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## Coxa Profunda Does Not Correlate With Acetabular Depth But With Inward Rotation Of The Pelvis In Hip Dysplasia

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**Introduction:** Although coxa profunda has been viewed as a radiographic indicator of pincer femoroacetabular impingement, a recent study suggests that coxa profunda is a nonspecific finding, seen in a variety of hip disorders including hip dysplasia (Nepple JJ et al, JBJS-Am, 2013). To date, the morphological features and clinical significance of coxa profunda in hip dysplasia has yet to be determined.

**Objectives:** This study was conducted to determine the prevalence, morphological features and clinical significance of the coxa profunda in hip dysplasia.

**Methods:** We performed retrospective review of pelvic radiographs and computed tomography images (CT) of 67 patients (67 hips) with hip dysplasia. Hip dysplasia was defined as lateral centre edge angle of Wiberg less than 20°. There were 64 females and 3 males, with the average age of 45.8 years. The institutional review board approved this study. Coxa profunda was defined as present when the floor of the acetabular fossa touched or was medial to the ilioischial line on standard AP radiograph of the pelvis. Radiographic indices of the acetabular dysplasia were also measured. CT measurements were performed after correcting the pelvic position to eliminate possible measurement error. For the index of the acetabular version, acetabular anteversion angle (AcAV) and acetabular inclination angle (AI) were measured on the axial and coronal planes through femoral head center, respectively. For the evaluation of the acetabular depth, we measured the acetabular depth ratio (ADR) at three directions: anterior, superior and posterior. We also measured the rotational angle of pelvis (innominate bone) at three levels on axial plane (Fujii et al, Clin Orthop, 2011): superior iliac angle (SIA) at the level of the anterior superior iliac spine, inferior iliac angle (IIA) at the level of the anterior inferior iliac spine and ischiopubic angle (IPA) as a representative of the closing angle of the ischiopubic portion. The greater value of these three angles indicated increased inward rotation of the pelvis. We compared these CT measurements value between hips with and without coxa profunda. Statistics: The chi-square test and Wilcoxon rank sum test were used to compare the categorical and continuous parameters between two groups, respectively.

**Results:** Coxa profunda was seen in 42% (28 hips) of 67 hips. There was no significant difference between hip with and without coxa profunda regarding the demographic and radiographic parameters. The comparison of CT measurements showed that AcAV was significantly increased ( $p < 0.0001$ ) in hips with coxa profunda ( $27.8^\circ \pm 4.3^\circ$ ) than in hips without coxa profunda ( $21.1^\circ \pm 4.6^\circ$ ). There was no significant difference in ADR at all three directions between two groups. The pelvis was rotated inward significantly ( $P < 0.0001$ ) in hips with coxa profunda than in hips without coxa profunda at all three levels: SIA ( $60.0^\circ \pm 5.2^\circ$  versus  $55.4^\circ \pm 6.2^\circ$ ,  $p < 0.0001$ ), IIA ( $73.4^\circ \pm 3.0^\circ$  versus  $69.2^\circ \pm 4.2^\circ$ ,  $p < 0.0001$ ) and IPA ( $31.4^\circ \pm 3.0^\circ$  versus  $28.7^\circ \pm 2.3^\circ$ ,  $p < 0.0001$ ).

**Conclusions:** The coxa profunda was common finding in patients with hip dysplasia. The result of CT measurements showed that the presence of coxa profunda does not correlate with acetabular depth and coverage of the femoral head, but with inward rotation of the pelvis and increased acetabular anteversion in dysplastic hips. Our observation may help surgeon to understand the pathology of early hip disorders from a plain radiograph and to plan the appropriate preservation hip surgery for those patients.