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 gold standard femoral neck BMD (gold standard)

Results:

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

Demographics
Race
Hispanic 131 (54.6%)
Black 71 (29.9%)
Caucasian 15 (6.3%)
Asian 20 (8.5%)
Average Age
67±10.5 years
Sex
Male 11 (4.7%)
Female 226 (95.3%)
Average Height
159.3 ± 7.6 cm
Average Weight
71 ± 11 kg
BMI
27.9 ± 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<0.001) 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.

REFERENCES:
[1] https://www.sheffield.ac.uk/FRAXtool.jsp

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

<table>
<thead>
<tr>
<th>FRAX Scores Compared</th>
<th>Discrepancy in Risk estimation</th>
<th>Overestimation</th>
<th>Underestimation</th>
<th>McNemar’s test</th>
</tr>
</thead>
<tbody>
<tr>
<td>No BMD vs. BMD</td>
<td>52/237 (16%)</td>
<td>52</td>
<td>0</td>
<td>p&lt;0.0001</td>
</tr>
<tr>
<td>FRAX</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reported FRAX vs. BMD</td>
<td>6/237 (2.4%)</td>
<td>2</td>
<td>4</td>
<td>p=0.414</td>
</tr>
<tr>
<td>FRAX</td>
<td>T-score vs. BMD</td>
<td>1/237 (0.4%)</td>
<td>0</td>
<td>p = 0.317</td>
</tr>
</tbody>
</table>

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<0.001), difference in risk estimation based on FRAX score was statistically significant only in BMD vs. no BMD comparison.

Disclosure of Interests: Navneet Kaur: None declared, Barbara Mendez: None declared, Avneet Vig: None declared, Beverly Johnson Shareholder of: ownership of johnson and johnson stock over 10,000 USD, Consultant for: I am a consultant for the rheumatology education group, Employee of: I have been paid indirectly by pharma as a consultant for the rheumatology education group, Tony Francis: None declared


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 (DBM) 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 DBM 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 DBM between RA-OP and P-OP.

Objectives: To compare the clinical efficacy of DBM 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; GRP 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 μg/l(p=0.151); TRACP-5b 563
INTRODUCTION

Correlation of metacarpal bone mass fragility fracture in male: experience of a hospital. University La Princesa, Radiology Department, Madrid, Spain; 2 University Hospital La Princesa, Radiology Department, Madrid, Spain.

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© DXR through the standardized software by Sectra (Linköping, Sweden)) avoiding overlapping of ROIs. The statistical study was performed using a descriptive approach. All analyses were performed using R (R Core Team 2013). The level of significance was set at 5%.

RESULTS

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 0.49 CI 95% 0.32-0.68). 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.

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 0.56 CI 95% 0.47-0.65) as well as 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.

ACKNOWLEDGEMENTS: Fabiola Santana and Carmen Alonso

REFERENCES: