

Correlation Between Localized Femoral BMD T-scores and Sites of Hip Fractures, and Evaluation of the Sensitivity of FRAX[®] Probability in Hip Fracture Patients

Department of Orthopedic Surgery, Inha University Hospital
Kyoung Ho Moon, M.D., Taek Ho Hong, M.D.

Introduction

Hip fracture patients, defined as femoral neck and intertrochanteric fracture, have low T-scores in BMD. In these days, FRAX[®] tool is used for measuring probability of major osteoporotic fracture and hip fracture in 10-years. We compared T-scores of each femoral neck and trochanteric area in the neck fracture patients (NFP) and intertrochanteric fracture patients (IFP). Our hypothesis is that T-score of neck portion in NFP is lower than T-score of neck portion in IFP, and vice versa. We also evaluate how FRAX[®] probability is meaningful and sensitive in hip fracture patients.

Methods

From April, 2003 to September, 2012, 180 hip fracture patients (98 for femoral neck fracture group, 82 for Intertrochanteric fracture group) were included, and all patient was evaluated BMD within two weeks after trauma. BMD was measured by Dual-energy X-ray Absorptiometry (DXA) device. T-scores of Femoral BMD were checked by localized femoral region, femoral neck, trochanter and total femur. We'd like to evaluate the correlation between localized femoral BMD T-scores and fractures site of hip.

We also calculated FRAX[®] probability in each patients. Calculating was done by computer-based algorithm from WHO. (<http://www.shef.ac.uk/FRAX>) We compared femoral neck group and intertrochanteric group by FRAX[®] probabilities. We also checked how many patients were included in high risk group by FRAX[®], defined as 10-years major osteoporotic fracture probability ($\geq 20\%$) or hip fracture probability ($\geq 3\%$). Our study was approved by IRB.

Result

In the neck fracture patients (NFP), average of T-scores in neck portion (-3.23) was lower than intertrochanteric fracture patients (IFP, -2.93, $p=0.029$). In IFP, average of trochanteric T-scores (-2.56) was lower than NFP (-2.54, $p=0.95$). Average of total femoral T-scores in NFP (-2.92) was lower than IFP (-2.75, $P=0.28$).

FRAX probability of Major osteoporotic fractures in NFP (14.4%) was higher than in IFP (11.1%, $P=0.009$). FRAX[®] probability of hip fracture in NFP (8.6%) was higher than IFP (5.9%, $P=0.008$).

19.5% of NFP and 10.1% of IFP were classified as high risk group for Major osteoporotic fractures. 77.3% of NFP and 80.8% of IFP were classified as high risk group for hip fracture.

Table 1. Localized BMD T-score in femoral neck fracture patients and intertrochanteric fracture patients

Localization of BMD T-scores	Neck Fracture group	Intertrochanteric Fracture Group	P-value
Neck portion	-3.23	-2.93	$P=0.029$
Trochanteric portion	-2.54	-2.56	$P=0.95$
Total	-2.92	-2.75	$P=0.28$

Table 2. Fracture probability calculated by FRAX[®] tool in femoral neck fracture patients and intertrochanteric fracture patients

FRAX [®] fracture probability (10 yrs fracture probability)	Neck Fracture group	Intertrochanteric Fracture Group	P-value
Probability of major osteoporotic fracture	14.4 %	11.1 %	$p=0.009$
Probability of hip fracture	8.6 %	5.9 %	$p=0.008$

Table 3. Percentage of high risk group for osteoporotic fractures designated by FRAX[®] tool in femoral neck fracture patients and intertrochanteric fracture patients

High risk group for osteoporotic fractures by FRAX [®] designation	Neck fracture patients	Intertrochanteric fracture patients
Major osteoporotic fractures (FRAX [®] probability > 20%)	19/97 (19.50%)	8/79 (10.1%)
Hip osteoporotic fracture (FRAX [®] probability of hip >3%)	75/97 (77.3%)	64/79 (80.8%)

Conclusion

Localized femoral T-scores can be valuable predictive factor for hip fracture in osteoporotic patients. High risk group designated by FRAX[®] probability is meaningful and sensitive tool to evaluate the hip fractures in osteoporotic patients.

REFERENCE

1. Kanis JA, McCloskey EV, Johansson H et al. (2008) A reference standard for the description of osteoporosis. *Bone* 42:467-475
2. Looker AC, Wahner HW, Dunn WL et al. (1998) Updated data on proximal femur bone mineral levels of US adults. *Osteoporos Int* 8:468-489
3. Stone KL, Seeley DG, Lui LY, Cauley JA, Ensrud K, et al. (2003) BMD at multiple sites and risk of fracture of multiple types: long-term results from the Study of Osteoporotic Fractures. *J Bone Miner Res* 18: 1947-54.
4. Kanis JA, Oden A, Johansson H et al. (2009) FRAX and its applications to clinical practice. *Bone* 44:734-743
5. Dawson-Hughes B, Tosteson AN, Melton LJ III et al. (2008) Implications of absolute fracture risk assessment for osteoporosis practice guidelines in the USA. *Osteoporos Int* 19:449-458