Proximal femur cortical thickness index: a radiographic parameter for preliminary assessment of bone mineral density and osteoporosis status in the age 50 years-and-over population

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論文題目

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（近位大腿皮質厚インデックス：50 歳以上の人々における骨密度と骨粗鬆症の状態の予備的評価のための放射線学的パラメーター）

論文の内容の要旨

[Introduction]

Bone mineral density (BMD) is the indicator of bone quality in at-risk individuals. Along with the fracture risk assessment tool (FRAX), a quick assessment of BMD from routine radiographs may be useful in the case of lacking X-ray absorptiometry data. This study aimed to investigate the correlation of cortical thickness index (CTI) and canal flare index (CFI) with BMD and FRAX and to evaluate their ability to predict femoral neck BMD (nBMD) and FRAX in the general elderly population.

[Materials and Methods]

A total of 560 volunteers (age ≥ 50 years) who underwent hip-spine X-ray, BMD scanning and FRAX calculation were retrospectively reviewed. CTI and CFI were measured on anteroposterior radiographs and analyzed for their correlation with BMD and FRAX and for their ability to predict nBMD. The ability of CTI to predict osteoporosis status (OPS) and fracture risk status (FRS) was also investigated and the threshold values were calculated. All the analyses were performed separately on male and female subjects. The study was approved by the institutional review board of the Toei hospital where the investigation were performed.

[Results]

Significant differences in CTI, CFI, nBMD and FRAX between males and females were observed. CTI and CFI demonstrated significant positive correlation with nBMD and FRAX (all $p < 0.001$) in both males and females. CTI, height, and weight significantly predicted nBMD. CTI statistically predicted OPS and FRS, and the values of 0.56 and 0.62 were computed as CTI thresholds for males and females, respectively.

[Discussion]

Although a significant correlation between CTI/CFI and BMD has been confirmed in several publications, not many have studied these parameters on a relatively large sample representing the general population rather than the subjects coming to the hospital. The major strength of our study was its large sample size including volunteers aged ≥ 50 years to provide representative data of the general population within a

geographic area. Secondly, the separated study of the two genders male and female helps reduce the possible errors causing by this demographic factor in data analysis. The limitations of our study included (1) selection criteria, since people with prior diagnosis of osteoporosis requiring medical therapy were included; (2) all volunteers were Japanese Asians, the data may be unrepresentative of other ethnicities; and (3) the position of the femur during radiography, since the internal and external rotation of the femur while standing may affect the CTI and CFI measurement.

[Conclusion]

In conclusion, CTI of the proximal femur can be considered a reliable parameter that can be measured with ease on standard anteroposterior radiographs. It showed correlation and the ability to predict nBMD and FRAX at a statistically significant level in the general elderly population. Our study proposes the use of CTI, in the case of lacking DXA machine for the assessment of BMD and FRAX, as a supportive assessment tool in estimating the risk of osteoporosis and fracture with radiography, especially in females.