Is Abnormal Morphology of the Femur Related to the Severity of Coxarthrosis?

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Introduction: Recent research on the pathomechanics of hip OA has suggested that an initiating event in this disease process is injury of the chondro-labral junction secondary to femoroacetabular impingement. This has led to proposals to perform screening of vulnerable populations, including families with a history of impingement, to identify and correct bony abnormalities. However, conclusive evidence is still awaited confirming a causal relationship between variations in femoral morphology and osteoarthritis. The current study describes the relationship between coxarthrosis and the morphology of the proximal femur. In this study we examine the hypothesis that increasing abnormality of the proximal femur is predictive of the onset and the severity of osteoarthritic changes in the hip joint.

Materials and Methods: Twenty-one femora (12F, 9M) with varying degrees of osteoarthritic degeneration of the hip joint were harvested from body donors with an average age of 81±13 years (range: 49 to 102). CT scans were prepared of each femur and reconstructed for detailed measurement and analysis. The centroids of cross-sections through the neck, a cylinder fit of the femoral shaft, and a sphere-fit were used to determine the neck axis, femoral long axis, and head center, respectively. The neck-shaft angle, anteversion angle, head displacement with respect to the neck axis, and alpha angle were quantified.

Each specimen was closely examined for the presence of gross osteoarthritic changes and assigned a numerical score based on the incidence of eburnation, osteophytes, pitting, scuffing, and contour changes, and given an OA score based on the Modified Collins method. Statistical analysis was completed to determine the correlation between femoral morphology factors and severity of OA.

Results: Seventeen of the 21 specimens (81%) were found to have some degree of osteoarthritis (score>1). Fourteen of the 21 (67%) were diagnosed as FAI based on gross observation by an experienced surgeon. Thirteen of the 14 (93%) FAI cases had some degree of OA versus only 4 of the 7 (57%) non-impinging cases (p=0.18).

Discussion: Conclusions: The current study supports the role of femoroacetabular impingement (FAI) in the development of osteoarthritis and also reveals that increased severity of FAI is significantly related to worsening of osteoarthritic changes. We have shown that an alpha angle of 55° is a useful measure to differentiate the severity of potential OA. The current study supports the need for early identification of FAI to minimize the irreversible effects of degenerative joint disease.