

Editorial Commentary: Predictive Nomograms for Hip Chondral Lesions: A Poor Man's Magnetic Resonance Imaging?



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Abstract: As the use of hip arthroscopy continues to increase, there is a greater need to identify prognostic factors to aid in patient selection, presurgical planning, and the management of postoperative patient expectations. These prognostic factors may then be used to aid in the development of predictive clinical tools that could help identify the presence of chondral pathology. These tools may provide an advantage over magnetic resonance imaging, which has previously been shown to have limited sensitivity in the detection of chondral injuries in the hip. If proven accurate, these nomogram tools may limit the future role of magnetic resonance imaging in the evaluation of hip pain. Future efforts should focus on validating these tools and on evaluating whether they are capable of changing clinical treatment algorithms.

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As the use of hip arthroscopy continues to increase, collective efforts have been focused on identifying prognostic factors that predict surgical outcomes. Large registry and database studies have identified several negative prognostic factors, including older age, increased body mass index (BMI), and the presence of osteoarthritis.¹ Of these factors, the presence of osteoarthritis has overwhelmingly been shown to adversely affect the outcomes after arthroscopic treatment of the hip compared with patients without osteoarthritis.²⁻⁵ Consequently, most surgeons use Tönnis grade 2 or higher and joint space <2 mm as relative, if not absolute, contraindications for hip arthroscopy.⁶ Excluding these patients, it is often disheartening at the time of arthroscopy to identify severe chondral injuries not always evident on preoperative imaging. Several studies have corroborated this finding, reporting the limited sensitivity of magnetic resonance imaging (MRI) in identifying chondral injuries of the hip.^{7,8} With this in mind, I read with great interest the article titled, "Predicting Severe Cartilage Damage in the Hip: A Model

Using Patient-Specific Data From 2396 Hip Arthroscopies," by Utsunomiya, Briggs, Dorman, Locks, Bolia, and Philippon.⁹

In this study, the authors reviewed a cohort of >2,300 cases of hip arthroscopy, identifying those with high-grade cartilage injuries of the acetabulum or femoral head that were revealed during arthroscopy. They retrospectively used multivariable logistic regression analyses to identify patient- and disease-specific variables associated with the presence of these cartilage injuries. The authors reported a greater risk of both acetabular and femoral chondral lesions in patients with older age; a greater risk of acetabular chondral lesions with male sex, elevated BMI, α angle, and reduced joint space; and a greater risk of femoral head chondral lesions with a lower lateral center edge angle and larger Tönnis angle. Using these results, the authors then developed predictive nomogram tools to identify the presence of severe chondral injuries without relying on advanced imaging. I commend the authors for the significant efforts associated with maintaining such a comprehensive clinical registry and for the statistical rigor used in the development of these nomograms.

The findings identified in this study are comparable to others in the literature. Hevesi et al.¹⁰ developed a similar clinical prediction tool, known as the Rapidly Assessed Predictor of Intra-operative Damage (RAPID) score, to aid in clinical identification of the presence of chondral

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lesions in the hip. They, too, performed a retrospective review of prospectively collected data, attempting to correlate specific variables with the presence of chondral lesions. However, their study was limited in that it focused only on acetabular chondral injuries and used a univariate regression analysis rather than a multivariate regression analysis. Nevertheless, they identified similar factors, including male sex, increased BMI, and the presence of a large cam deformity, as predictive factors for the presence of an osteochondral injury. More recently, McClincy et al.¹¹ performed a comparable cohort study in adolescent patients, identifying similar risk factors of male sex, older age, and increased BMI as risk factors for acetabular chondral injuries.

Collectively, the results of these prognostic studies are useful from both a resource-management and a clinical standpoint. From a resource-management perspective, the use of validated clinical tools may limit the need for preoperative MRI. Personally, MRI already has a limited role in my clinical practice, primarily reserved as a prognostic tool to evaluate chondral status. In line with the findings presented by Cunningham et al.¹² in their economic analysis of hip arthroscopy, clinical examination and plain radiographs are often sufficient in identifying femoroacetabular impingement and probable labral pathology, with little added benefit of cross-sectional imaging. If these clinical tools can accurately identify those with moderate or severe chondral injuries, it may obviate the need for MRI in these patients, further reducing unnecessary health care expenditures.

From a clinical perspective, these nomogram tools will help to identify patients with negative prognostic factors and potentially inferior surgical outcomes. Prior reports have indicated that outcomes after arthroscopy are worse, with higher conversion to total hip arthroplasty in patients with moderate or severe chondral injuries.^{1,13} Identifying them preoperatively can help in setting realistic postoperative expectations or potentially avoiding unnecessary surgery altogether.

One word of caution regarding these prediction scores and nomograms—the results should not be extrapolated to asymptomatic hips with radiographic femoroacetabular impingement. These predictive models have used variables identified retrospectively from a symptomatic cohort, and the findings may not hold true for or be predictive of the development of chondral lesions in an asymptomatic population. At best, they could potentially help in identifying those asymptomatic patients with radiographic femoroacetabular impingement who would benefit from closer surveillance.

Finally, and most importantly, do these prediction models alter surgical treatment? Although they may help us to identify chondral lesions, available treatment options to date for the hip have been limited. Results from microfracture have been disappointing, and have been associated with a higher risk of conversion to total

hip arthroplasty.¹⁴ Newer solutions, including cartilage restoration techniques such as autologous chondrocyte implantation or matrix-induced chondrocyte implantation, sound promising but lack supportive clinical evidence.¹⁵ Ultimately, we need to answer the question of whether addressing the mechanics of the hip, with structural treatments including labral repair or reconstruction and femoral or acetabular osteochondroplasty, will be sufficient in improving function and delaying disease progression or whether additive cartilage restoration procedures will help us further improve the outcomes of patients identified with the use of these tools.

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