Introduction

In total hip arthroplasty, the angle of acetabular component is a critical factor for the post-operative dislocation and the longevity of prostheses. The angle is principally determined in relation to anterior pelvic plane. However, the pelvic orientation (anterior or posterior tilt) on standing position differs from patients to patients. It is reported that the pelvic orientation is influenced by the condition of affected hip as well as the conditions of contralateral hip and lumbar lordosis. It is also reported that the pelvis tends to tilt posteriorly along with aging. Furthermore, the pelvic orientation might change after THA. In pre-operative planning, surgeon should prospect the post-operative pelvic orientation to determine the angle of acetabular component.

The changes of the pelvic orientation after THA were reported, while little attention was paid to the condition of affected hip as well as the conditions of contralateral hip and lumbar lordosis. We measured the pelvic tilt and the lumbar lordosis on the standing lateral X-rays before operation and one-year post-operation. We categorized the patients with regard to the conditions of hips and lumbar spine.

Materials and Methods

Fifty-one unilateral patients (7 males and 44 females, average age: 66.9 years old) and 30 bilateral patients (4 males and 26 females, average age: 61.9 years old) were enrolled in this study. The diagnosis was dysplastic osteoarthritis in all patients. In unilateral patients, the hip was affected in one side and the other hip was normal or acetabular dysplasia without symptoms. In bilateral patients, THAs in both hips were done within two months.

Pelvic inclination angle (PIA) and lumbar lordotic angle (LLA) were measured on the standing lateral X-rays before operation and 1-month, 6-month and 1-year post-operation (Fig. 1, 2). The effects of patient age, BMI, ROM of the hip, preoperative PIA and LLA on the changes of PIA were statistically investigated using multiple linear regression analysis. We divided the patients into three groups with regard to pre-operative PIA (anterior group: PIA < 0, intermediate group: 0 < PIA < 10, posterior group: PIA > 10) and with regard to pre-operative LLA (insufficient group: LLA < 20, moderate group: 20 < LLA < 40, severe group: LLA > 40).

Results

ROM, patient age and BMI had no correlation with the changes of PIA. In patients with severe lordosis, both preoperative PIA and LLA affected PIA change after THA. PIA increased in anterior tilt group and PIA did not change in intermediate group, while PIA gradually decreased in posterior group (Fig. 3). In insufficient lordosis group, PIA remarkably increased after THA compared with that in severe group (Fig. 4). In bilateral patients, PIA did not change regardless of pre-operative PIA (Fig. 5).

Discussion

These results indicated that the changes of PIA were affected by the conditions of hips and lumbar spine. In unilateral patients, PIA tended to close each other in anterior, intermediate and posterior groups. In insufficient group, PIA was greater before THA, while PIA further increased after THA. In bilateral group, PIA slightly increased regardless of pre-operative PIA.

By categorizing patients with regard to the conditions of hips and lumbar spine, we can prospect the tendency of the direction of PIA changes. Further investigation is necessary to prospect the estimated PIA value after THA.