, Behçet's disease, adult onset Still disease, neoplastic disease, seronegative spondyloarthropathies other than primary AS, secondary causes of osteoporosis and having been received any drugs known to affect calcium metabolism were also excluded. No patient was on steroids or disease-modifying agents. Patients with disease of at least 6 month duration were recruited in this study. Informed consent was obtained from each patient. Control group was consisted of 36 healthy individuals (16 females, 20 males). The controls were recruited from the family of those in the patients group. Controls had no joint complaints and any rheumatological disease. Age and sex distributions in the group of control subjects were similar to those of AS patients. Informed consent was obtained from each control.

Lumbar spine (L2-4 anteroposterior view) and left femoral neck bone mineral density was determined by using Dual-Energy X-Ray Absorptiometry (DXA- Hologic QDR 4500). Instrument was calibrated before use in each new location using the manufacturer's internal standard. BMD was measured by a single technician to reduce interoperative error.

The DXA measurements were expressed as BMD (g/cm^2), t-score (comparison with normal subjects of the same sex with peak bone mass) and z-score (comparison with age and sex matched normal controls).

Complete blood cell counts, alkaline phosphatase (ALP), osteocalcin levels were measured using competitive immunoassay method in both groups. Serum C-telopeptide (CTx) level was measured by enzyme linked immunoabsorbent assay.

The Statistical Package for Social Sciences (SPSS 11.5, SPSS Inc, Chicago, IL) was used for all statistical analyses. Statistical methods consisted of chi square statistic for the comparison of categorical data, and t-test for continous variables. Relationships among the clinical and demographical variables were assessed by means of Pearson correlations. The 2-tailed significance level was set at .05.

Results

Table 1 illustrates a comparison of demographic variables of the study population. There were no significant differences among two patient groups and healthy controls in regard to age, gender, duration of disease. We observed, twenty patients (32%) had osteoporosis and eleven patients had osteopenia. The clinical findings were given in Table 2. There were significant differences between AS patients and controls in regard to lumbar and femoral neck t-scores ($p<0.001$, for both). Lumbar and femoral neck BMD scores were significantly lower in AS patients than controls ($p<0.001$, for both). AS patients had significantly higher ALP and CTx levels ($p=0.01$, $p<0.001$, consequently), and lower osteocalcin level than controls ($p<0.001$).

Lomber BMD scores were negatively correlated with the length of disease duration in AS patients ($r=-0.322$, $p=0.01$).

Table 1. Demographic variables of the study population

	Ankylosing spondylitis (n=62)	Controls (n=36)	p
Age	33.4±7.5	42.8±5.3	0.2
Gender (male)	36	20	0.8
BMI	27.1±6.0	27.3±6.3	0.3
Mean duration of illness (year)	5.7±4.2	-	0.6

BMI: Body Mass Index

Table 2. Comparison of clinical and biochemical parameters between the patient group and controls

	Ankylosing spondylitis (n=62)	Controls (n=36)	p
Lumbar t score	-0.4±1.1	0.9±0.7	< 0.001
Femoral neck t score	0.2±1.0	1.3±0.5	< 0.001
Lumbar BMD (g/cm2)	101.2±12.7	104.0±10.7	< 0.001
Femoral neck BMD (g/cm2)	95. 0±24.0	107.6±7.8	< 0.001
ALP (IU/L)	167.9±37.9	92.3±5.5	0.01
Osteocalcin (ng/ml)	30.2±9.2	53.9±36.2	< 0.001
CTx (ng/ml)	52.1±16.9	15.0±13.4	< 0.001

BMD: Bone Mineral Density, CTx: C-Telopeptid, ALP: Alkaline Phosphotase

Discussion

In the present study, we found a reduction of BMD in the lumbar spine as well as the femoral neck in patients with AS. Furthermore, there was significant correlation between BMD values and disease duration. We observed osteoporosis in %32 and osteopenia in %11 of AS patients.

Susceptibility to osteoporosis in the general population is influenced by genetic and environmental factors. We found that our AS patients are more likely to show a reduced BMD at risk for osteopenia and osteoporosis than their age and sex-matched healthy controls.

There were several studies which investigated the BMD in patients with AS. Mitra and coworkers (9) reported that mean BMD at the femoral neck and lumbar spine was significantly decreased at both sites as compared to the control group. Lange et al. (10) suggested that osteoporosis was frequent in AS and there were a close association of BMD, bone metabolism and inflammatory activity. In another study, 91 AS patients were investigated in regard to bone loss and it has been suggested that osteoporosis in AS is primarily caused by an inflammatory-mediated degradation of bone (11). In contrast Mullaji et al. (12) found that patients with advanced disease had a significantly increased mean lumbar BMD compared with both the control group and patients with mild disease and they suggest that axial osteoporosis, shown by the reduced lumbar spine BMD, may predispose to the development of a kyphotic deformity.

Osteoporosis is frequently associated with AS and BMD decreased predominantly in patients with active disease (13). Among possible mechanisms, inflammatory mediators released during the course of AS (14).

We found that BMD value was negatively correlated with disease duration in patients with AS. In previous studies, significant correlations were found between bone turnover markers and the levels of proinflammatory cytokines, ESR or CRP (15-17). According to our results, there were not relation between disease activity parameters and BMD values in patients with AS. Özdolap et al. (17) proposed that BMD values were related with disease duration, our results were confirmed the results of their study.

Acute-phase reactants are of limited clinical utility in the assessment and management of patients with ankylosing spondylitis. ESR and CRP levels are not abnormal in every patient in active disease (18).

About 50% of spinal bone mass has to be lost before demineralisation becomes apparent on standard radiographs (19). Radiography is therefore relatively insensitive in assessing skeletal changes (12). DXA is the most reliable technique for measurement of bone mineral density (20,19).

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