

Morphology of the Acetabular Cartilage Surface in Elderly Cadavers Analyzing the Contact between the Acetabulum and Femoral Head

Authors : Keisuke Akiyama, Takashi Sakai, Junichiro Koyanagi, Hideki Yoshikawa, Kazuomi Sugamoto

Abstract : The geometry of acetabular cartilage surface plays an important role in hip joint biomechanics. The aim of this study was to analyze the morphology of acetabular articular cartilage surface in elderly subjects using a 3D-digitizer. Twenty hemipelves from 12 subjects (mean ages 85 years) were scanned with 3D-digitizer. Each acetabular surface model was divided into four regions: anterosuperior (AS), anteroinferior (AI), posterosuperior (PS), and posteroinferior (PI). In the global acetabulum and each region, the acetabular sphere radius and the standard deviation (SD) of the distance from the acetabular sphere center to the acetabular cartilage surface were calculated. In the global acetabulum, the distance between the acetabular surface model and the maximum sphere which did not penetrate over the acetabular surface model was calculated as the inferred femoral head, and then the distribution was mapped at intervals of 0.5 mm. The SD in AS was significantly larger than that in AI ($p = 0.006$) and PI ($p = 0.001$). The SD in PS was significantly larger than that in PI ($p = 0.005$). The closest region (0-0.5 mm) tended to be distributed at anterior or posterosuperior acetabular edge. The contact between the femoral head and acetabulum might start at the periphery of the lunate surface, especially in the anterior or posterosuperior region. From viewpoint of acetabular morphology, the acetabular articular cartilage in the anterior or posterosuperior edge could be more vulnerable due to direct contact mechanism.

Keywords : acetabulum, cartilage, morphology, 3D-digitizer

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