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FRI0492

CALCULATING FRAX SCORE IN CLINICAL PRACTICE: PITFALLS AND PROBLEMS

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Background: Osteoporosis related fractures cause significant morbidity and mortality. FRAX score uses clinical risk factors and country-specific data in addition to Bone Mineral Density (BMD) to assess patients with high 10-year risk of hip (>3%) or major osteoporotic (>20%) fracture. We noticed discrepancies between radiologist reported and physician calculated FRAX scores at our hospital. We hypothesized that providers are calculating FRAX score differently as BMD in the FRAX calculator is an optional input variable.

Objectives: This study was initiated to see the differences in results when FRAX score is calculated using T-score, BMD and no BMD and how this difference can influence treatment.

Methods: Retrospective chart review of 1200 DEXA reports from 2013 to 2015 was done. Patients between ages of 40-90 years with T-score ranging from ≤ -1 to >-2.5 at femoral neck were included in the study. Patients already on osteoporosis therapy and/or with T-score ≤ -2.5 or >-1 were excluded.

Pertinent risk factors were obtained from chart review. 237 patients met inclusion criteria and 3 separate FRAX scores were calculated using a) Femoral neck BMD b) T-score c) no BMD value. FRAX score reported by radiologist in the chart was also reviewed. Subsequently, FRAX scores obtained using T-score, no BMD value and radiology reported scores were compared against FRAX score calculated using femoral neck BMD (gold standard)

Results:

Table 1. shows demographic information for 237 patients who met inclusion criteria.

Demographics	
Race	
Hispanic	131 (54.8%)
Black	71 (29.9%)
Caucasian	15 (6.3%)
Asian	20 (8.5%)
Average Age	67 $\pm$ 10.5 years
Sex	
Male	11 (4.7%)
Female	226 (95.3%)
Average Height	159.3 $\pm$ 7.6 cm
Average Weight	71 $\pm$ 13 kg
BMI	27.9 $\pm$ 4.9
Previous fracture	13 (5.4%)
Current smoking	14 (5.9%)
Steroid use	48 (20.3%)
RA	26 (11%)
Secondary osteoporosis	8 (3.4%)
Alcohol use	3 (1.3%)

When FRAX score calculated using BMD was compared with FRAX score calculated without BMD, number of patients with high 10-year fracture probability decreased from 49 to 11 patients, which was a statistically significant decrease of 77.6% ($p<0.001$).

When data was stratified according to age, there was significant overestimation of risk in patients >65 years ($p<0.0001$) when FRAX was calculated without BMD.

Conclusion: FRAX score calculation without BMD leads to both statistically and clinically significant overdiagnosis especially in elderly.

Interchanging T score and BMD to calculate FRAX score leads to same treatment decision.

Further education of providers regarding FRAX score is needed.

Many providers are not aware that if BMD column is left blank, it defaults the calculation to no BMD. A pop up alerting the user "no machine was selected so the calculation will default to no BMD which can lead to overestimation of risk" in FRAX tool might be helpful to avoid miscalculation.

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Table 2. shows difference in risk estimation when different FRAX score assessments were compared against gold standard femoral neck BMD.

FRAX Scores Compared	Discrepancy in Risk estimation	Overestimation	Underestimation	McNemar's test
No BMD vs. BMD FRAX	52/237 (16%)	52	0	$p<0.0001$
Reported FRAX vs. BMD FRAX	6/237 (2.4%)	2	4	$p=0.414$
T-score vs. BMD FRAX	1/237 (0.4%)	1	0	$p=0.317$

McNemar's test was used to compare difference in risk estimation and although the difference in absolute FRAX score values was statistically significant in all groups ($p<0.0001$), difference in risk estimation based on FRAX score was statistically significant only in BMD vs. no BMD comparison.

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CLINICAL EFFICACY OF DENOSUMAB IN PATIENTS WITH OSTEOPOROSIS BETWEEN RHEUMATOID ARTHRITIS AND PRIMARY OSTEOPOROSIS; 24 MONTHS OF FOLLOW-UP

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Background: Denosumab (DMB) is a fully human monoclonal antibody to the receptor activator of nuclear factor-kappaB ligand (RANKL) that blocks its binding RANK, inhibiting the development and activity of osteoclasts, decreasing bone resorption, increasing bone density and reducing fracture risk. Also DMB is a useful therapeutic agent for both rheumatoid arthritis (RA-OP) and primary osteoporosis (P-OP). However there is still few comparative study of clinical efficacy of DMB between RA-OP and P-OP.

Objectives: To compare the clinical efficacy of DMB in patients with osteoporosis between rheumatoid arthritis and primary osteoporosis for 24 months.

Methods: RA patients diagnosed according to the 2010 ACR/EULAR criteria. RA-OP and P-OP patients met at least one of the following criteria were eligible; a bone mineral density T score of -2.5 or less at the lumbar spine or total hip and either one or more moderate or severe vertebral fractures or two or more mild vertebral fractures. All patients were initiated DMB from between October, 2013 and August, 2016. The final study cohort of 61 RA-OP and 50 P-OP patients received continuous DMB therapy more than 24 months. The DMB dose was 60mg at once every 6 months. In all cases native or activated vitamin D has been used. We reviewed the results for 24 months about the increase and decrease of bone mineral density (BMD) of lumbar spine (LS) and total hip (TH) by DEXA and bone turnover markers, intact n-terminal propeptide type I procollagen (PINP) and tartrate-resistant acid phosphatase form 5b (TRACP-5b).

Results: In the patients of RA-OP ($n=61$) and P-OP ($n=50$), the number of female was each 56(92%) and 45(90%) cases ($p=0.741$). The mean age was 72.7 ± 7.5 and 76.8 ± 7.8 years old ($p=0.006$); disease duration of RA-OP patients was 12.6 ± 12.9 years; the body mass index was 20.4 ± 2.7 and 20.3 ± 3.0 ($p=0.687$) and the FRAX was 27.2 ± 15.7 and 24.6 ± 11.1 ($p=0.745$). Clinical findings related to RA-OP at baseline were as follows; CRP 0.8 ± 1.1 ; DAS-CRP 3.28 ± 1.36 ; HAQ 1.16 ± 1.04 in RA-OP patients and in the patients of RA-OP and P-OP, bone turnover markers and bone mineral density at baseline were as follows; PINP 57.7 ± 32.2 and 64.0 ± 32.7 $\mu\text{g/l}$ ($p=0.151$); TRACP-5b 563

± 237 and 570 ± 217 mU/dL ($p=0.674$); LS-BMD 0.85 ± 0.16 and 0.74 ± 0.13 g/cm² ($p<0.001$) and TH-BMD 0.62 ± 0.09 and 0.60 ± 0.08 g/cm² ($p=0.110$). The rate of decreased P1NP from baseline to 6, 12 and 24 months were each -43.7% vs -61.3% ($p=0.015$) at 6 month, -40.2% vs -55.2% ($p<0.001$) at 12 month and -43.5% vs -67.9% ($p<0.001$) at 24 month and TRAC-5b were -44.6% vs -51.5% ($p=0.225$) at 6 month, -39.5% vs -53.0% ($p=0.007$) at 12 month and -41.3% vs -54.2% ($p=0.663$) at 24 month in the RA-OP vs P-OP group. The rate of increased LS-BMD from baseline to 6, 12 and 24 months were each 4.3% vs 4.5% ($p=0.743$) at 6 month, 6.3% vs 6.9% ($p=0.575$) at 12 month and 9.3% vs 11.1% ($p=0.300$) at 24 month and TH-BMD were 2.5% vs 2.6% ($p=0.583$) at 6 month, 3.3% vs 3.2% ($p=0.683$) at 12 month and 5.7% vs 4.2% ($p=0.403$) at 24 month RA-OP vs P-OP group.

Conclusion: DMB was effective for both RA-OP and P-OP, and the clinical efficacy was almost similar between the two groups.

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FRI0494

CORRELATION OF METACARPAL BONE MASS MEASURED EITHER BY DUAL X-RAY DENSITOMETRY OR DIGITAL X-RAY RADIOGRAMMETRY WITH SEVERITY OUTCOMES IN PATIENTS WITH EARLY ARTHRITIS

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Background: Rheumatoid arthritis (RA) is a systemic autoimmune disorder that predominantly affects small joints of the hands and feet. X-ray digital radiogrammetry (DXR) is a validated technique for the evaluation of bone mineral density (BMD) in the diaphysis of metacarpals (MC) that has demonstrated that low bone mass at this location correlates with worse radiographic progression (1). However, this technique is not available in our environment. Dual X-ray densitometry (DXA) is a simple, accessible and widely validated technique for the study of osteoporosis. Our group has previously validated the reproducibility of MCP measurements by DXA (2).

Objectives: To study the relationship between baseline MC BMD measured by DXA or DXR and disease severity in patients with early arthritis at 2 years follow-up.

Methods: 202 patients belonging to PEARL (Princess Early Arthritis register longitudinal) study were included. Demographic, laboratory, radiographic and therapeutic data were recorded by protocol. Most patients (87%) were women, 59% fulfilled 2010 ACR criteria and 41% were classified as undifferentiated arthritis. More than 60% were seropositive (60% RF; 58% anti-CCP). Median disease duration at first visit was 4.6 months, median DAS28 4.2 and HAQ 0.875. The BMD of 2th to 4th MC was measured by DXR through the standardized software by Sectra (Linköping, Sweden) applied on radiographs of hands submitted in digital format (GE® DX Definium 8000). Baseline non-dominant hand DXA was performed using a densitometer Hologic® QDR4500. To analyze 2th to 4th MC BMD, we created 3 regions of interest (ROI) similar to that generated in the DXR measurements; briefly, the ROIs cover the mid-third of each MC diaphysis, avoiding overlapping of ROIs. The statistical study was performed with Stata 12 for Windows, including linear correlation between MC-BMD values measured by DXR and DXA (Pearson's test), and different multivariate analyses in which MC-BMD measured either by DXR or DXA were included as dependent variable and sex, age and body mass index (BMI) as independent confounding variables. Then in these models different surrogate variables of disease severity such as disease activity (DAS28), disability (HAQ) or cumulative DMARD treatment after 2 years of follow-up were included in order to determine whether there was an association with MC-BMD.

Results: The MC-BMD measured by DXA and DXR at baseline showed a good correlation ($r=0.87$, $p<0.001$). As expected, being female (β coefficient -0.0381, $p=0.0001$) and age > 65 years (β coefficient -0.076, $p=0.0001$) were associated with lower BMD, whereas high body mass index (β coefficient $0.002 \times \text{kg/m}^2$, $p=0.004$) was associated with higher BMD. Adjusting by this confounding variables, the multivariate analyses did not show any significant association between MC-BMD and DAS28, HAQ or treatment intensity, neither with the DXA or DXR measurements.

Conclusion: Despite of the good correlation between DXR and DXA, our data obtained either with DXA or DXR do not confirm the association of low MC-BMD measured with DXR and more aggressive disease in patients with early arthritis.

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FRAGILITY FRACTURE IN MALE; EXPERIENCE OF A FRACTURE LIAISON SERVICE

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Background: Secondary prevention of osteoporotic fracture is more efficient with the Fracture Liaison Service (FLS) model.

Objectives: To describe the characteristics of male patients attended in a FLS

Methods: Prospective observational study. The program consists of: 1) recruitment from the emergency records, hip fracture admitted or referral to outpatient rheumatology; 3) baseline visit: questionnaire including demographic variables, FRAX and previous treatments; 4) DXA; 5) patient education; 6) report of results to the patient and the PC doctor, with specific management recommendations; complex patients are referred to rheumatology; and 7) follow-up through telephone survey plus prescription check in electronic records. The characteristics of male patients are described and compared with women.

Results: 2,135 patients have been included, 382 male (18%). The recruitment was in 300 cases (78%) from the emergency list, in 55 cases (14%) admission for hip fracture and in 25 cases (6%) from outpatient clinic. The characteristics of the patients are shown in the table.

The average age was similar in men and women. Hip fracture was more frequent in men (34% vs. 25%, OR 1.63 CI 95% 1.50-1.75) as opposed to forearm fracture (18% vs. 33%, OR 0.46 CI 95% 0.32-0.60). Male had previous DXA (6% vs 25%, OR 0.22 CI 95% 0.00-0.43) and previous treatment with bisphosphonate (4% vs 19%, OR 0.17 CI 95% 0, 0-0.44) less frequently.

Of the variables included in the FRAX, in men was less frequent the previous fracture (13% vs 24%, OR 0.48 CI 95% 0.32-0.64), the hip fracture of the parents (9% vs. 13%; OR 0.66 CI 95% 0.47-0.85) and the use of corticoids (6% vs 10%, OR 0.61 CI 95% 0.39-0.84). However, active smoking was more frequent in men (21% vs 14%, OR 1.67 CI 95% 1.53-1.81) as well as consumption >2 daily units of alcohol (18% vs 5%; OR 3.96 CI 95% 3.78-4.13).

The percentage of osteoporosis was lower in men compared to women (30% vs 46%, OR 0.49 CI 95% 0.30-0.68) as well as the percentage of patients with >1 fall in the last year (29% vs 45%, OR 0.51 CI 95% 0.30-0.71).

In addition, after the visit to the FLS, a bisphosphonate was indicated less frequently to men than to women (68% vs. 77%, OR 0.64 CI 95% 0.51-0.76) and were referred less frequently to PC (64% vs. 76%; OR 0.55 95% CI 0.41-0.70). Finally, persistence at 12 months was lower in men than in women (53% vs. 68%, OR 0.53 CI 95% 0.30-0.76).

Conclusion: Compared with women, men seen in an FLS present hip fracture more frequently and a forearm fracture less frequently. Men also have a lower frequency of personal and family history of fracture and a greater frequency of smoking and alcohol intake. The percentage of patients who are candidates for treatment and persistence is lower than in women. These data should be taken into account in the identification and treatment of fragility fracture in men.

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