Symposium: 2014 Bernese Hip Symposium

CORR Insights®: Patient-specific Anatomical and Functional Parameters Provide New Insights into the Pathomechanism of Cam FAI

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Where Are We Now?

While initially evoking critical skepticism, there has been an almost tsunami-like expansion of surgical interventions and publications related to femoroacetabular impingement (FAI).

This CORR Insights® is a commentary on the article "Patient-specific Anatomical and Functional Parameters Provide New Insights Into the Pathomechanisms of Cam FAI" by Ng and colleagues available at: DOI: [10.1007/s11999-014-3797-1](https://doi.org/10.1007/s11999-014-3797-1).

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With FAI, surgeons are faced with two main difficulties: (1) Identifying affected individuals and making the correct diagnosis and (2) treating the symptoms associated to FAI, which are further complicated by the fact that the affected patients are young, often active, and sometimes very athletic.

In an attempt to shed light on the first point, the interesting paper by Ng and colleagues addressed the difficulty in identifying individuals affected by FAI. Ng and colleagues investigated potential differences in anatomical and functional parameters amongst symptomatic, asymptomatic, and control individuals. They also aimed to verify these parameters with the goal of identifying individuals at risk of developing symptoms of cam FAI.

The authors enrolled 43 men for the study and allocated them to three study

groups (symptomatic, asymptomatic, and control) according to the presence or absence of clinical signs and symptoms related to FAI. Femoral morphology was determined by several parameters, some of which were quite similar. For the acetabulum, only the acetabular version was considered. Pelvic ROM and terminal ROM (depth) of a full-depth squat were quantified with a motion capture system. The WOMAC and HOOS questionnaires were employed to evaluate pain experienced by the participants. Only femoral neck-shaft angle (and pain scores) differed significantly between symptomatic and asymptomatic individuals, with lower values for the former. A multivariate statistical technique (step-wise discriminant function analysis) was then used to identify the most suitable anatomical and functional parameters for classifying participant's affected hip within respective subgroups. The parameters that were most useful in terms of predicting symptoms were radial alpha angle, femoral neck-shaft angle, and pelvic ROM. The authors concluded that in the presence of cam

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FAI, indications of decreased femoral neck-shaft angle and pelvic ROM during a full squat can identify those at risk of symptomatic FAI.

Where Do We Need To Go?

The authors should be credited for their attempt to better understand why patients with cam FAI become symptomatic, since cam deformities are quite common in the asymptomatic population (and have been observed in as many as 25% in Caucasians [1]). Although cam FAI might be the most prevalent deformity amongst men, damage will occur only in the presence of acetabular conditions allowing the cam deformity to cause harm – and by the way individuals (ab)use their hips. As a consequence, patients with mild acetabular dysplasia are less likely to experience symptoms from cam deformities compared to hips with focal or global acetabular overcoverage. And, naturally, less-active individuals are less likely to damage their joints compared high-demand patients such as dancers or athletes who engage in impact sports.

Unfortunately, the present study did not provide information on acetabular morphology nor on the activity level of their participants. This makes some of their conclusions fairly speculative.

For example, although not statistically different (no power analysis was provided), individuals from the symptomatic group did not show the highest alpha angles. In fact, they even presented higher femoral torsion and acetabular version compared to the asymptomatic participants, which should protect the cam deformity to enter the hip. Conversely, there was a tendency for symptomatic subjects to be older, which alone, and if sufficiently powered, might have explained the observed differences. In addition, we are concerned that quantification of pelvic ROM using a deep squat may not be the ideal approach to identify patients with symptomatic FAI, because this motion is rarely encountered in daily life. The full-depth squat considered in this study is a global movement involving multiple joints (lumbar spine, knee, ankle, etc ...), including the contralateral nonaffected or less-affected hip, and also soft tissues (laxity). This, again, makes it rather difficult to make a firm conclusion on pelvic motion as an indicator of hip function.

How Do We Get There?

FAI is a complex interplay of morphological abnormalities and demands posed on the hip. There are some

individuals who can outlive cam FAI deformities while others – even with less strain on their hips – become symptomatic early in life. Outcome predictions based upon deformities and/or functional demands remain difficult. An improved understanding of these factors is important and the authors are to be complimented for addressing this complex problem. As mentioned by the authors, there is a need for future studies including acetabular parameters capturing coverage and orientation, as well as a more specific assessment of patients' function. Currently, internal rotation of the hip and flexion seem to be the most critical hip movements for individuals with FAI. The combined quantification of hip internal rotation ROM, hip flexor muscle strength, and eventually hip kinematic, kinetic, and electromyographic parameters during cutting maneuvers could be a promising approach in the near future.

Reference

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