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CORR Insights

CORR Insights®: Periacetabular Osteotomy Provides Higher Survivorship Than Rim Trimming for Acetabular Retroversion

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Where Are We Now?

The current study by Zurmühle and colleagues evaluated the mid-term survivorship of patients with acetabular retroversion who underwent either anteverting periacetabular osteotomy (PAO) or acetabular rim trimming through a surgical hip dislocation. The authors report improved functional scores and less progression in osteoarthritis in the anteverting PAO cohort but no difference in conversion to THA between the two groups. Today, hip arthroscopy would be favored over surgical hip dislocation as the approach for rim trimming and labral repair, thus in this modern era of joint preservation, this study highlights the well-known concept that performing the correct procedure (rather than the least-complex one) usually is in the patient's best interest.

The notion that acetabular retroversion can cause hip impingement and pain has been accepted for more than two decades [4]. Studies [2, 5] have shown that structural defects of the hip likely involve both the acetabulum and a rotational abnormality of the entire inferior hemipelvis. The presence of the ischial, crossover, and posterior wall signs, and the association of retroversion with anterior-inferior iliac spine or subspine impingement further support the evidence that the entire hemipelvis is posteriorly rotated. Additionally, Steppacher and colleagues [5] showed that the acetabulum is not overgrown anteriorly and the size of the outer margins of the acetabular rim are normal while the size of the lunate surface may actually be smaller therefore a rim trimming would decrease a smaller than normal lunate surface.

Zurmühle and colleagues support the use of PAO, and consider it the best surgical treatment for patients with acetabular retroversion that had all radiographic signs of retroversion. This group, however, represented only 10% of all the patients that were treated at the authors' institution during a 15-year period. Thus, the results of this study can only be applicable to this select group. In addition, although PAO is the preferred treatment for reorienting the acetabulum in patients with hip dysplasia, the procedure's complexity, steep learning curve, and potential for complications have

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limited its widespread use. Conversely, hip arthroscopy is commonly performed in patients with acetabular retroversion—the number of arthroscopic hip procedures has increased almost five-fold over the last decade, with the largest increase found in patients 18 to 34 years old [3]. Considered a less-invasive surgical approach, hip arthroscopy in this setting might involve trimming the rim and reattaching the labrum with or without a concomitant femoral head and neck osteochondroplasty.

Zurmühle and colleagues not only question the value of rim trimming over anteverting PAO for this select patient group, but also the importance of surgical treatment of the labrum if the acetabulum is reoriented with a PAO, as none of the patients in the anteverting PAO group had labral refixation but most had favorable results.

Where Do We Need To Go?

This study raises several important questions: First, how reliable are radiographic images alone in determining the severity of acetabular retroversion as a guide to surgical treatment? Second, does the labrum need to be treated at the time of impingement surgery or can it be ignored? We also need more-robust ways of defining success. Conversion to THA is too blunt a tool, and too easily confounded by factors unrelated to the success or failure of a hip-preservation procedure. Patient-reported outcomes should be the standard.

A better understanding of the three-dimensional anatomy of acetabular retroversion, its interplay with patient-specific proximal femoral anatomy, and the resultant hip ROM are needed in order to aid surgical decision-making. We also need improved imaging modalities to help classify patients into severity of disease groups, which could help determine the most-appropriate surgical treatments. But not all patients with retroversion are the same, and so arriving at simple classification scheme may be challenging.

Intraarticular work, either arthroscopic or open to repair or reattach the labrum, requires an arthrotomy, and carries the potential risk of cartilage damage, adhesion, or heterotopic bone formation. We need to determine whether the labrum should be addressed at the time of PAO, and this same controversial question applies to patients with hip dysplasia. More than 80% of patients in the anteverting PAO group had MRI findings consistent with labral tears, and it was not addressed, therefore the labrum is not the only pain generator in an impinging hip. Extraarticular impingement and instability could be addressed with reorientation of the acetabulum, and the labrum could potentially be ignored as long as the acetabulum is reoriented and impingement-free ROM is achieved.

How Do We Get There?

Because of the broad spectrum of deformities encountered in clinical practice, and the fact that the femur cannot be ignored, acetabular retroversion is better suited for a study with low-dose CT scans as they can determine the extent of the condition, map the extent of the cartilage weight-bearing area, and model the consequences of rim trimming or reorientation surgery. I find it helpful to use these software programs to mimic the effects of rim trimming or reorientation surgery on the loading patterns and resultant ROM prior to performing surgery, but I believe that more-rigorous studies should evaluate the accuracy and reproducibility of these programs before they go into widespread use.

Although hip arthroscopy in patients with acetabular retroversion appears to provide a less-invasive approach for these patients (compared to surgical hip dislocation or PAO), clearly in this highly selected group of patients, hip arthroscopy is not the best

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option as the sole treatment. Hip arthroscopy may have a role as an adjuvant treatment for patients with labral pathology, but this study even calls that into question. In this highly selected group of patients, an anteverting PAO should be the first line of treatment with the goal of correcting the acetabular deformity without compromising acetabular cartilage loading area.

As noted in the previous section, there are potential benefits to not opening the joint such as avoiding the risk of cartilage damage, adhesion, or heterotopic bone formation. Ideally, a multicenter, randomized trial should be performed in order to determine the value of labral repair at the time of PAO.

The current study highlights the importance of collecting validated outcome scores in order to determine the results of our joint preservation techniques in these young patients. Without these scores, Zurmühle and colleagues would have found no difference in survivorship from THA and would not support a change in practice. A validated quality-of-life instrument and activity score should suffice for most patients. We have been collecting a large number of quality-of-life and activity-related outcome scores through our multicenter study group over the past decade [1].

Finally, owing to its perceived decreased level of invasiveness, hip arthroscopy is a tempting procedure in patients with differing hip conditions. Surgeons should evaluate the morphologic characteristics of the acetabulum and determine the presence of acetabular retroversion in order to determine surgical treatment. For this highly selected group of patients, a PAO should be favored over hip arthroscopy with rim trimming. Emerging data suggest that patients after failed hip arthroscopy fare worse than those undergoing PAO without prior surgery. We should strive to create centers of excellence where patients with these characteristics are cared for, and can undergo the operation that has the best likelihood of long-term success.

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