FRI0564 **128 PATIENTS WITH SUBACUTE SYMPTOMATIC FRAGILITY VERTEBRAL COMPRESSION FRACTURES: HIGH INCIDENCE OF MORTALITY, FALLING, MONOCLONAL GAMMOPATHY OF UNCERTAIN SIGNIFICANCE AND MYELOMA, PERNICIOUS ANEMIA AND VITAMIN B-12 DEFICIENCY: IS THIS A PROFILE OF AN OSTEOPOROTIC OR AN AGED POPULATION?**

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Background: Epidemiological studies have identified risk factors for falling and fractures. However there is a paucity of observational studies[1,2] of patients with symptomatic fragility vertebral compression fractures (VCF). These studies were not done in community based populations and did not evaluate the contribution of falling.
Objectives: To study factors contributing to both osteoporosis and falling in a cohort of community based patients with symptomatic subacute fragilty VCF.
Methods: We saw 128 patients with symptomatic subacute fragility VCF in our community based outpatient fracture clinic over a two year period. We performed a complete history and physical, review of past medical records and radiographs, complete blood count, sedimentation rate, chemistry profile, TSH, urinalysis, vitamin B-12, PTH, 25-OH vitamin D, and serum protein electrophoresis (SPE). We performed testosterone level, methylmalonic acid, antiparietal cell antibody and intrinsic factor antibody in select cases. We recorded diseases including diabetes, COPD, cardiac, neurological for each patient.
Results: There were 92 females aged 45–98 years (mean 77.7), 36 males aged 39–94 years (mean 77.6). Factors contributing to falling included peripheral neuropathy-61, use of sedatives-43, blindness-12, foot drop-6, dementia-3, Parkinson's-3, hyponatremia-2. VCF were precipitated by falls in 94 patients, of which 87 occurred at home. VCF occurred with lifting in 8 patients, bending in 3, and were spontaneous in 23. Use of steroids was reported in 18 patients and associated with mulitple ($>$3) fractures ($p<0.0008$). Blindness (p=0.022) and multiple fractures (p=0.049) were found more often among females. Males were more likely to have peripheral neuropathy (p=0.056) and 3 or more medical conditions ($P<0.008$). Age correlated with the number of diseases ($p<0.0001$). Diagnosis based on laboratory studies included vitamin D insufficiency-29, vitamin D deficiency-12, pernicious anemia-6, vitamin B-12 deficiency-8, monoclonal gammopathy of uncertain significance (MGUS)-10, myeloma-2, hypogonadism-12, and iatrogenic hyperthyroidism-3. Ankylosing spondylitis and lymphoma were diagnosed in one patient each. The average age of those that died was 83.9 years compared to 76.8 of the remaining group (p=0.033).
Conclusions: Conditions that increase with age and are associated with an increased risk of falling and fracture include neurological diseases, visual loss, use of steroids and sedatives, MGUS, myeloma, pernicious anemia and vitamin B-12 and vitamin D deficiencies. These were all common in our cohort with subacute symptomatic fragility VCF. Accordingly we recommend vitamin B-12 levels and SPE in the evaluation of all patients with VCF. These findings support the emphasis on interventions to reduce the risk of falling in the elderly and to recognize and treat these age-related conditions in an attempt to mitigate the risk of VCF.
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[2] Dumitrescu B, et al, BMC Musculoskeletal Disorders 2008, 9:109.
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FRI0565 **FRAGILITY FRACTURES IN PATIENTS ON DEPO-PROVERA ARE NOT ASSOCIATED WITH USUAL RISK FACTORS FOR FRACTURE**

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Background: Depo-Provera is one of the most widely-used contraceptives. The side-effects includes loss in bone mineral density (BMD), increasing fracture risk (1,2). It is not known if conventional fracture risk factors impact fracture risk in these patients.
Objectives: We set out to determine if the usual risk factors for fracture are associated with increased risk of fragility fractures in patients exposed to Depo-Provera.
Methods: Patients referred for bone densitometry at a scanner in North West of England were analysed. Femoral and vertebral BMD, height, weight and body mass index (BMI) were recorded, in addition to: age, diagnosis of rheumatoid arthritis, smoking status, alcohol consumption, family history of fractures, history of secondary osteoporosis, corticosteroid use, total average proportion fat, average tissue thickness, fat mass, and lean mass. Patients with exposure to Depo-Provera were selected for analysis. Initially patients with and without a fracture were compared using Chi-squared test and T-test. Logistic models were fitted univariately and adjusted for age to analyse association between traditional risk factors and fracture.
Results: 304 females (103 currently and 201 previously on Depo-Provera) were included. 62 (20.4%) had sustained had least one fragility fracture. There was no significant difference in fracture risk between those currently and previously on Depo-Provera (p=0.176 95% CI). Decreased left femoral BMD significantly impacted fracture risk (p=0.035 95% CI). All other factors investigated did not significantly increase fracture risk in this cohort.(see table below)

Predictor	All (n=304)	Patients with fracture (n=62)	Patients without fracture (n=242)	*p*-value	Odds ratio (95% CI)
Age at scan (years)	36.7	41.5	39.2	0.083	1.028 [0.10, 1.06]
Height (m)	163.2	163.3	163.2	0.924	1.002 [0.96, 1.04]
Weight (kg)	73.0	76.9	72.1	0.078	1.012 [0.10, 1.03]
Femoral BMD (left) (g/cm^2)	0.966	0.932	0.975	0.035	0.100 [0.01, 0.82]
Femoral BMD (right) (g/cm^2)	0.972	0.945	0.979	0.112	0.177 [0.02, 1.47]
Lumbar spine BMD (L2) (g/cm^2)	1.115	1.099	1.119	0.364	0.432 [0.07, 2.62]
BMI (kg/m^2)	27.4	28.8	27.0	0.068	1.037 [0.10, 1.08]
Average proportion fat	0.274	0.299	0.267	0.069	9.071 [0.86, 101.12]
Average tissue thickness (cm)	17.6	18.3	17.5	0.080	1.076 [0.99, 1.17]
Fat mass (g)	275.2	302.7	268.1	0.053	1.002 [0.10, 1.00]
Lean mass (g)	724.8	697.3	731.9	0.053	0.998 [0.10, 1.00]
Alcohol (no. of patients)	23	8	15	0.102	2.235 [0.78, 5.96]
Smoking (no of patients)	154	31	123	1.000	0.968 [0.53, 1.76]
Family history (no. of patients)	77	17	60	0.744	1.145 [0.57, 2.22]
Rheumatoid arthritis (no. of patients)	11	3	8	0.702	1.485 [0.25, 6.43]
Secondary operation (no. of patients)	48	10	38	1.000	1.032 [0.43, 2.29]
Corticosteroids (no. of patients)	67	18	49	0.169	1.609 [0.80, 3.14]

Conclusions: Our study suggests that fragility fractures in patients taking Depo-Provera are not associated with the usual risk factors for fractures. To our knowledge, this is the first study demonstrating fracture risk in such patients to be independent of conventional risk factors. This therefore indicates an as yet unidentified mechanism of increased fracture risk. Study limitations include the small number of fractures and lack of data on length of treatment with Depo-Provera. Further research is needed into the mechanisms by which the drug gives rise to increased fracture risk, independent of other factors.
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FRI0566 **TERIPARATIDE AND ALENDRONATE IMPROVED BONE LOSS AND HYPERALGESIA IN A MOUSE MODEL OF OSTEOPOROSIS**

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Background: Osteoporosis may cause not only fractures but also chronic back pain in elderly women. Teriparatide (TPTD) and alendronate (ALN) are widely used in clinical for treatment of osteoporosis. Several studies have demonstrated that TPTD and ALN treatments improved skeletal pain in osteoporosis patients.
Objectives: We investigated the effect of TPTD and ALN on pain-related behavior in ovariectomized (OVX) mice. And we investigated expression of inflammatory cytokines treated OVX mice.
Methods: 8-week-old female ddY mice were OVX and assigned to 4groups; SHAM-operated mice treated with vehicle (SHAM), OVX mice treated with vehicle (OVX), OVX mice treated with TPTD (TPTD) and OVX mice treated with ALN (ALN). Mice were started treatment immediately after surgery. For 4 weeks, mice were injected subcutaneously with vehicle or 40μg/kg ALN twice a week or 40μg/kg TPTD 5 times a week.
The bilateral distal femur metaphyses were analyzed three-dimensionally by μCT 4 weeks after surgery (each group; n=8).
Mechanical sensitivity was tested using von Frey filaments 4 weeks after surgery. To evaluate the 50% withdrawal threshold, seven von Frey filaments with forces of 0.07, 0.16, 0.4, 0.6, 1.0, 1.4 and 2.0 g were applied to the middle of the plantar surface. Data was collected using the up-down method.
To evaluate expression of interleukin-1β (IL-1β), IL-6 and tumor necrosis factor-α (TNF-α), mice were anesthetized and the bilateral hindlimb bone excised. We performed quantitative polymerase chain reaction (q-PCR) from hindlimb bone.
Results: μCT analysis of the distal femur metaphysis showed that bone volume/tissue volume (BV/TV) and trabecular number (Tb.N) were significantly less in the OVX group than in the SHAM group, whereas trabecular separation (Tb.Sp) was significantly greater in the OVX group than in the SHAM group. In the TPTD and ALN group, BV/TV and Tb.N were significantly greater than in the OVX group, whereas Tb.Sp was significantly less than in the OVX group. And in the ALN group, BV/TV and Tb.N were significantly greater than in the TPTD group, but Tb.Sp was no significance.
The 50% withdrawal threshold was significantly lower in the OVX group than in the SHAM group, and it was significantly higher in the TPTD and ALN group than in the OVX group. And the 50% withdrawal threshold was no significance between the TPTD and ALN group.
The expression levels of TNF-α was increased in the OVX group compared with those in the SHAM group. Other cytokines were not increased significantly in the

OVX group. In the TPTD and ALN group, the expression levels of TNF-α was significantly degreased than the OVX group. And the expression levels of TNF-α was no significance between the TPTD and ALN group.
Conclusions: In this study, TPTD and ALN treatments prevented bone loss in OVX mice. Mechanical hyperalgesia in hindlimbs tended to be decreased in the OVX group compared with the TPTD and ALN group. ALN treatment was more effective in bone formation compared with TPTD treatment, whereas pain relief was no significance between TPTD and ALN treatment. These results suggest that TPTD treatment was more effective in osteoporosis patients with skeletal pain.
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FRI0567 DIFFERENCES IN ADCHERENCE TO OSTEOPOROSIS MEDICATIONS IN PATIENTS WITH RHEUMATIC DISEASES: A 3-YEAR RETROSPECTIVE COHORT STUDY

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Background: Patients with rheumatic diseases (RD) have an increased risk of developing osteoporosis (OP) compared with healthy population due to chronic inflammation, low physical activity and using some kind of medications. Persons with RD and OP require prolonged osteoporosis treatment due to increased risk of fracture.
Objectives: To evaluate adherence and persistence with different osteoporosis medications in RD patients with OP during 3 years.
Methods: We conducted a retrospective study of 204 patients (82% women, mean age 54±11 years) with RD (93 – rheumatoid arthritis, 48 – systemic sclerosis, 39 – systemic lupus erythematosus and 24 – ankylosing spondylitis), whom OP was diagnosed in 2013. In 2016 we revised there medical charts for collection information on the osteoporosis treatment and performed telephone contact for patient's self-reporting.
Results: 196 (96%) patients started the OP treatment. Among them 26% - alendronate, 24% received alfacalcidol or supplements of calcium and vitamin D only, 16% - stroncium ranelate, 12% - ibandronate, 9% zoledronic acid, 8% - calcitonin and 5% - denosumab.
8 (4%) patients didn't start the drug treatment at all, 72 (35%) patients were persisted less than 12 months, 47 (23%) – 2 years and 77 (38%) – 3 years. Mean persistence was 2.1, 2.4, 1.6, 1.7, 1.9, 2.0 years for alendronate, alfacalcidol, stroncium ranelate, ibandronate, zoledronic acid, denosumab, respectively. 61 (31%) persons were switched from one antiosteoporotic medication to another due to side effects, inconvenient dose regimen or other reasons. Persistence to oral therapy was better among women than men ($p<0.05$), especially on daily regimen. Discontinuers were less likely than persistent subjects to visit rheumatologist and BMD measurement each year for control of treatment ($p<0.05$). Patients with ankylosing spondylitis were less persistent than persons with other RD. Presence of OP fractures in anamnesis had no significant influence on adherence. 8 (4%) patients had fractures during retrospective period, among them 6 - received only supplements of calcium and vitamin D, 1 - zoledronic acid once and 1 – without OP therapy.
Conclusions: Only 1/3 of patients with RD received antiosteoporotic drugs during 3 years. Visits to rheumatologist and BMD measurements increased subject's persistence. Improving the quality of medical care can be achieved through education and motivation of patients for a long-term treatment of OP.
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FRI0568 ECHOSOUND APPROACH FOR SHORT-TERM FOLLOW-UP OF THE DENOSUMAB EFFECT ON BMD RECOVERY AGAINST AROMATASE INHIBITOR IMPACT IN BREAST CANCER PATIENTS

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Background: The Aromatase Inhibitors (AIs)-based therapy used in breast cancer patients to profoundly lower estrogen levels seems to enhance the loss of bone mineral density (BMD) and to increase the fragility fracture rate [1]. Several clinical studies demonstrated that, in breast cancer patients that received the adjuvant AIs, the subcutaneous administration of Denosumab-based therapy significantly increased BMD values and reduced the rate of clinical fractures.
Objectives: To monitor the short-term Denosumab and AIs therapeutic effects on BMD in breast cancer patients through an innovative echographic approach, the EchoSound technology [2].
Methods: 154 breast cancer patients selected for receiving the adiuvant AIs therapy were recruited. All the patients underwent spinal and femoral dual X-ray absorptiometry (DXA) examinations before AIs therapy administration starting (time T0). After AIs treatment starting, enrolled patients were divided into 2 groups: 105 patients received only the AIs treatment (Group A), whereas the remaining 49 patients (Group B) received also an additional Denosumab treatment, in order to contrast the BMD reduction induced by AIs administration. Follow-up measurements were conducted at two different time points: 12 (T1) and 18 (T2) months from AIs treatment starting. At time T1, patients underwent both DXA examinations and EchoSound echographic scans, whereas at time T2 only the echographic scans were performed, since DXA cannot be used for short-term follow-ups.
Results: At time T1, the following results were obtained on lumbar spine: Group A showed a BMD decrement, which was equal to -2.07%±1.66% ($p<0.01$) according to DXA and to -2.22%±0.89% ($p<0.01$) according to EchoSound; Group B showed a BMD increase of 4.06%±1.49% ($p<0.01$) and 4.31% ±0.62% ($p<0.01$) as measured by DXA and EchoSound scans, respectively. At time T2, Group A showed a further BMD decrement, resulting in a total decrease of -3.95%±1.09% ($p<0.01$) with respect to T0 values; on the contrary, in Group B Denosumab treatment produced an additional BMD increment, resulting in a total BMD increase of 4.98%±1.03% ($p<0.01$) in the same 18-month period. Similar results were obtained for femoral neck BMD: a total BMD decrease of -2.37%±0.97% ($p<0.01$) during the whole treatment period was observed in Group A, whereas a total BMD increment of 3.53%±0.43% ($p<0.01$) was measured in the same period in Group B.
Conclusions: By using the EchoSound technology the short-term follow-up of the positive Denosumab effects on BMD reduction in patients treated with adjuvant AIs was feasible and accurate. This approach can be also useful to monitor the therapy effectiveness in patients undergoing specific anti-osteoporotic treatments.
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[2] Clin Cases Min Bone Metab 2015;12:142.
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FRI0569 EVALUATION OF BONE MICROARCHITECTURE IN SYSTEMIC SCLEROSIS PATIENTS: RELATIONSHIPS BETWEEN TRABECULAR BONE SCORE (TBS) AND DISEASE SEVERITY

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Background: Systemic sclerosis (SSc) is a rare connective tissue disorder characterized by an increased synthesis and deposition of extracellular matrix in the skin and internal organs (1). Several studies described SSc as potential risk factor for osteoporosis, however, to date the bone quality in SSc is unclear (2). Trabecular bone score (TBS) has been recently proposed as an indirect measure of bone microarchitecture (3).
Objectives: The aim of this study was to assess bone microarchitecture in SSc patients and possible association with disease severity and microangiopathy.
Methods: Twenty-three female SSc patients (mean age 63.2±12.8 SD years, mean disease duration 92.8±66 SD months, mean Raynaud's Phenomenon duration 142.6±126.1 SD months) were enrolled after written informed consent. The assessment of disease severity was performed using the Medsger's severity scale (4). Bone Mineral Density (BMD) measurements at L1-L4, femoral neck and total hip, were performed using DXA Prodigy Densitometer (GE Lunar). TBS was derived for each spine DXA examination using the TBS index (TBS iNsight Medimaps). Nailfold videocapillaroscopy (NVC) was used to assess the microangiopathy based on nailfold video capillaroscopic pattern (NVC) analysis and the microangiopathy evolution score (MES) (5–6). Using the FRAX (Fracture Risk Assessment Tool) we also evaluate the 10-year risk of hip and major joints osteoporotic fracture.
Results: A positive correlation was observed between TBS and Medsger's general organ score (r=0.5; p=0.01); no other correlations were found between TBS and Medsger's score. Interestingly, TBS was positively and significantly correlated with modified Rodnam skin score (mRss) (p=0.01). When the patients were divided in two groups considering skin involvement by mRss, TBS was found significantly higher into the group with mRss >15 compared to the group with mRss <15 (1.255±0.08 vs 1.163±0.03; p=0.01) No correlations were found between NVC patterns/MES and bone quality assessment (TBS) or bone density assessment (BMD), only a significant correlation, as expected, was observed