Background:

Objectives: Assess the severity of coronary atherosclerosis in men with coronary heart disease (CHD) depending on bone mineral density (BMD).

Methods: 102 of men with verified CHD aged 51-75 (60.8 ± 6.9) were examined. All patients performed two-energy X-ray absorption of lumbar vertebrae bodies LI-LIV and hip necks (Excell XR-46, Norland, USA) and polyproject coronarangiography (Innova, General Electric, USA). On the basis of results of densitometry on value of T-criterion (the recommendation of ISCD, 2007) estimated BMD condition: normal BMD (T criterion ≥ -1), osteopenia (T-criterion from -1 to -2.5) and osteoporosis (OP) (T criterion < -2.5). According to the SYNTAX scale (www.syntaxscore.com), the following degrees of coronary artery (CA) injury severity were isolated to quantify the expression of atherosclerotic injury: low (22 or less), intermediate (23-32) and high (33 or more). According to the result of multispiral computed tomography of CA, calcium index of vessels was determined by the Agatston method using the CaScore program. On the basis of the calcium index value the degree of CA calcinosis was evaluated: 0 - absence of calcinosis, 1-10 - minimal, 11 - 100 - moderate, 101-400 - increased, more than 400 - expressed calcinosis.

Results: According to the results of densitometry, patients were found to have 21 patients (20.6%) with normal BMD, 48 (47.0%) - osteopenia and 33 (32.4%) - osteoporosis. Osteopenic syndrome (OPS) was found in 79.4% of men. All patients tested, depending on the degree of CA calcinosis, were distributed as follows: 57.8% of men had pronounced CA calcinosis, 25.5% - increased, 6.9% - moderate, 2.0% - minimal, 7.8% of patients had no CA calcinosis. In a comparative analysis of the degree of coronary calcinosis in men with CHD depending on the T-criterion, it was found that the majority of patients with OPS (69.7% of patients with OP and 60.4% with OPe) had pronounced CA calcinosis. In men with normal BMD, the prevalence of pronounced CA calcinosis (33.3%) was significantly lower than in patients with OPS ($p < 0.050$). Calcinosis-negative CA was recorded reliably more frequently in patients with normal BMD (28.6%) compared to men with low BMD ($p < 0.050$). The results of the work demonstrated the relationship of the studied parameters of coronary atherosclerosis expression with densitometry indicators in men with CHD. Thus, the inverse correlation of the BMD at the level of the hip neck with the number of significant stenoses of the spacecraft ($r = -0.19$; $P = 0.045$) and the degree of coronary calcinosis ($r = -0.23$; $P = 0.022$) and similar dependence of BMD of vertebral bodies LI-LIV with coronary calcinosis degree ($r = -0.19$; $p = 0.046$). A direct correlation between CA calcinosis and FRAX hip fracture risk ($r = 0.24$; $p = 0.018$). Inverse correlation of parameters of atherosclerotic damage of CA (number of significant stenoses and degree of calcinosis) with BMD was established, and direct correlation of CA calcinosis degree with risk of hip fracture on FRAX scale in male persons with CHD over 50 years of age was revealed.

Conclusion: The findings suggest in favor of likely common mechanisms for developing atherosclerosis with OP and allow coronary calcinosis to be considered as a condition potentially increasing the risk of hip fracture.

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SAT0481

RELATIONSHIP BETWEEN SARCOPENIA AND BONE MINERAL DENSITY IN MEN WITH CORONARY HEART DISEASE

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Objectives: To study the relationship of indicators of muscle mass, muscle strength and muscle function with bone mineral density (BMD) in men with coronary heart disease (CHD).

Methods: 79 men aged over 50 years with verified CHD were examined (mean age 63 (57; 66) years).

The BMD (g/cm^2) and T-criterion (standard deviation) of the femoral neck and lumbar spine (L1-L4) were evaluated using dual-energy x-ray absorptiometry (DXA) on the lunar Prodigy Primo bone densitometer (USA).

To assess muscle mass, the total area (cm^2) of the lumbar muscles of the axial section at the level of the 3rd lumbar vertebra (L3) was determined using multispiral computed tomography on a 64-slice computer tomograph "Somatom Sensation 64" (Siemens AG Medical Solution, Germany). The ratio of the obtained index of the area of skeletal muscle to the square of the patient's growth index determined the "musculoskeletal index L3" (SMI). The media considered the threshold value to be $52.4 cm^2/m^2$. Evaluation of muscle strength was performed using a mechanical wrist dynamometer DC-25. Muscle function was examined using a short physical performance battery (SPPB).

Results: The data obtained from the results of correlation analysis show that there is a reliable direct correlation between BMD and hand dynamometry indicators ($r = 0.250$; $p = 0.026$ for the right hand and $r = 0.247$; $p = 0.028$ for the left hand), the T-criterion of the femoral neck and hand dynamometry indicators ($r = 0.245$; $p = 0.030$ for the right hand and $r = 0.242$; $p = 0.032$ for the left hand). A similar relationship was established between the BMD of the lumbar vertebra and the parameters of dynamometry ($r = 0.237$; $p = 0.036$ for the right hand and $r = 0.228$; $p = 0.043$ for the left hand) and T-criterion for the lumbar region and dynamometry parameters ($r = 0.232$; $p = 0.039$ for the right hand and $r = 0.220$; $p = 0.051$ for the left hand). There is no significant relationship between densitometry scores and the result of SPPB tests.

There was a significant direct relationship between the total SPPB score and the area of skeletal muscle at the L3 level ($r = 0.249$, $p = 0.026$), the total SPPB score and the musculoskeletal index ($r = 0.233$, $p = 0.039$). A similar relationship was established between the result of the chair lift test and the total area of skeletal muscle at the L3 level ($r = 0.262$, $p = 0.019$) and the musculoskeletal index ($r = 0.220$, $p = 0.050$).

A significant negative relationship between walking speed and the musculoskeletal index was found ($r = -0.260$, $p = 0.021$). The relationship between muscle mass and strength could not be traced.

Conclusion: A decrease in muscle strength correlates with the severity of bone loss, while a decrease in muscle function correlates with a decrease in muscle mass. The results obtained confirm the probability of common mechanisms in the development of sarcopenia and osteoporosis in patients with CHD.

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SAT0482

FRAX 10-YR FRACTURE RISK IN RHEUMATOID ARTHRITIS ASSESSED WITH AND WITHOUT BONE MINERAL DENSITY – ARE WE TREATING OUR PATIENTS UNDER BDMARDS?

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Background: Patients with rheumatoid arthritis (RA) have a higher risk of osteoporosis not only due to chronic inflammation status, but also due to the treatment with glucocorticoids. FRAX is a computer-based algorithm developed by the World Health Organization for estimation of the 10-year risk of a hip or major osteoporotic fracture. Inclusion of femoral neck bone mineral density (BMD) in the estimation is optional.

Objectives: The study aimed to identify the RA patients under treatment with biological disease-modifying antirheumatic drug (bDMARD), who have FRAX scores, calculated with and without BMD, classified as high fracture risk and evaluate if they are receiving treatment for osteoporosis. The authors also investigated the intra-individual agreement between FRAX fracture risk calculated with and without BMD.

Methods: Demographic and clinical data and BMD results from RA patients followed in a tertiary university hospital and registered in the Rheumatic Diseases Portuguese Register were used for analysis. Patients under 40 years of age at the last visit were excluded. McNemar test was applied for the identification of discordance of risk categories. The Wilcoxon test was used to characterize the intraindividual differences between paired FRAX risks with and without BMD. Correlations between pairs of variables were evaluated by the Spearman test. For independent variables Mann-Whitney test was used.

Results: A total of 303 patients were included, 244 were females (80.5%) and 49 current smokers (16.2%). Mean age was 59.5 ± 9.54 years and mean disease duration 18.5 ± 10.4 years. Two hundred and twenty patients (72.4%) and 243 (80.2%) were RF and ACPA positive, respectively, and 51.5% had erosive disease. Mean disease activity score (DAS28-4V-CRP) was 3.08 ± 1.18 and mean femoral neck BMD $0.84 \pm 0.12 g/cm^2$. One hundred and seventy nine patients (58.9%) were concomitantly treated with conventional synthetic DMARDs and 215 (70.7%) with glucocorticoids. Among all the patients, 35 (11.6%) had previous fractures and 19 (6.3%) have family history of fracture. The median 10-year risk of a major fracture and a hip fracture, calculated without BMD, was 6.0 (1.2-50) and 1.5 (0.1-39), respectively; with BMD it was 6.9 (1.3-61) and 1.7 (0-49). When FRAX score is calculated without BMD ($n = 303$), 76 (25.1%) patients were categorized as high fracture risk. Among them, only 41 (54%) were receiving osteoporosis treatment. FRAX assessment with BMD ($n = 231$) identified 99 (32.7%) patients with high fracture risk, 51 (51.5%) in treatment for osteoporosis. Thirty patients (21%) previously classified as low fracture risk using FRAX without BMD were recategorized as high risk ($p < 0.001$). Despite that, there was a strong correlation between fracture risks assessed with and without BMD for both major and hip fracture ($r = 0.867$, $p <$

0.0001 and $r = 0.728$, $p < 0.0001$, respectively). ACPA and RF positive patients did not have higher FRAX scores (including or not BMD). Patients with erosive disease had a higher 10-year probability of major fracture evaluated by FRAX when it includes BMD ($p=0.041$).

Conclusion: It is very important to accurately assess the risk of osteoporotic fractures in RA patients to treat them properly. The authors highlight the high number of patients who are not receiving treatment according to FRAX categorization. In spite of the correlation between estimated fracture risk by FRAX with and without BMD, there is a discordance in fracture risk categorization, as one fifth of patients of low risk were reclassified as high risk. For the RA population treated with bDMARDs, our findings raise the need to request a DXA not only for patients classified as having an intermediate risk of fracture, but also for low-risk patients.

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SAT0483

SAFETY OF INTRAVENOUS IBANDRONIC ACID IN CHRONIC KIDNEY DISEASE: A REAL WORLD EXPERIENCE

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Background: Common forms of intravenous bisphosphonate used at the Royal Derby Hospital are zoledronic acid and ibandronic acid for a variety of indications. In the treatment of osteoporosis, zoledronic acid is preferred due to its convenience of once-yearly dosing; compared to ibandronic acid which is given three-monthly. Zoledronic acid is contraindicated in patients with an estimated glomerular filtration rate (eGFR) of less than 35 due to nephrotoxicity concerns. Ibandronic acid, however, is generally offered with an eGFR of 30 or over and is perceived to be a safer choice in more advanced chronic kidney disease. The potential of extending the use of ibandronic acid to patients with lower eGFR is being explored. However, there is a paucity of real world data and this study will therefore seek to affirm the safety profile in those on treatment.

Objectives: Establish the safety profile of IV ibandronic acid with regards to worsening renal function or significant hypocalcaemia injury in the context of reduced renal clearance.

Methods: The details of patients receiving IV ibandronic acid at Royal Derby Hospital were retrieved from the osteoporosis department register in September 2019. Data was collected anonymously from records using the electronic prescribing and pathology hospital database, together with electronic letters. The first three pre-infusion serum adjusted calcium levels, vitamin D, creatinine and eGFR were recorded. In addition, results from initiation to present were screened for any episodes of hypocalcaemia, acute kidney injury (AKI) or significant decline in renal function.

Results: Treatment duration ranged from 6 months to 6 years. Female:male ratio was 9:1 and the average age was 75 years (range 50-90). Baseline eGFR ranged from 27 to over 60; 3 patients had eGFR ≥ 60 , 2 had eGFR 27 while remaining patients (75%) had eGFR 30-59. All patients received a standard 3mg infusion on each occasion. The most common rationale cited for ibandronic acid choice as opposed to zoledronic acid was reduced creatinine clearance or eGFR. Three patients (15%) developed one or more episodes of mild hypocalcaemia (lowest 2.01 mmol/l). No episodes of hypocalcaemia were identified in the first three pre-infusion levels. Four patients (25%) had a decline in eGFR by more than 5 ml/min/1.73m² but there was no definitive causal link with ibandronic acid and was most commonly felt to be related to their underlying renal disease. Three patients (15%) had at least one episode of AKI since commencing treatment, each explained by an intercurrent illness. Serum Vitamin D levels were measured pre-infusion in 92% of cases.

Conclusion: This study reaffirms the safety profile of ibandronic acid use in renal function as low as CKD Stage 3b (≥ 30 ml/min/1.73m²). No episodes of AKI or sustained decline in renal function were causally linked to ibandronic acid.

References: Royal Derby Hospital Proposed Clinical Guideline (2019) – Use of ibandronic acid in CKD 4 at reduced dosage.

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SAT0484

TRABECULAR BONE SCORE IN SYSTEMIC LUPUS ERYTHEMATOSUS PATIENTS

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Background: Systemic lupus erythematosus (SLE) patients shown an increased risk of low bone mass as a result of multifactorial events: physical inactivity, persistent inflammation, low vitamin D levels (photosensitivity) and glucocorticoid treatment. Trabecular Bone Score (TBS), is an index extracted from the dual-energy X-ray absorptiometry (DXA) that provides an indirect measurement of bone axial microarchitecture and allows to get information about bone quality in several rheumatic diseases (1-4).

Objectives: The aims of this study were to examine the prevalence and risk factors for low bone mineral density (BMD) (osteoporosis or osteopenia) in female patients affected by SLE and to compare with matched healthy subjects (CNT).

Methods: 70 female patients (mean age 41 ± 20 years) affected by SLE and 65 age-matched CNT (mean age 46 ± 7 years) were enrolled. Bone Mineral Density (BMD, g/cm²) of the lumbar spine (L1-L4) was analyzed using a DXA scan (GE, Lunar Prodigy). Lumbar spine TBS was derived for each spine DXA examination using the TBS index (TBS iNsight Medimaps).

Results: The mean BMD $\pm$ SD was 0.47 ± 0.57 g/cm² at the lumbar spine and 0.78 ± 0.22 g/cm² at the hip in SLE patients. The prevalence of osteopenia was 40.0% and was 19.4% of osteoporosis in SLE patients. Most of SLE patients (75%) presented a bone loss that was significantly higher when compared with control group ($p < 0.001$). Lumbar spine TBS score was found significantly lower in SLE patients compared with CNT (0.687 ± 0.675 vs. 1.294 ± 0.809 $p < 0.001$, respectively) and of 0.47 ± 0.94 times lower than expected from the concomitant reference BMD value.

Conclusion: The study shows that the further TBS analysis, independently from the concomitant BMD value, is significantly lower than expected in SLE patients. The detection of the TBS, together with the BMD, may offer a more reliable indication of the real whole bone condition in chronic and systemic inflammatory rheumatic diseases, such as SLE.

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SAT0485

PERCENTAGE BODY FAT HAS A STRONGER ASSOCIATION WITH BONE MINERAL DENSITY AT THE HIP AND SPINE COMPARED TO BODY MASS INDEX

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Background: A decreased body mass index (BMI) is associated with poorer bone health, a decreased bone mineral density (BMD), and an increased fracture risk. Cardiovascular (CVS) data has shown that the waist:hip ratio is a more robust measurement for CVS outcomes than BMI (1). Waist:hip ratio has never been evaluated as an outcome measure for bone health. Dual-energy x-ray absorptiometry (DEXA) has the capacity to measure average percentage fat in the L1-L4 region and at the hip, and directly relates to the measurement of waist:hip ratio.

Objectives: To evaluate the relationship between BMD and average percent fat in a cohort referred for DEXA scanning.

Methods: We analysed data routinely collected from patients referred for DEXA between 2004 and 2010 at the Royal Lancaster Infirmary in the North of England. Data collected for these patients included DEXA scans