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CORR Insights®: How are Dysplastic Hips Different? A Three-dimensional CT Study

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Where Are We Now?

Prior to the introduction of CT scans, researchers assessed the pathological anatomy of dysplastic hips using two-dimensional plain radiographs. As a result, dysplastic hips were characterized by superolateral acetabular dysplasia and decreased lateral coverage of the femoral head [3]. The introduction of CT scans enabled the three-dimensional

examination, affording researchers the opportunity to assess anterior and posterior coverage or acetabular version, which are particularly difficult to examine with conventional radiographs. Previously published studies [2, 4, 5, 8] have shown detailed measurements using CT data. However, we still do not know precisely which deformities we should correct, when we should correct them, and whether we can ever truly “normalize” the dysplastic hip.

The current study by van Bosse and colleagues compared the size, length, and version of acetabulum between nondysplastic (normal) and dysplastic hips using pelvic CT data. The authors found that compared with the normal hip, the dysplastic acetabulum is not hemispherical, but rather is elongated and shallow. Importantly, these characteristics are more evident in females than in males. The authors concluded that current approaches to periacetabular osteotomy (PAO) cannot compensate for the established

deformity unless performed at an early age, when acetabular remodeling is possible.

Where Do We Need To Go?

Periacetabular osteotomy may delay the onset or progression of osteoarthritis by increasing the femoral head coverage and decreasing the articular cartilage stress. Therefore, PAO is often a good choice for young patients with hip dysplasia [6–9]. Up to now, PAOs have aimed the lateral coverage such as the center-edge angle to be a normal value in a coronal plane, however there is limited information for the target values for the correction of acetabular version and associated anterior and posterior coverage in an axial or sagittal plane. Assuming normalization of these parameters is a goal of PAO, care should be taken to provide increased version from the top to bottom of acetabulum based on the results of this paper.

Age of the patient is an important issue. This paper recommended performing corrective osteotomy at an early age when acetabular remodeling is possible. I agree with the authors’

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view that earlier intervention is likely to result in a better outcome. But in clinical practice, this is not always possible, and so we need more information about how older patients can (or cannot) remodel their acetabula after these procedures.

The effects of femoral anteversion on the pathology of hip dysplasia should also be considered. The best approach to acetabular correction may differ between patients with excessive femoral anteversion and those with normal or decreased femoral anteversion. Increased femoral anteversion is often observed in hip dysplasia, although the degree to which this is clinically relevant is quite variable [1]. Therefore, whether we should correct the femoral anteversion remains unclear.

How Do We Get There?

In all likelihood, it will be difficult for researchers to find older patients with remodeling potential after PAO for a randomized controlled trial. Therefore, it would be helpful to examine comparative effectiveness of these procedures

for cohorts of patients both younger than and older than the age of 20. While the outcomes will also be affected by several other factors, it would be worth knowing if there are differences between these two age cohorts. A comparative study is needed in cohorts with and without femoral derotational osteotomy in order to properly answer whether we should correct the femoral anteversion combined with PAO. Biomechanical analysis of the optimal acetabular and femoral anteversion should be considered as well.

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