The Effects of Developmental Dysplasia of the Hip on the Pelvic Incidence

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Objectives

Developmental dysplasia of the hip (DDH) and pelvic incidence (PI) have been shown to affect the change of hip orientation. PI is shown to be associated with the development of spine pathology, but the relationship between hip diseases and abnormal PI was generally ignored. Though a few studies have explored the relationship between PI and osteoarthritis of the hip (OA), its correlation between DDH has not been explored. The purposes of this study were to investigate whether DDH affects PI and the correlation between DDH severity and PI.

Methods

Retrospectively, computed tomography scans of 53 DDH patients and 53 healthy age-matched controls were analyzed. The pelvic anatomical coordinate systems were established using the anterior pelvic plane (APP) with the origin at the midpoint of anterior superior iliac spines. The measured midpoint of the femoral head centers and the measured midpoint of the sacral endplate was projected to the sagittal plane of the pelvis. PI was defined as the angle between the line perpendicular to the sacral plate at its midpoint and the line connecting this point to the femoral heads axis.

Results

Patients with DDH (Crowe type I-III) had a significantly ($p=0.041$) higher PI than the healthy controls: DDH 47.6 ± 8.2°, normal 44.2 ± 8.8°. Patients with Crowe type I had a significantly ($p=0.038$) higher PI (48.2 ± 7.6°) than the healthy controls, while the PI of patients with Crowe type II and III patients and the healthy controls showed no significant difference: Crowe type II 50.2 ± 9.6°, $p=0.073$; Crowe type III 43.8 ± 7.2°, $p=0.93$. No significant differences were found between the PI in patients with Crowe type I-II, $p=0.618$; Crowe type I-III, $p=0.138$; type II-III, $p=0.087$.

Conclusion

These findings highlight that the PI in patients with DDH is different from that of healthy controls. Besides, the PI is not corresponded to the severity of the DDH using the Crowe classification. Previous studies have shown that many DDH patients experienced hip OA, and the potential impact of the PI on the hip diseases should not be ignored. Therefore, the PI may be taken into account when treating DDH patients in order to reduce complications such as hip OA.

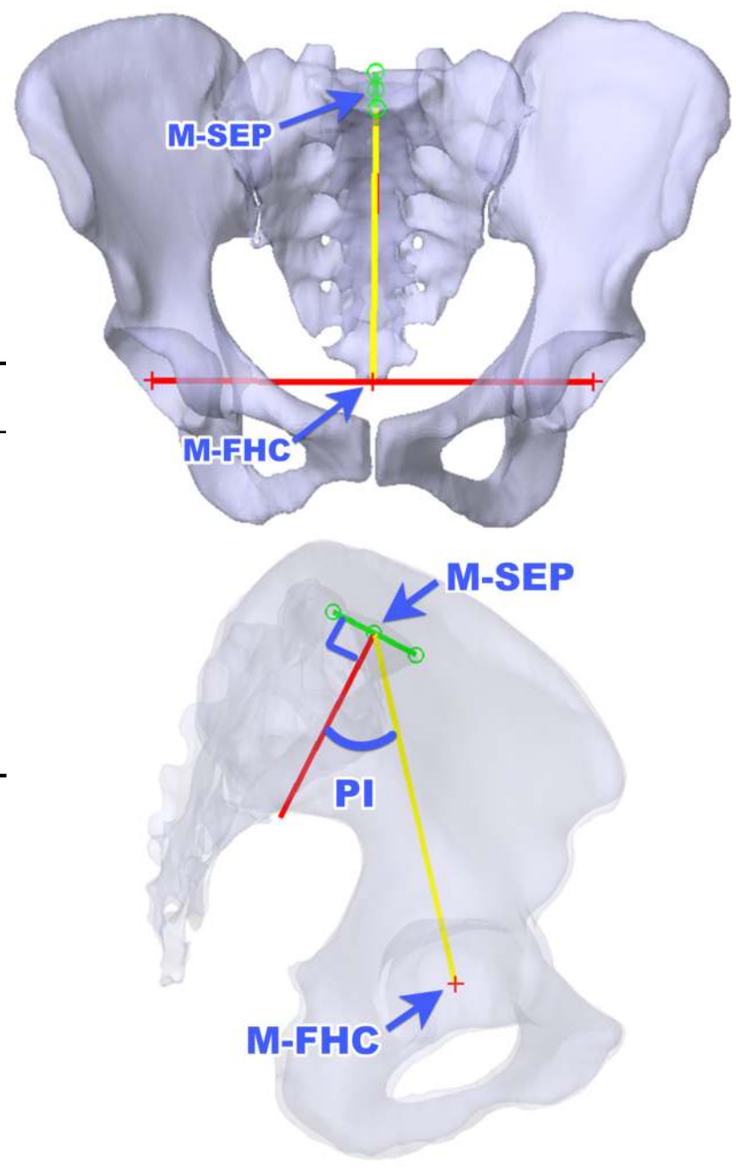
Table 1. Compare the PI between DDH (Crowe type I-III) group and the healthy control group. DDH (Crowe type I-III) group has a significantly greater PI than the healthy control group. Patients with Crowe type I has a significantly greater PI than the healthy control group. The PI was not corresponded to the severity of DDH using the Crowe classification.

Classification	PI (°)
Healthy Control Group	44.2 (8.8; 41.8-46.6)
DDH (Crowe Type I-III) Group	47.6(8.2; 45.6-49.9)†
Crowe Type I	48.2 (7.6; 45.2-51.2) ††
Crowe Type II	49.6 (9.6; 44.0-55.1)
Crowe Type III	44.0 (7.4; 39.3-48.7)

*** Values express mean (SD; 95%CI).**

† Significant differences between the DDH (Crowe type I-III) group and the healthy controls group at 0.05 level.

†† Significant differences between patients with Crowe type I and the healthy control group at 0.05 level.



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