*The Open Orthopaedics Journal*, 2015, *9*, 185-187 



# Hip Arthroscopy in the Presence of Acetabular Dysplasia

Narlaka Jayasekera*, Alessandro Aprato and Richard N. Villar

*The Villar Bajwa Practice, Spire Cambridge Lea Hospital, 30 New Road, Cambridge CB24 9EL, UK*

**Abstract:** *Purpose*: Hip arthroscopy is a well established therapeutic intervention for an increasing number of painful hip conditions. Developmental dysplasia of the hip (DDH) is commonly associated with intra-articular hip pathology. However, some surgeons perceive patients with hip dysplasia as poor candidates for hip arthroscopy. Our aim was to describe early outcomes of arthroscopic treatment for patients with DDH, who also had femoroacetabular impingement (FAI) treated when necessary, and to compare these outcomes against a control group of patients without DDH.

*Methods*: Prospective case-control study of 68 consecutive hip arthroscopy patients assessed with a modified Harris Hip Score (mHHS) preoperatively and at six weeks, six months, and one year after surgery. Presence of DDH was determined using a standard anteroposterior (AP) pelvic radiograph to measure the centre-edge angle (CEA) of Wiberg, with a CEA < 20º used as threshold for diagnosis of DDH.

*Results*: 12 patients (eight female and four male) with acetabular dysplasia and mean CEA of 15.4º (9º to 19º). The control, nondysplastic group comprised 54 patients (23 females and 31 males) with a mean CEA of 33.1º (22º to 45º). All patients in the dysplastic group had a labral tear and 11 (91.7%) had associated femoral cam impingement lesion addressed at arthroscopy. Our study demonstrates a significant (p=0.02) improvement in outcome in the dysplastic group at one year using the mHHS.

*Conclusion*: Hip arthroscopy in the presence of DDH is effective in relieving pain for at least one year after surgery although does not address underlying acetabular abnormality.

**Keywords:** Acetabular dysplasia, femoroacetabular impingement, hip arthroscopy, outcome.

## INTRODUCTION

Labral tears are commonly seen in patients with developmental dysplasia of the hip (DDH) [1-3], while patients with DDH are also known to present with femoroacetabular impingement (FAI) [2, 4]. Both DDH and FAI may result in abnormal loading of the acetabulum [5]. There is a claimed association between acetabular labral tears, DDH and FAI with early-onset osteoarthritis (OA) [6-15]. That said, there are no controlled trials in support of this relationship. Despite this, current orthopaedic dogma would suggest that an early diagnosis of conditions such as DDH and FAI is essential if early-onset OA is to be prevented [16-18]. Ilizaliturri *et al.* were first to describe arthroscopic treatment of FAI secondary to DDH [2]. The orthopaedic literature cites a few reports on hip arthroscopy in the presence of dysplasia [2, 3, 19-21]. Some surgeons perceive patients with hip dysplasia to be poor candidates for hip arthroscopy [22]. Fujii *et al.* in their series of 23 symptomatic dysplastic hips noted a high incidence of intraarticular lesions at hip arthroscopy performed at the time of corrective osteotomy [23]. The hip arthroscopy surgeon may choose to address such lesions and FAI lesions arthroscopically alone, without the additional significant morbidity associated with open surgery [24]. Recent advances in diagnostic imaging modalities and hip arthroscopic techniques have revealed a myriad of treatable painful hip conditions associated with hip dysplasia. These include chondral lesions [2, 3, 19, 20], ligamentum teres rupture [3, 19] and loose bodies [3, 19]. To date there is no case control study in the orthopaedic literature that describes objective outcome measures in patients with acetabular dysplasia in whom FAI has also been addressed. The aim of this study is to describe outcomes of arthroscopic treatment for patients with DDH, who also had FAI treated when necessary, and to compare these outcomes against a control group of patients without DDH.

## PATIENTS AND METHODS

This is a prospective case-control study of 68 consecutive patients who underwent arthroscopy of the hip in the specialist practice of the senior author (***). Of these, two had undergone previous corrective surgery for dysplasia and were excluded. All persons gave their informed consent prior to their inclusion in the study. The operations were performed under general anaesthetic in the lateral position with a specialist hip distractor (Lateral Hip Positioning System, Smith & Nephew Inc., Andover, Massachussets, USA [25]. A detailed description of the senior author's arthroscopy technique is previously described by Simpson *et al.* [25]. All operative findings were assessed, described and recorded by the senior author and entered into a specialist database (Microsoft 2010). Data were collected prospectively for patient gender and age. As an outcome measure we used the modified Harris hip score (mHHS),

*Address correspondence to this author at 19-21 Freemont Drive, Mount Tamborine, Queensland 4272, Australia; Tel: +61455826899; Fax: +61755450507; E-mail: naja01@doctors.org.uk

1874-3250/15 

which was recorded pre-operatively, at six weeks, six months and one year after surgery. The mHHS has construct validity for hip arthroscopy [26]. Also, it is the most frequently used outcome score in hip arthroscopy undertaken for intra-articular pathology [27].

The presence of DDH was determined using a standard anteroposterior (AP) pelvic radiograph, which is considered the most important view for defining acetabular dysplasia [28-30] and is widely employed in an outpatient setting. The centre-edge angle (CEA) of Wiberg [29, 31] was used for the assessment of DDH because of its high inter- and intraobserver reliability and proven clinical relevance in the assessment of DDH [32]. A CEA <20º was used as a threshold for the diagnosis of DDH. In each case the most recent radiograph was used for measurement so as to better reflect the architecture of the hip at the time of arthroscopy.

The statistical analysis was performed using Sofa-Statistics (released under open source AGPL3 license © 2009-2011 Paton-Simpson & Associates Ltd). Independent samples t-test was used for the analysis of age and mHHS between groups and Wilcoxon signed-rank test for the analysis of the mean improvement in total mHHS for the dysplastic group. A p value < 0.05 was considered to be statistically significant.

## RESULTS

We included a total of 66 patients in the study. Patients were divided into a dysplastic group (12 patients, eight female and four male) and a nondysplastic group (54 patients, 23 female and 31 male). A summary of the intraoperative findings is shown in Table **1**.

**Table 1. Summary of pathology found at surgery.**

| Pathology | Number of Patients (Dysplastic Group) | Number of Patients (Nondysplastic Group) |
|---|---|---|
| Femoroacetabular impingement | 11 | 24 |
| Labral tear | 10 | 23 |
| Osteochondral defect | 4 | 34 |
| Synovitis | 3 | 8 |
| Iliopsoas tendinopathy | 2 | 3 |
| Chondral delamination | 1 | 5 |
| Ligamentum teres tear (partial) | 3 | 1 |

The mean age of patient in the dysplastic group was 40 years (19 to 50) and the mean age of the nondysplastic group was 36 years (19 to 60). There was no significant age difference between the two groups (independent samples t-test, p=0.225). The mean CEA for the dysplastic group was 15.4º (9º to 19º). The mean CEA for the nondysplastic group was 33.1º (22º to 45º).

There was no significant difference (independent samples t-test) in mean total mHHS between the dysplastic and nondysplastic groups pre-operatively and at six weeks, six months and one year after surgery (Table **2**). There was statistically significant improvement in the mean total mHHS at one year compared with the pre-operative scores for both the dysplastic (Wilcoxon signed-rank test, p = 0.02; mean improvement 24 points) and nondysplastic (Wilcoxon signed-rank test, p <0.001; mean improvement 21 points) groups.

**Table 2. Mean total modified Harris Hip Score (mHHS) for the dysplastic and nondysplastic groups.**

| Time from Surgery | mHHS for the Dysplastic Group | mHHS for the Non-Dysplastic Group | p Value |
|---|---|---|---|
| Pre-op | 55.4 | 57.9 | 0.068 |
| 6 weeks | 61.1 | 67.5 | 0.335 |
| 6 months | 69.3 | 71.0 | 0.823 |
| 1 year | 79.3 | 78.7 | 0.909 |

## DISCUSSION

In 1986 Dorrell *et al.* [33] were the first to report on labral tears in the presence of hip dysplasia. They described degenerate labral tears as a result of abnormal stresses on the uncovered lateral portion of the femoral head and advocated surgical treatment of the labral lesion by excision, as repair was not possible in those days. They also stressed the importance of correcting the underlying morphological abnormality. By the millennium, hip arthroscopy was gaining a firm foothold in several centres around the world. In this period the first reports of hip arthroscopy in patients with dysplasia appeared in the orthopaedic literature [19, 20]. These reports predate Ganz *et al*'s [34] work on femoroacetabular impingement, which was to unlock the shackles of early hip arthroscopy and drive its rapid development and popularity. In their pioneering report McCarthy *et al.* [20] considered mainly patients with a CEA of Wiberg of between 22º and 28º. However, in their series of 170 hips 26 had a CEA of Wiberg of between16º to 22º. They described the risk of progressive repetitive trauma to the labrum and resultant risk of articular cartilage lesions because of the uncovering of the anterior femoral head. They did not describe the assessment of pain or function by way of scores, nor was FAI treated. In a second dysplasia study Byrd *et al.* [19] compared 16 dysplastic patients with a CEA of Wiberg <20º with 32 patients who had borderline dysplasia (CEA of Wiberg 20º to 25º). For the dysplastic group they reported a mean 26-point improvement in mHHS at a mean 27-month follow-up. They also found no significant difference in preoperative and postoperative mHHS between the two groups. Byrd *et al.* [19] did not describe the mean CEA of Wiberg in their group of dysplastic patients. Again, FAI was not treated. However, they concluded that hip dysplasia was not a contraindication for arthroscopy. These early studies were before the era of labral repair and FAI surgery and thus differ from our study. Our series of 12 patients with dysplasia has to our knowledge the lowest mean values for CEA of Wiberg for a hip arthroscopy publication to date.

We acknowledge the short-term follow-up of this study and that our study design does not allow far comparison of outcomes between open surgery and hip arthroscopy in the presence of dysplasia.

This study demonstrates hip arthroscopy in our dysplastic group to be a safe and effective procedure with favourable short-term follow-up. However, we have yet to establish if this early satisfactory outcome will translate into a better longer-term prognosis. We acknowledge that hip arthroscopy in the presence of DDH does nothing to correct the underlying morphological abnormality shown by the hip. However, it can certainly improve a patient's pain for at least one year after surgery. Correction of the underlying bony abnormality would, of course, depend on whether or not a clear link, supported by controlled studies, exists between DDH and eventual degenerative change. This is a widely held view but currently unproven. We do agree, however, with Ilizaliturri *et al.* [2] that the femoral head in dysplastic hips may often need to be addressed in a timely manner to avoid irreparable damage to the hypertrophied labrum.

## CONFLICT OF INTEREST

The 1st and 2nd authors declare that they have no conflict of interest.

The senior (3rd) author holds a consultancy agreement with Smith & Nephew Endoscopy.

## ACKNOWLEDGEMENTS

Declared none.

## REFERENCES

[1] Groh MM, Herrera J. A Comprehensive review of hip labral tears. Curr Rev Musculoskelet Med 2009; 2: 105-17.

[2] Ilizaliturri VM Jr, Nossa-Barrera JM, Acosta-Rodriguez E, Camacho-Galindo J. Arthroscopic treatment of femoroacetabular impingement secondary to paediatric hip disorders. J Bone Joint Surg Br 2007; 89: 1025-30.

[3] Haene RA, Bradley M, Villar RN. Hip dysplasia and the torn acetabular abrum: an inexact relationship. J Bone Joint Surg Br 2007; 89: 1289-92.

[4] Paliobeis CP, Villar RN. The prevalence of dysplasia in femoroacetabular impingement. Hip Int 2011; 21: 141-5.

[5] Kappe T KT, Reichel H, Fraitzl CR. Can femoroacetabular impingement and hip dysplasia be distinguished by clinical presentation and patient history? Knee Surg Sports Traumatol Arthrosc 2012; 20: 387-92.

[6] Altenberg AR. Acetabular labral tears: a cause of hip pain and degenerative arthritis. South Med 1977; 70: 174-5.

[7] Robertson WJ, Kadrmas WR, Kelly BT. Arthroscopic management of labral tears in the hip: A systemic review of the literature. Clin Orthop Relat Res 2007; 455: 88-92.

[8] McCarthy JC, Noble PC, Schuck MR, Wright J, Lee J. The Otto E. aufranc award: the role of labral lesions to development of early degenerative hip disease. Clin Orthop Relat Res 2001; 393: 25-37.

[9] Seldes RM, Tan V, Hunt J, Katz J, Winiarsky R, Fitzgerald RH Jr. Anatomy, histologic features, and vascularity of the adult acetabular labrum. Clin Orthop Rel Res 2001; 382: 232-40.

[10] Ferguson SJ, Bryant JT, Ganz R, Ito K. The influence of the acetabular labrum on hip joint cartilage consolidation: a poroelastic finite element model. J Biomech 2003; 33: 953-60.

[11] Ferguson SJ, Bryant JT, Ganz R, Ito K. The acetabular labrum seal: a poroelastic model. Clin Biomech 2000; 15: 463-8.

[12] Ferguson SJ, Bryant JT, Ganz R, Ito K. An invitro investigation of the acetabular labral seal in hip joint mechanics. J Biomech 2003; 36: 171-8.

[13] Byrd JW. Labal lesions: an elusive source of hip pain case reports and literature review. Arthroscopy 1996; 12: 603-12.

[14] Farjo LA, Glick JM, Sampson TG. Hip arthroscopy for acetabular labral tears. Arthroscopy 1999; 15: 132-7.

[15] Fraitzl CR KT, Pennekamp F, Reichel H, Billich C. Femoral head-neck offset measurements in 339 subjects: distribution and implications for femoroacetabular impingement. Knee Surg Sports Traumatol Arthrosc 2013; 21(5): 1212-7.

[16] Schoenecker PL, Clohisy JC, Millis MB, Wenger DR. Surgical management of the problematic hip in adolescent and young adult patients. J Am Acad Orthop Surg 2011; 19: 275-86.

[17] Jessel RH, Zurakowski D, Zilkens C, Burstein D, Gray ML, Kim YJ. Radiographic and patient factors associated with pre-radiographic osteoarthritis in hip dysplasia. J Bone Joint Surg Am 2009; 91: 1120-9.

[18] Engesaeter IO, Lie SA, Lehmann TG, Furnes O, Vollset SE, Engesaeter LB. Neonatal hip instability and risk of total hip replacement in young adulthood: follow-up of 2,218,596 newborns from the Medical Birth Registry of Norway in the Norwegian Arthroplasty Register. Acta Orthop 2008; 79: 321-6.

[19] Byrd JWT, Jones KS. Hip arthroscopy in the presence of dysplasia. Arthroscopy 2003; 10: 1055-60.

[20] McCarthy JC, Lee JA. Acetabular dysplasia: a paradigm of arthroscopic examination of chondral injuries. Clin Orthop Relat Res 2002; 405: 122-8.

[21] Ilizaliturri VM Jr, Chaidez PA, Valero FS, Aguilera JM. Hip arthroscopy after previous acetabular osteotomy for development dysplasia of the hip. Arthroscopy 2005; 21: 176-81

[22] Parvizi J, Bican O, Bender B *et al.* Arthroscopy for labral tears in patients with developmental dysplasia of the hip: a cautionary note. J Arthroplasty 2009; 24: 110-13

[23] Fujii M, Nakashima Y, Jingushi S, *et al*. Intraarticular findings in symptomatic developmental dysplasia of the hip. J Pediatr Orthop 2009; 29(1): 9-13.

[24] Botser IB, Jackson TJ, Smith TW, Leonard JP, Stake CE, Domb BG. Open surgical dislocation versus arthroscopic treatment of femoroacetabular impingement. Am J Orthop (Belle Mead NJ) 2014; 43(5): 209-14.

[25] Simpson J, Sadri H, Villar R. Hip arthroscopy technique and complications. Orthop Traumatol Surg Res 2010; 96(8 Suppl): S68-76.

[26] Thorborg K, Roos EM, Bartels EM, *et al.* Validity, reliability and responsiveness of patient-reported outcome questionnaires when assessing hip and groin disability. Br J Sports Med 2010; 44: 1186-96.

[27] Kemp JL, Collins N, Makdissi M, Schache AG, Machotka Z, Crossly K. Hip arthroscopy for intra-articular pathology: a systemic review of outcomes with and without femoral osteoplasty. Br J Sports Med 2012; 46: 632-43.

[28] Tannast M, Zeng G, Anderegg C, *et al.* Tilt and rotation correction of acetabular version on pelvic radiographs. Clin Orthop Relat Res 2005; 438: 182-90.

[29] Delaunay S, Dussault RG, Kaplan PA, Alford BA. Radiographic measurements of dysplastic adult hips. Skeletal Radiol 1997; 26: 75-81.

[30] Tonnis D. Normal values of the hip joint for the evaluation of X-rays in children and adults. Clin Orthop Relat Res 1976; 119: 39-47.

[31] Nelitz M, Guenther KP, Gunkel S, Puhl W. Reliability of radiological measurements in the assessment of hip dysplasia in adults. Br J Radiol 1999; 72: 331-4.

[32] Murphy SB, Ganz R, Muller ME. The prognosis in untreated dysplasia of the hip: a study of radiographic facors that predict the outcome. J Bone Joint Surg Am 1995; 77: 985-9.

[33] Dorrell J, Catterall A. The torn acetabular labrum. J Bone Joint Surg Br 1986; 68: 400-3.

[34] Ganz R, Parvizi J, Beck M, Leunig M, Notzli H, Siebenrock KA. Femoroacetabular impingement: a cause for osteoarthritis of the hip. Clin Orthop Relat Res 2003; (417): 112-20.

Received: February 18, 2015 Revised: April 11, 2015 Accepted: April 20, 2015