E-Poster

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Differences in Hip Extension Angle During Walking and Lower Limb Biomechanics in Postoperative Patients With Total Hip Arthroplasty

Topic: Biomechanics

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BACKGROUND

Total hip arthroplasty (THA) for hip osteoarthritis results in high pain relief and functional improvement in patient-oriented evaluation. On the other hand, previous studies using three-dimensional motion analysis have shown that the hip extension angle during walking does not improve in a certain number of patients. Furthermore, improving the hip extension angle is one of the main goals of postoperative physical therapy after THA surgery. The purpose of this study was to compare the biomechanics of the lower extremities of postoperative THA patients divided into groups according to their hip extension angle during walking, and to gain new knowledge about the improvement of hip extension angle after surgery.

METHODS

Fourteen patients (11 women, mean age 65.4 years, mean BMI 23.6 kg/m^2), one year after THA surgery, were asked to walk 10 m at a comfortable walking speed. The anterior and posterior tilt angles of the pelvis, joint angles and joint moments in the sagittal plane of the hip, knee, and ankle joints were calculated from the position coordinates of each marker and ground reaction force, and muscle activities of the lower limb were measured using surface electromyography. The joint moments were normalized by body weight, and the mean values of muscle activities normalized the muscle activities during walking. The hip extension angle at the end of stance phase of the healthy control group was used as a reference to classify the subjects into good and poor hip extension groups, and lower extremity biomechanics were compared using Statistical Parametric Mapping, the Japanese Orthopaedic Association Hip Disease Evaluation Questionnaire (JHEQ), and gait speed using an unpaired t-test.

RESULTS

Eight patients were classified into the good group and six into the poor group. The good group had a greater hip extension range of motion ($p < 0.001$), a smaller anterior pelvic tilt ($p < 0.001$), and a smaller knee flexion angle at the beginning of stance ($p < 0.001$) than the poor group in all analysis intervals. There were no significant differences in joint moments, muscle activity, JHEQ, or gait speed between the groups.

CONCLUSION

The difference in hip extension angle was presumably due to pelvic tilt, and other lower extremity biomechanical compensation strategies may not be as pronounced in THA postoperative patients at one year postoperatively.

Statement of Disclosures

None

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