HYPERTHYROIDISM AND BONE MASS: CHARACTERIZATION OF HYPERTHYROID OSTEOPOROSIS.

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Hyperthyroidism is associated with increased bone resorption and reduced bone mass. Nevertheless, not all patients show the same risk to develop osteoporosis. The objetive of this study was to analyze potential clinical and biochemical factors able to identify hyperthyroid patients with increased risk of osteoporotic fractures. Patients and methods: We studied 127 consecutive hyperthyroid patients (110 female, 17 male; age 41±16 years). Bone mineral density (BMD) was measured by DXA at lumbar spine (**LS**; L_2-L_4) and femoral neck (**FN**). Data were expressed as T-score (SD *versus* peak bone mass). Patients were placed in two groups on the basis of recent WHO criteria (1994): **group A**: No osteoporosis (T-score>-2.5, n=98) and **group B**: lumbar or femoral osteoporosis (T-score<-2.5, n=29). Study protocol included evaluation of age, height, weight, body mass index, thyroid hormones and bone turnover markers. Results: 24/127 (18.9%) and 22/127 (17.3%) hyperthyroid patients met lumbar and femoral osteoporosis criteria respectively. **Group B** showed greater age ($p<0.001$) and less weight and height ($p<0.05$ and $p<0.01$), longer duration of menopausia ($p<0.01$), and greater levels of total and bone alkaline phosphatase ($p<0.001$ and $p<0.01$). No diferences in FT_4, TSH, osteocalcin, tartrate-resistant acid phosphatase, type I colagen C-telopeptide, and urine hydroxiproline were found. Discriminant lineal analysis allowed to identify osteoporotic patients with error <20%. Conclusions: Hyperthyroid patients with lumbar or femoral osteoporosis show a typical clinical and biochemical profile useful in the management of hyperthyroid bone disease.

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UTILITY OF NEW MARKERS OF BONE TURNOVER IN HYPERTHYROID PATIENTS

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Hyperthyroid patients show an accelerated bone turnover, so hyperthyroidism is a good model to assess the utility of new markers of bone metabolism (bone alkaline phosphatase [$_B$ALP; IRMA] and type I colagen C-telopeptide [ICTP, RIA]) in the management of hyperthyroid bone disease. The aim of this study was to evaluate the influence of age, body mass index (BMI) and degree of thyroid function on $_B$ALP and ICTP levels in hyperthyroid patients as well as its relationship with bone mass measurements and with older bone turnover markers. Patients and methods: We studied 127 hyperthyroid patients (age 41±16 years; 110 female, 17 male). Total alkaline phosphatase ($_T$ALP) and tartrate-resistant acid phosphatase (TRAP) by autoanalyzer, $_B$ALP by IRMA, osteocalcin (BGP), urine hydroxiproline (OHP), ICTP, TSH and FT_4 by RIA were measured. Bone mineral density (BMD) was measured by DXA at lumbar spine (**LS**; L_2-L_4) and femoral neck (**FN**). Data were expressed as Z-score (SD *versus* spanish control population adjusted by age and sex) and as T-score (SD *versus* peak bone mass) ROC curves for diagnosis of osteoporosis (T-score<-2.5) were generated by parametric methods (CLabRoc software). Results: BGP, OHP and ICTP levels showed a negative correlation with age and BMI ($p<0.05$). All markers of bone metabolism but TRAP correlated with FT_4 ($p<0.05$). BGP, $_T$ALP and $_B$ALP correlated with TSH ($p<0.05$). All markers correlated between them ($p<0.05$), but only BGP, $_B$ALP and OHP were related to lumbar and femoral BMD ($p<0,05$), showing a better profile in ROC plots. Conclusions: The utility of ICTP in hyperthyroid bone disease is limited by its great sensitivity to several factors (age, BMI). $_B$ALP offers a more reliable information in hiperthyroid patients. Classical bone turnover markers show high performance in the management of hyperthyroid bone disease.

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EFFECT OF 1α-OH-VITAMIN D_3 ON BONE METABOLISM IN PATIENTS TREATED WITH GLUCOCORTICOID

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Osteoporosis is a major health problem for patients treated with steroids. We aimed to study the effect of 1α-OH-vitamin D_3 (D) on bone in patients who just started receiving glucocorticoids. We selected 22 women (age: 34-49 yrs) who were recently diagnosed with SLE, sclerosis multiplex, rheumatoid arthritis or asthma bronchiale. Patients did not have other diseases or did not take drugs known to influence bone metabolism. Patients were randomly enrolled into two groups and were given 5-25 mg prednisone. After 4 weeks, group D (D-treated; n=11) received 0.5-1.0 μg D and group C (control; n=11) was given 500 mg calcium. There was no significant difference in age and steroid doses between groups. Serum calcium (Ca), osteocalcin (OC), collagen I C-terminal propeptide (CICP) and urinary deoxypyridinoline crosslink excretion (DPD) was measured before steroid administration, and before D or calcium treatment as well as 6 weeks and 6 months later. Bone mineral density (BMD) was examined before treatment and 6 months after by DEXA and SPA. Serum Ca and urinary DPD did not change significantly in either group during the 6 months. OC ($5.63\pm0.28\rightarrow2.31\pm0.17$ ng/ml, $p<0.001$) and CICP ($90.7\pm3.5\rightarrow52.5\pm3.4$ ng/ml, $p<0.001$) decreased after 4 weeks on steroid in both groups and increased in group D (OC=3.85 ± 0.19 ng/ml, $p<0.001$; CICP=69.6 ± 2.5 ng/ml, $p<0.001$) but not in group C after 6 weeks and remained unchanged after 6 months. Lumbar spine BMD was slightly but significantly reduced in group C ($1.016\pm0.01\rightarrow0.996\pm0.01$ g/cm^2, $p<0.05$) after 6 months while it showed no change in group D. BMD of the femoral neck and radius did not change significantly in either group during this period. Based on these results, D treatment might be effective in preventing steroid-induced bone loss by stimulating bone formation, however, longer follow-up is required to estimate the long-term effects of this therapeutical modality.

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HORMONAL INFLUENCES IN MALE OSTEOPOROSIS

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Oestrogen is known to have a profound influence on bone turnover in women. The effect of sex steroids on bone turnover in men is less well understood. In order to clarify this we have examined bone mass and histomorphometric markers of bone turnover in relationship to the prevailing serum concentration of oestradiol (E2) and testosterone (T) in 39 men with spinal osteoporosis. E levels were related to T ($r=0.34$, $p=0.03$). Both hormones were related to bone mass; E was correlated with femoral neck bone density ($r_s=0.41$, $p=0.02$) and T with distal forearm and spinal bone density ($r=0.52$, $p=0.008$; $r=0.41$, $p=0.02$ respectively). In order to allow for the relationship between T and E the turnover data were analysed by multiple regression. E2, but not T, was related to mineralising surfaces ($R^2=0.34$, $p=0.001$) whereas T, but not E2, was related to resorption surfaces ($R^2=0.22$, $p=0.03$). In terms of trabecular microarchitecture E2 was related to trabecular thickness ($R^2=0.14$, $p=0.05$) whilst T was related to trabecular number ($R^2=0.21$, $p=0.03$). We conclude that, in men with osteoporosis, sex steroids have important effects on bone turnover. Furthermore it would appear that E2 and T have complementary actions.

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