Characteristics of radiographic morphometries of the lower leg in subjects with progression of knee osteoarthritis in the TOEI cohort

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論文題目

Characteristics of radiographic morphometries of the lower leg in subjects with progression of knee osteoarthritis in the TOEI cohort

（TOEI コホート研究で変形性膝関節症の進行が見られた被験者の下肢単純 X 線像における形態的特徴）

論文の内容の要旨

[Introduction]

Knee osteoarthritis (OA) is one of the most common orthopaedic diseases. However, few studies have reported the morphometric characteristics of the lower leg related to the progression of knee osteoarthritis in regional populations. This study aimed to determine the radiographic morphometries of the lower leg in subjects who showed progression of osteoarthritis of the knee in the TOEI cohort.

[Materials and Methods]

Data were collected from the TOEI cohort study, during the period from 2014 to 2016, to assess osteoarthritis of the knee and radiographic morphometries of the lower leg. The joints were divided into 3 groups according to osteoarthritis progression over 2 years. There were 323 legs of females and 163 legs of males. Knees which did not exhibit osteoarthritis were in group 1; knees with osteoarthritis that remained stable for 2 years were in group 2; knees that worsened osteoarthritis over 2 years were in group 3. Morphometric parameters in the lower leg were measured by radiographs taken in 2014.

[Results]

In female subjects, group 2 had higher age, lower lever arm ratio and lower hip-knee-ankle angle, and higher height of the hip center compared with group 1. Group 3 had higher age compared with group 1, lower height of the hip center compared with group 2. In male subjects, group 2 had lower height of the hip center and lower hip-knee-ankle angle compared with group 1. Group 3 had higher patellar shift index compared with group 1, higher height of the hip center and higher femoral neck length compared with group 2.

[Discussion]

This study showed that higher age was the risk of osteoarthritis progression of the knee in female subjects. Hip morphometries such as height of the hip center and femoral neck length were different between female and male in terms of the risk of osteoarthritis progression of the knee.

In this study, a higher age was related to the progression of knee OA in female subjects but not in male subjects. This suggests that we have to focus on more prevention of

knee osteoarthritis in female than in male in super-aged society in the future.

There was a sex difference in the result of height of the hip center (HHC) related to knee OA. Some studies have shown similar results to those in our present study. In particular, Boissonneault et al. reported changes in the geometric parameters of the hip in relation to OA of the knee, including changes in HHC.

In female subjects, the parameter of lever arm ratio (LAR) in group 2 was lower than that in group 1. The decrease in LAR indicates the decrease in body weight lever arm and/or the increase in abductor lever arm. The force of the hip abductor muscles is generated from the motor forces around the center of the hip.

Femoral neck length (FNL) is different in sex and age. Higher FNL and HHC might be associated with some sort of the change of knee kinematics resulted in the progression of OA for a short period in male subjects.

In this study, The number of subjects with negative the hip-knee-ankle (HKA) angle increased in group 2 for both female and male subjects. A negative HKA angle indicates that the biomechanical condition of the varus of the knee joint could generate more overload to the medial site of the knee.

In this study, the patella shift index (PSI) value in group 3 was significantly higher than that in group 1 in male subjects. Metsna et al. also reported that changes in both HKA and PSI parameters in female and male patients were related to knee OA.

There were several limitations in this study. First, there might be some biological effects on the changes in the geometry of the spine. Second, morphometric measurements were only obtained once in 2014. Third, the standing position of the lower leg and spine during the X-ray examination are natural standing posture may have affected morphometric measurements in this study.

The advantages of our research, the pathological status and the treatment history of spine and lower limb could influence the results of the morphometric parameters of lower limb. The subjects who have these status were excluded in this study.

[Conclusion]

In conclusion, higher age was the risk of osteoarthritis progression of the knee in female subjects but not significant risk in male subjects. Hip morphometries such as height of the hip center and femoral neck length in which showed a sex difference might be associated with the progression of knee osteoarthritis for 2 years. Further studies should identify other risk factors that may affect the progression of knee OA in regional populations and may predict the progression of OA of the knee for prophylaxis.