

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 < 20° used as threshold for diagnosis of DDH.

Results: 12 patients (eight female and four male) with acetabular dysplasia and mean CEA of 15.4° (9° to 19°). The control, nondysplastic group comprised 54 patients (23 females and 31 males) with a mean CEA of 33.1° (22° to 45°). 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, Massachusetts, 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

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 $<20^\circ$ 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 15.4° (9° to 19°). The mean CEA for the nondysplastic group was 33.1° (22° to 45°).

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 22° and 28° . However, in their series of 170 hips 26 had a CEA of Wiberg of between 16° to 22° . 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 $<20^\circ$ with 32 patients who had borderline dysplasia (CEA of Wiberg 20° to 25°). 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 for 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.

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