

Hip Joint Involvement in Diffuse Idiopathic Skeletal Hyperostosis: Correlation Between the Extent of Spinal Ligament Ossification and Hip Joint Degeneration

Ryosuke Nishimura, Tomofumi Kinoshita, Kohei Kono, Tatsuhiko Kutsuna, Naohiko Mashima, Masaki Takao

INTRODUCTION:

Diffuse Idiopathic Skeletal Hyperostosis (DISH) is a systemic disease characterized by extensive ossification along ligaments and joint capsules of the spine, primarily affecting the elderly. Although DISH was originally considered a spinal disease, there are reports of peripheral joint and hip involvement as well. An early stage called “pre-DISH,” which involves ossification over three contiguous vertebrae without fully meeting established diagnostic criteria, is also of clinical interest because of its potential as a precursor condition. Structural changes such as ossification around the joints, deformation of the acetabular shape, and narrowing of the joint space are hypothesized to result from spinal stiffness and abnormal biomechanical stress distribution. However, the direct correlation between the degree of spinal ligament ossification and degenerative changes in the hip joint remains unclear. In this study, we aimed to clarify this correlation by focusing on ossification around the joints and acetabular morphology in relation to the severity of DISH, using CT to analyze these changes three-dimensionally.

METHODS: Between 2009 and 2018, we conducted a retrospective cross-sectional study using computed tomography (CT) data obtained from 8,216 patients, capturing images from the cervical spine to the pelvis. Patients exhibiting ossification of the spinal ligaments were classified into three groups based on severity: pre-DISH (n=56), thoracic DISH (n=113), and thoracolumbar DISH (n=43). We evaluated the percentage of periarticular ossification in the upper, lower, anterior, and posterior regions of the acetabulum. Additionally, structural parameters of the hip joint (joint space width (JSW), lateral center edge angle (L-CEA), anterior center edge angle (A-CEA), posterior acetabular sector angle (PASA), and anterior acetabular sector angle (AASA)) were quantitatively evaluated from CT images. Statistical comparisons were performed using chi-square tests for categorical data and one-way analysis of variance (ANOVA) for continuous variables, with a significance level set at $p < 0.05$.

RESULTS: The prevalence of periarticular ossification increased with DISH severity. Superior ossification was noted in 23% of pre-DISH, 45% of thoracic DISH, and 63% of thoracolumbar DISH patients. Posterior ossification increased from 21% to 84% across the same groups ($p < 0.001$). Joint space narrowing was significantly more pronounced in thoracolumbar DISH (right: 3.65 ± 0.76 mm; left: 3.58 ± 0.79 mm) compared to pre-DISH and thoracic DISH ($p < 0.01$). L-CEA and A-CEA were significantly greater in DISH groups, particularly on the left side ($p < 0.01$). PASA was significantly higher on the left side in thoracolumbar DISH ($105.4^\circ \pm 10.0^\circ$, $p < 0.05$).

DISCUSSION AND CONCLUSION:

Our research results strongly support the existence of a significant correlation between the degree of ossification of the spinal ligaments in DISH and the degree of structural hip joint degeneration characterized by ossification around the joint, narrowing of the joint space, and an increase in the acetabular coverage angle. These findings support the concept that the spinal stiffness inherent in DISH changes hip biomechanics and may promote the degenerative changes observed after spinal fusion surgery. An increase in acetabular coverage angle (L-CEA, A-CEA, PASA) may reflect pathological ossification processes rather than improvements in joint function. Recognizing DISH not simply as a spinal lesion but as a systemic musculoskeletal disorder is essential for comprehensive evaluation and targeted therapeutic strategies, particularly in elderly patients with concomitant spinal fusion and symptomatic hip disorders. Future longitudinal studies and biomechanical analyses are necessary to further clarify the causal mechanisms in these complex clinical scenarios and optimize treatment approaches.

