

Retrospective Analysis of Arthroscopic Cam Decompression. Is Hip Joint Still Preserved Although at Learning Curve?

Artroskopik Cam Dekompresyonun Geriye Dönük Analizi. Öğrenme Eğrisinde Olmasına Rağmen Kalça Eklemi hala Korunuyor mu?

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ABSTRACT

Hip arthroscopy is an effective treatment for femoroacetabular impingement (FAI). The purpose of the present study was to report retrospectively the patients self-reported outcomes, and hip survival rates within a mean follow-up of five years.

Retrospectively collected data on 25 patients with FAI within a minimum follow-up of 42 months (mean 60 months) treated with hip arthroscopy and labrum repair were analyzed. The primary outcome measures were the Hip Outcome Score (HOS) Activities of Daily Living (ADL) subscale, HOS-Sport subscale, Visual analog scale (VAS) for pain. Patient satisfaction was rated. Measurement of joint spaces and osteoarthritis (Tonnis) grading were done preoperatively and at the last follow-up visit.

Pre- and postoperative mean alpha angles were 67±4 degrees 46±3 degrees, respectively. Minimal clinically important difference (MCID) was achieved for HOSADL in 76 %, and for HOSSS in 56% of the patients, while all patients achieved MCID for VAS pain scores. Mean satisfaction level was 7.5±1.8. Mean preoperative Tonnis stage of the patients was 0.9±0.9 which increased to 1.1±0.8 (p:0.046). Mean preoperative lateral joint space was 4.8±1 which decreased to 4.5±1 p<0.001. Mean middle joint space also decreased from 4.5±0.9 to 4.3±0.7 (p:0.04). However this decrease was not statistically significant at joint space measured at foveal level (p>0.05) (5±0.8 vs 4.9±0.7).

Mid-term results show that after cam decompression, it is possible to say that hip joint is at least preserved and progression of hip osteoarthritis seems to be delayed. Patient functional results, and pain scores are generally improved in accordance with the literature data.

Keywords: hip arthroscopy, femoro-acetabular impingement, osteoarthritis

Öz

Kalça artroskopisi, femoroasetabular sıkışma (FAS) için etkili bir tedavidir. Bu çalışmanın amacı, ortalama beş yıllık takip süresinde geriye dönük olarak hastaların bildirdiği sonuçları ve kalça sağlığını rapor etmektir.

Kalça artroskopisi ve labrum tamiri ile tedavi edilen minimum 42 aylık (ortalama 60 ay) takipte FAS'lı 25 hastadan geriye dönük olarak toplanan veriler analiz edildi.

Birincil sonuç ölçütleri, Kalça sonuç skoru (HOS) günlük yaşam aktiviteleri (ADL), HOS-Spor ölçekleri ve ağrı için görsel analog ölçeği (VAS) idi. Hasta memnuniyeti derecelendirildi. Eklem boşluklarının ölçümü ve osteoartrit (Tönis) derecelendirilmesi ameliyat öncesi ve en son takipte yapıldı.

Ameliyat öncesi ve sonrası ortalama alfa açıları 67±4 derece ve 46±3 dereceydi. Hastaların 76%'ında HOSADL için minimal klinik önemli fark (MCID) elde edildi ve hastaların 56%'sı HOSSS için MCID'ye ulaştı ve tümü VAS ağrı skoru için MCID'ye ulaştı. Ortalama memnuniyet seviyesi 7,5±1,8'di. Hastaların ameliyat öncesi ortalama Tönis evresi 0,9±0,9 iken 1,1±0,8'e yükseldi (p:0,046). Ameliyat öncesi ortalama yan eklem boşluğu 4,8±1 idi ve 4,5±1'e düştü p<0,001. Orta eklem boşluğu da 4,5±0,9'den 4,3±0,7'e düştü (p:0,04). Ancak bu azalma foveal seviyede ölçülen eklem aralığında istatistiksel olarak anlamlı değildi (p>0,05) (5±0,8 vs 4,9±0,7).

Ara dönem sonuçları, cam dekompresyonundan sonra kalça eklemine en azından korunduğunu ve kalça osteoartritin ilerlemesinin geciktiğini söylemenin mümkün olduğunu göstermektedir. Hastanın fonksiyonel sonuçları ve ağrı skorları genellikle literatürle uyumlu olarak iyileşir.

Anahtar sözcükler: kalça artroskopisi, femoro-asetabular sıkışma, osteoartrit

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INTRODUCTION

Symptomatic femoroacetabular impingement (FAI) occurs secondary to abnormal contact between the proximal femur and acetabulum due to cam, pincer or mixed morphology. This contact later may lead to symptomatic labrum tear, chondral damage and finally the osteoarthritis (OA) ⁽¹⁾. Most studies have reported that although patients with FAI benefit from physical therapy, surgical management with hip arthroscopy is more beneficial for patients. However whether this surgery prevents or delays osteoarthritis is still not certain ⁽²⁾. Whereas most recently, level of evidence increased indicating that cam morphology of femoral head (asphericity) leads to development of hip osteoarthritis due to acetabular chondral damage ⁽³⁻⁷⁾. Supporting this, Domb et al. ⁽⁷⁾ also reported that in patients treated with hip arthroscopy and optimal resection, cam deformity (postoperative α angle < 55°) had lower incidence of conversion to total hip arthroplasty than incomplete resection (postoperative α > 55°). A recent in vitro study also confirmed that accurate cam resection restored normal peak joint contact stresses ⁽⁸⁾.

Despite advances in surgical techniques, instruments and knowledge, hip arthroscopy is still a demanding procedure and has steep learning curve ⁽⁹⁻¹¹⁾. Recent review reported that 30 cases is most commonly used cut-off number for learning curve to increase the chance of successful outcome and/or decrease the number of complications ⁽¹²⁻¹⁴⁾.

Purpose of the present study was to report the results of first cases of a single surgeon and to see whether patients had decreased joint space or increased degree

of the osteoarthritis at the latest follow-up. Hypothesis was that restoration of alpha angle or correction of cam deformity would prevent or delay the development of hip osteoarthritis at symptomatic FAI patients at mid-term although surgery was performed during learning curve of the surgeon.

Patients and methods

After local institutional ethics committee approval, retrospective data on all patients undergoing hip arthroscopy between 2013-2016 for the treatment of FAI by single surgeon (OH, first cases) was included in the study. Patients were excluded if they had osteonecrosis of the femoral head, Perthes disease sequelae, history of hip trauma, and dysplasia.

All patients had positive physical examination and magnetic resonance imaging (MRI) findings to confirm the diagnosis of FAI and labrum tear. Cam type deformity was defined as α angle > 60° at pre-operative Dunn X-ray ⁽¹⁵⁾ and a pincer deformity was defined as lateral center-edge angle (LCEA) > 40° and/or cross-over sign ^(16,17) at pelvis X-rays. Tönnis grading was performed ⁽¹⁸⁾ and the joint space was measured at 3 locations: the lateral edge, middle of the sourcil, and above the level of the fovea at neutral pelvic X ray (Figure 1) in the supine position ⁽¹⁹⁾.

Arthroscopy was performed with the patient in supine position on a traction table using anterolateral, anterior, mid-anterior portals. After inter-portal capsulotomy, diagnostic arthroscopy was performed, the labrum tear was identified, pincer lesion was then excised. All patients received labrum repair. Number of anchors (Gryphon, Depuy Synthes, USA) used changed between 1-3 (mean 1.6 anchors). Afterward cam lesions were

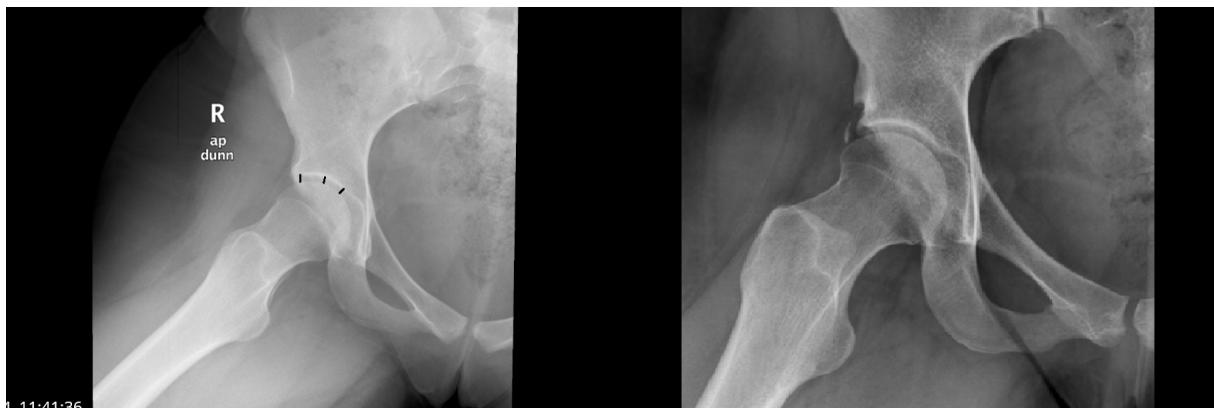


Fig 1. Joint space measurements (Dunn X-rays of the patients obtained preoperatively, and at postoperative 6 years)

Table I. Patients self-reported outcomes and radiographic measurements (0 degrees, mean±SD 'standard deviation', CI; %95 confidence interval)

31 hips (mean±SD)[CI]	preoperative	Last postoperative visit	p -value
Dunn α°	67±4[65-69]	46±3[45-47]	<0.001
LCEA $^{\circ}$	42±8[39-45]	31±2[30-32]	<0,001
Head-neck distance(mm)	4±0.8[4-5]	7±2[6-7]	<0.001
VAS	9±0.7[8-9]	2±1[2-3]	<0.001
HOS _{ADL}	63±14[57-68]	86±15[81-92]	<0.001
HOS _{SS}	51±17[45-57]	79±18[73-86]	<0.001

Dunn α : Dunn alpha angle (degrees); LCEA, lateral center –edge angle; VAS: Visual Analogue Scale; HOS: Hip Outcome Score; ADL: Activities of Daily Living

excised and dynamic plus fluoroscopic examination was done to confirm adequate resection of impingement. Joint capsule was left open at all cases. Immediately patient started to practice passive hip range of motion exercises with %20 of body weight bearing using two crutches for three weeks postoperatively. Then patient started active exercises and weight bearing as tolerated.

Patient-reported outcome measures were collected retrospectively from each patient at the latest follow-up visit (mean 60 months '42-79months').

The primary outcome measure was the Hip Outcome Score (HOS) Activities of Daily Living (ADL) subscale, HOS-Sport subscale, Visual analog scale (VAS) for pain⁽²⁰⁾. Patient satisfaction was rated on a 10-point scale, with 1 indicating extremely unsatisfied and 10 indicating very satisfied^(21,22).

Statistical analysis

Data analysis was performed using SPSS for Windows, version 22 (IBM, SPSS statistics). A value of $p < 0.05$ was considered as statistically significant. Wilcoxon signed-rank test was used to compare variables obtained preoperatively and at the last follow-up visit.

RESULTS

Thirty-one hips of 25 patients (6 bilateral) were analyzed in the study. Average age of the patients (6 women, and 19 men) was 32 (19-47) years. Average follow-up period was 60 months (42-79months).

Preoperative and postoperative head-neck distance (mm), LCEA (degrees), Dunn α angles (degrees) are given in Table I which all changed significantly at early postoperative period ($p < 0.05$).

Mean preoperative Tönnis stage of the patients was 0.9 ± 0.9 [0.6-1.3] (mean±std [CI 'confidence interval']) which increased to 1.1 ± 0.8 [0.7-1.4] ($p: 0.046$). Mean preoperative lateral joint space was 4.8 ± 1 [4.4-5.3] which decreased to 4.5 ± 1 [4.1-4.9] $p < 0.001$. Mean middle joint space also decreased from 4.5 ± 0.9 [4.2-4.9] to 4.3 ± 0.7 [4-4.6] ($p: 0.04$). However, this decrease was not statistically significant at joint space measured at foveal level ($p > 0.05$) (5 ± 0.8 [4.7-5.3] vs 4.9 ± 0.7 [4.6-5.2]). Mean satisfaction level was 7.5 ± 1.8 [6.8-8.2] at the last follow-up visit.

Minimal clinically important difference (MCID) was achieved for HOSADL in 76 %, and for HOSSS in 56% of the patients, while all patients achieved MCID for VAS pain scores. Mean satisfaction level was 7.5 ± 1.8 ⁽²³⁾.

DISCUSSION

Main finding of the present study was decrease of joint space measurement was approximately 0.3mm at a mean follow-up of five years after cam decompression which probably not clinically significant. Thus it is possible to say that hip joint is at least preserved and progression of hip osteoarthritis is delayed.

Minimal clinically important difference is defined as the threshold value for smallest change in the outcome score resulting in a perceived improvement^(23, 24). Studies calculated new MCID values for their study or they used the previously mentioned values. At the present study upper limits of MCID values for HOS described at the literature, were chosen⁽²³⁾. Beck et al⁽²⁵⁾ followed up their adolescent patients (13-21 years of age) for a minimum 5 years, and reported that %88 of their patients achieved MCID for HOS. Lower values were reported at the present study due to higher age group and/or probably due to choosing the upper limit for MCID values.

At another study with 45 patients (mean age of 34 years) Lee et al⁽²⁶⁾. reported similar improvement at HOSADL (from 58 to 85) and HOSSS (from 51 to 82) after an average follow-up period of 7 years. Patient satisfaction was 7.6 of 10⁽²⁶⁾.

Menge et al⁽²²⁾. reported comparable degree of improvement for HOSADL (25 points) while higher magnitude of improvement for HOSSS (40 points) without any difference between treatment modalities used for the repair of the labrum (debridement or repair) in their 154 patients with an average age of 40 years. Higher rate of conversion to total hip arthroplasty was seen in patients with ≤ 2 mm joint space⁽²²⁾. At the present study although some degree of joint space decrease was observed, neither preoperatively nor postoperatively critical joint space of 2mm was seen at any patients. Whether this decrease of joint space at lateral and middle parts is clinically relevant, is the subject of future studies.

Our study has some limitations. First, this was a retrospective study with limited data. Second, the degree of chondral damage or labrum tear was not reported and there was not a control group for comparison. Results are those of a single surgeon at the learning curve that may limit generalization. It is reported that after learning curve is completed, complication rate, surgery time, re-operation rates are decreased. However the evidence also indicates that surgeons may still have successful outcomes when performing hip arthroscopy earlier in their careers^(27,28).

Lastly, joint space measurements were made at supine pelvic radiographs that may limit validity of the results however a more recent study has reported that standing and supine pelvic radiographs were not significantly different and both may be used to assess width of the joint space⁽²⁹⁾.

This midterm results show that that after cam decompression, it is possible to say that hip joint is at least preserved and progression of hip osteoarthritis seems to be delayed. Patient functional results, pain scores were generally improved in line with the literature. However future prospective studies are still needed to further delineate the efficacy of this procedure to stop or delay progression of hip osteoarthritis.

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