

Editorial Commentary: Arthroscopy for Borderline Developmental Dysplasia of the Hip: Selection Determines the Outcomes



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Abstract: Although the literature has presented results that favored arthroscopic procedures in treating borderline developmental dysplasia of the hip (BDDH), it remains controversial whether arthroscopic surgery would be better than periacetabular osteotomy for BDDH. Instead of a debate on the application of arthroscopy, the issue worthy of discussion should be distinguishing suitable BDDH candidates for hip arthroscopy. First, identification of patients with real BDDH is critical for making management choices. Second, it should be distinguished whether the major symptoms result from mechanical lesions or functional hip instability. Third, once hip arthroscopy is suggested for BDDH patients, relative contraindications such as advanced age and osteoarthritis should be taken into consideration, in addition to labral repair and capsular closure or plication intraoperatively. In conclusion, more long-term and high-grade evidence is still demanded to end the debate, but we believe that an individualized management strategy based on an accurate diagnosis and comprehensive assessment will bring optimal outcomes for BDDH patients.

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Hip arthroscopy for borderline developmental dysplasia of the hip (BDDH) has been reported to achieve satisfactory outcomes within follow-up periods of 2 to 5 years.¹⁻²³ Our previous study concluded that overall satisfactory improvement regarding patient-reported outcomes was achieved after isolated hip arthroscopy for BDDH,²⁴ and the conclusion is corroborated in the current systematic review entitled “Arthroscopy and Borderline Developmental Dysplasia of the Hip: A Systematic Review” by Kuroda, Saito, Kumar, Malviya, and Khanduja.²⁵ However, it still remains controversial whether hip arthroscopy is a better option than periacetabular osteotomy (PAO) for BDDH.^{2,24,26} Surgeons opposing arthroscopy for BDDH have argued that it only addresses the soft tissues, that is, the secondary stabilizers of the hip, not solving the biomechanical problems associated with the abnormal osseous geometry.²⁶⁻²⁸

We have to admit that most published studies in the literature about hip arthroscopy in patients with BDDH had low-level evidence and only reported short-term outcomes. Up to now, neither long-term follow-up studies nor randomized controlled trials comparing arthroscopy and PAO among BDDH patients have been available. It seems that this debate will go on in the near future. We advocate pausing the debate comparing PAO and arthroscopy in treating BDDH and instead turning to defining the subgroup of BDDH patients who can achieve optimal outcomes after arthroscopic procedures. In other words, selection of suitable BDDH candidates for arthroscopy will determine the outcomes on a great scale.

First, patients with real BDDH should be distinguished and selected. Normally, BDDH is defined by a lateral center-edge angle (LCEA) between 20° and 25°^{1,2,10-13,17,21,23,29-32} or between 18° and 25° according to some modifications.^{3-5,7-9,15,18,20,33} Because the diagnosis of BDDH relies primarily on a small range of LCEAs, even a minor offset can cause misdiagnosis, leading to the heterogeneity of the BDDH cohort. According to the definition by Wiberg,³⁴ the LCEA is the angle formed by the vertical line along the longitudinal axis of the pelvis and the line connecting the center of the femoral head and the acetabular sourcil edge.

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However, inaccurate measurement of the LCEA is not uncommon. The most lateral point of the acetabulum rather than the sourcil edge is often used, which would cause a typical mistake with a falsely high LCEA value.³⁵ Besides, the congenital difference in LCEAs between male and female populations must not be neglected,^{1,7} which might have resulted in the superior outcomes of the female BDDH patients shown in the current review by Kuroda et al.²⁵ Although an LCEA slightly less than 25° may represent a significant structural abnormality in male patients, it is possibly a normal anatomic variant in female patients.^{1,7,25} This difference clearly indicates a need to set different criteria for BDDH based on sex. Additionally, use of the LCEA alone as the standard of evaluation for BDDH has been questioned.³⁶ The LCEA merely allows evaluation of the lateral coverage of the acetabulum, whereas factors including anterior and posterior coverage and acetabular roof obliquity may also be powerful indicators of hip stability.^{27,36} In the meantime, an anatomic abnormality on the femoral side such as femoral anteversion should also be added to form comprehensive diagnostic criteria.^{3,27}

Second, identifying the fundamental cause of the symptoms in BDDH patients is critical in selecting suitable candidates for hip arthroscopy. As we know, the symptoms in BDDH patients might be attributed to mechanical lesions or functional hip instability. Mechanical lesions including labral tear, cam impingement, ligamentum teres tear, and capsular laxity can be managed using hip arthroscopy. However, because arthroscopy is rarely able to correct bony defects, PAO is needed to treat osseous hip instability in BDDH patients. Hip stability can be evaluated through a physical examination including the strength test, anterior and posterior apprehension signs, external rotation dial test, axial distraction test, and Beighton signs of hypermobility, among others.³⁷⁻⁴¹ Parameters measured on imaging are also important in the diagnosis of hip instability. For example, an acetabular index greater than 10°, femoral neck-shaft angle greater than 135°, femoral anteversion greater than 25°, acetabular labral hypertrophy, and ligamentum teres tear are all indicative of hip instability.⁴²⁻⁴⁸ Moreover, parameters such as the femoro-epiphyseal acetabular roof index,^{22,49} the iliocapsularis-to-rectus femoris ratio,⁵⁰ and the iliofemoral line⁵¹ have recently been developed and shown to be effective in defining instability in the hip.

Third, once hip arthroscopy is suggested for BDDH patients, the relative contraindications should be noted. From our experience, we learned that advanced age is the foremost risk factor in the prognosis. Therefore, we suggest that arthroscopic surgery should be cautiously applied to patients older than 40 years.^{5,8,9,13,24} It is also important to exclude patients with osteoarthritis or severe chondral lesions.^{4,5,8,10,13,24}

Finally, arthroscopic procedures including acetabular labral repair, cam osteoplasty, capsular closure or plication, and intra-articular debridement are commonly performed in BDDH patients. Labral repair and capsular closure are strongly recommended to restore stability in BDDH patients.^{10,11,20}

The advantage of fewer postoperative complications after hip arthroscopic procedures in BDDH patients has been validated in many short- to mid-term follow-up studies.^{1-7,9-23} Meanwhile, it is apparent that suboptimal outcomes increase as the follow-up period increases and could reach an overall rate of 33% according to a 5-year follow-up study.^{8,36} More long-term high-grade evidence is needed to analyze the impact of different characteristics of BDDH patients on their prognosis after arthroscopy to form a detailed description of which BDDH patients can achieve optimal results with arthroscopy. In addition, we believe that it is necessary to establish a staged treatment protocol based on an accurate diagnosis of BDDH. With the help of technological advances in imaging and biomechanical simulation, we hope to be able to clarify these 3 major questions in each BDDH patient: Is the developmental dysplasia of the hip really borderline? Do the major symptoms result from hip instability? Can soft-tissue management alone solve the present and prospective problems? Only then can we determine what stage the diseased hip is at and offer a patient-specific treatment plan. We believe that an individualized treatment strategy will bring optimal outcomes for BDDH patients.

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