UNILATERAL DEVELOPMENTAL DYSPLASIA OF THE HIP
AFFECTS ON THE ALIGNMENT OF THE WHOLE LOWER EXTREMITY

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INTRODUCTION
Developmental dysplasia of the hip (DDH) leads to the deformity in the whole lower extremity. For example, valgus deformity in ipsilateral knee joint is often observed in combination with leg length discrepancy, and adduction contracture in the hip. It has been speculated that severity of the DDH influence on the valgus deformity of the knee, adduction contracture of the hip and leg length discrepancy. However, there have been quite a few reports on quantitative analysis on the issue.

The purpose of this study was to investigate the alignment of the lower extremity in patients with neglected unilateral DDH, in comparison with healthy adults without DDH, and to analyze the relationship of the alignment and the severity of DDH (Crowe classification (I)), adduction contracture of the hip joint, and leg length discrepancy.

MATERIALS AND METHODS
Nineteen adult patients (18 female and one male) with neglected unilateral DDH were evaluated. The mean age of the group was 64.7 years (range, 50 to 78 years). The inclusion criteria for the study were no prior treatment of the unilateral DDH without osteoarthritis of the hip in contralateral, and without osteoarthritis oh the knee in the both side lower limb, and no other musculoskeletal abnormality. Fourteen healthy adults (13 female and one male) served as the control group. The mean age of the control subjects was 71.8 years (range, 66 to 79 years). All patients and control subjects signed an informed-consent form, and our institutional review board approved the study. Maximum abduction angle of the hip were measured. All individuals were evaluated with radiography in each side of lower limb in the coronal plane with the patella facing forward.

Crowe Classification
Dislocated hips were grouped according to the classification described by Crowe et al.

Mechanical Axis
Mechanical axis was defined as the line drawn from the center of the femoral head to the center of the talocrural joint (Figure 1).

Femorotibial angle (FTA) and Weight-Bearing Ratio (WBR)
FTA (2), that is an angle between the femur shaft and tibial shaft were measured, and WBR (3), that is a distance from the mechanical axis to the most medial point of the medial tibial plateau divided by a distance from the most medial point to the most lateral point of the tibia, were measured (Figure 2).

A paired t-test was used for the comparison between the both side legs in DDH group. A non-paired t-test was used to compare DDH group with control group. Correlation analysis was performed to examine the effect of the possible factors (LLD, abductor angle, and Crowe classification) on the valgus alignment (FTA and WBR) on ipsilateral leg in DDH patients. A p value of < 0.05 was considered significant. All analyses were done with computer software (Stat View 4.5; Abacus Concepts Inc., Berkeley, CA).

RESULTS
According to the system of Crowe et al., 8 patients had Group-I hip subluxation, 7 patients had Group-II, 5 patients had Group-III, and no patients had Group-IV. Maximum abduction angle of the hip was 20.3 ± 7.5 degrees in ipsilateral DDH side, and 38.8 ± 7.0 degrees in contralateral side in DDH group (p <0.001). The difference of FTA between ipsilateral side and contralateral side in DDH group, and the difference between ipsilateral side in DDH group and control group were significant. Leg alignment was more valgus in ipsilateral side in DDH group than in contralateral side in DDH group and control group (Table 1).

The difference of WBR between ipsilateral side and contralateral side in DDH group, and the difference between ipsilateral side in DDH group and control group were significant. The mechanical axis of ipsilateral side in DDH group passed through more lateral than contralateral side in DDH group and control group (Table 1).

LLD (mean ± SD) of DDH group was -1.7 ± 1.2 cm.

There was a significant correlation between the alignment of the lower extremity (FTA and WBR) and the severity of DDH (Crowe classification, maximum abduction angle of the hip joint, and LLD) ( | R | = 0.334 - 0.400, p < 0.005).

Table 1: FTA and WBR (Mean ± SE)

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<thead>
<tr>
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<th>FTA (degree)</th>
<th>WBR</th>
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<tbody>
<tr>
<td>Ipsilateral</td>
<td>175.4 ± 0.8</td>
<td>43.7 ± 3.9</td>
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<tr>
<td>Contralateral</td>
<td>178.4 ± 0.3</td>
<td>N.S.</td>
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<tr>
<td>Control</td>
<td>177.9 ± 0.5</td>
<td>54.1 ± 2.3</td>
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Discussion
Coxitis knee is the knee joint arthropathy secondarily occurred by presence of coxitis. A limit of range of motion in hip joint is speculated to be one of the causes. Kandemir reported that Crowe classification correlated the valgus deformity of the knee (4). However, there have been no reports on the correlation adduction contracture, LLD and valgus deformity.

The current study showed that the lower extremity was more valgus and the maximum abduction angle was less in ipsilateral side in DDH group than in contralateral side in DDH group and control group. The severity of DDH (Crowe classification, adduction contracture of the hip joint, and LLD) affected on the alignment of the lower extremity without knee osteoarthritis.

The DDH condition of the hip may affect the whole alignment of the ipsilateral leg which could be a cause for the knee osteoarthritis.

References

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