

RESEARCH ARTICLE

Is Only Peripheral Hip Arthroscopy Enough for Selected Patients with Femoroacetabular Impingement Syndrome?

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Received: 08 December 2020

Accepted: 09 April 2022

Abstract

Background: Peripheral compartment hip arthroscopy has gained popularity over central compartment hip arthroscopy as peripheral compartment arthroscopy does not cause perineal post compression, prolonged lower extremity traction and thus complications such as acetabular labrum and articular cartilage injuries. The study, in essence, aims to emphasize that peripheral hip arthroscopy (OPHA) alone is sufficient without an additional surgical method in the treatment of femoroacetabular impingement syndrome (FAI).

Methods: A total of 35 patients, being 21 female and 14 male, among a group of patients who were suffering from FAI syndrome and applied to private hip conservatory centers and has undergone hip arthroscopy at a later stage by a senior surgeon (I.T.) were selected from the medical-based software of the hospital. Patients with intra-articular pathology as a result of magnetic resonance imaging (MRI) were excluded from the study. The group had a mean age of 40.6, youngest being 17 and oldest 69, while the mean observation period was 26.6 months, varying between shortest 6 months and longest 63. In order to assess the patient satisfaction as well as clinical outcomes, Postel Merle d'Aubigné (PMA) score was used.

Results: When patient satisfaction was evaluated, overall decrease in pain was found and when gait characteristics were evaluated together with movement, an increase in overall satisfaction was found ($P < 0.05$). Secondary arthroscopic procedures was not required in any of the patients included in this study. A group of three patients only needed some additional surgical interventions like stem cell therapy, hip arthroplasty and pelvic osteotomy.

Conclusion: OPHA can provide adequate treatment in selected FAI patients as it allows us to avoid critical complications such as damage to the cartilage, avascular necrosis, complications caused by traction and prolonged operation times seen in central compartment arthroscopy.

Level of evidence: III

Keywords: Femoroacetabular impingement syndrome, Hip arthroscopy, Peripheral compartment

Introduction

Femoroacetabular impingement syndrome (FAI) is known for causing limited mobility and pain in hip as well as hip osteoarthritis as a pathology. 1,2 FAI can be cam, pincer, or mixed type. It's possible to observe impingement due to femoral version problems or

sometimes even in individuals who have normal anatomy but making activities forcing their hips to an excessive range of motion. 3,4 Hip arthroscopy as a treatment of FAI has proven itself to reduce pain and shown very positive clinical results. Return to sport activities are comparable

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to and even better than open surgery.^{3,5}

Hip arthroscopy application in the peripheral compartment helped massively to understand the pathology and functional anatomy of the hip joint. However, surgeons performing hip arthroscopy have to deal with the technical problems specific to this method, such as joint anatomy, joint depth, and narrow maneuvering space. Additionally, surgical access points have continued to be developed due to the presence of dangerous structures in proximity of the surgical field such as labrum or cartilage to the surgical field.⁶ Peripheral compartment hip arthroscopy, first described by Dienst M. in 2001, has gained popularity since perineal post compression and prolonged traction of lower extremity causes multiple complications in hip arthroscopy.

FAI syndrome mostly originates in the anterior peripheral hip joint compartment. A Hartmann et al. described the arthroscopic assisted mini-open technique based on the definitions of arthroscopic and open treatment techniques.⁹ In addition, some researchers have also reported reliable and satisfactory results with the mini-open technique.^{10,11} Only peripheral hip arthroscopy (OPHA) can be defined as a less invasive mini-open technique or an arthroscopic mini-open technique for the anterior hip compartment.

The study aims to describe OPHA experience in FAI treatment without distracting the hip and central compartment entry. Additionally, assess the morbidity of FAI "cam" resection with an arthroscopic labral treatment and its early clinical outcome.

Materials and Methods

In this retrospective study, software database of the hospital has been used to select 45 patients who admitted to the hip preservation center (Bezmi'alem Vakif University) and underwent hip arthroscopy by a senior surgeon (I.T.) between 2013 and 2018. Patient demographics, physical examination, imaging, diagnosis, surgical procedure, and postoperative follow-up results were collected retrospectively from the database and patients via phone. The selection criteria has been selected as: patients with FAI symptoms, such as C-sign pain, positive impingement tests, and radiological evidence of FAI. Patients with intra-articular pathology on preoperative imaging and who underwent an arthroscopy in the central compartment were excluded from the study. Patients with hip instability, complex labral tears, synovial chondromatosis, and various other lesions were also excluded. Postel Merle d'Aubigné (PMA) score is used to evaluate clinical results.¹² Many demographic variables such as gender, age and body size were recorded for all patients. Alpha angles were calculated from preoperative X-rays in the Anteroposterior view and modified Dunn-lateral view and magnetic resonance imaging (MRI).

Surgical Technique

Preoperative planning

All patients were examined thoroughly. The diagnosis of FAI was made by anterior-posterior pelvis radiography

and modified Dunn lateral radiography. Routine MRI for the accompanying pathologies, such as a labral tear, was requested, and computed tomography scanning with three-dimensional (3D) reconstruction was performed for preoperative planning. In some special cases, patients were evaluated with MRI arthrograms.

Surgical procedure

The OPHA was performed with the patient in supine position without traction on a regular table under general anesthesia or spinal anesthesia with fluoroscopy. A single dose of 1 gr cefazolin was given preoperatively. All patients were routinely positioned, scrubbed, and draped. The hip was checked to evaluate any impingement as well as range of motion. Other functional tests were carried out in various degrees of abduction, adduction, flexion and rotation both internally and externally.

Portal Placement

Anatomic landmarks on the anterior superior iliac spine and greater trochanter were marked preoperatively on the skin [Figure 1]. Generally, an anterolateral portal (ALP) and distal anterolateral portal (DAP) were used, but other accessory portals were used when necessary.

Anterolateral Portal

A standard ALP that was 2 cm anterior and 2 cm superior to the anterosuperior border of the greater trochanter was used [Figure 2]. The ALP was typically set using fluoroscopic guidance and tactile sensation. The knee was in 30° of flexion and internally rotated. The spinal needle and cannula were inserted in the anteromedial part of the femoral neck under fluoroscopic guidance and dilated with dilators [Figure 3]. An arthroscope was introduced through the cannula and visualized the peripheral compartment to locate the "cam" lesion and look for other anterior hip pathologies [Figure 4].



Figure 1. Patient position for peripheral hip arthroscopy and marked anatomic landmarks on the skin.



Figure 2. Anterolateral Portal.

Distal Anterolateral Portal

The DAP was set 3 to 5 cm distal to the anterolateral portal, just anterior to the lateral aspect of the proximal femoral shaft and neck. In order to lead portal placement, direct arthroscopic visualization was used. The DAP was used as the working portal. The spinal needle was passed, dilated with dilators, and the open cannula was passed to work with a radio frequency probe and burr. The hip has been continuously rotated externally and internally as well as flexing and extending to resect the FAI "cam" lesion. The resection level was determined by an impingement test under arthroscopic visualization. The chondrolabral junction and acetabular cartilage can be visualized with a few seconds of manual traction performed by the assistant doctor. After resection of the cam lesion, the labrum was examined by a hook. [Figure 5]. Labrum examination can be performed easily at this procedure, especially after cam excision. When a degenerated labrum is

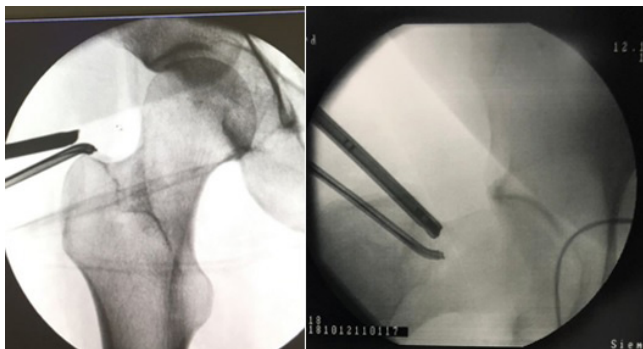


Figure 3. The view of the Anterolateral Portal on fluoroscopy.

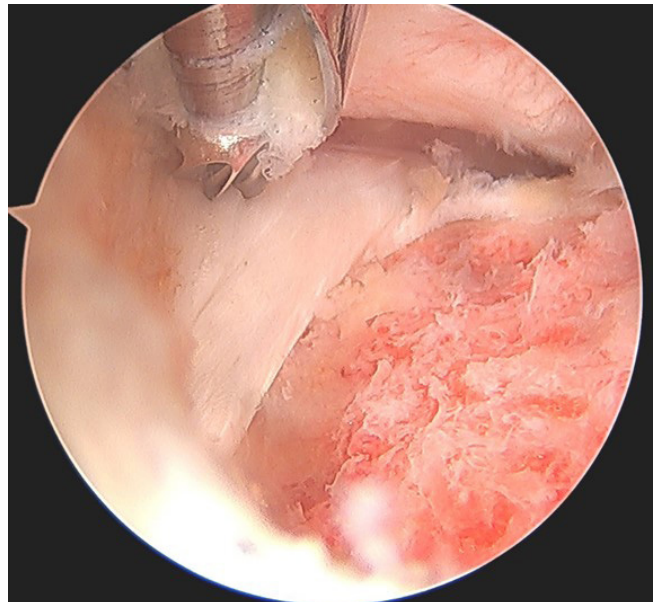


Figure 4. The view of the femoral neck after cam resection.

encountered, the labrum is debrided with a shaver. But in the case of a healthy labrum, the labrum is repaired with a simple stitch looped over the labrum via suture lasso from the anterolateral portal without any joint distraction.

Results

A total of 45 patients were diagnosed with FAI and underwent hip arthroscopy. The study took thirty-five patients (21 females and 14 males) who met our criteria into evaluation. The patients selected for the study had a mean age of 40.6 (17-69 y); while 19 patients had right-side (54%) and 16 had left-side (46%) FAI. The mean preoperative alpha angle was 68.12 ± 9.47 . The mean period of observation was 26.6 (6-63 m) months. Twenty patients (57%) had arthroscopic excision of the bump (cam) lesion, and seven patients (20%) had both cam and pincer lesion excision. Five patients (14%) had a labral repair, and three patients (8%) had labral resections.

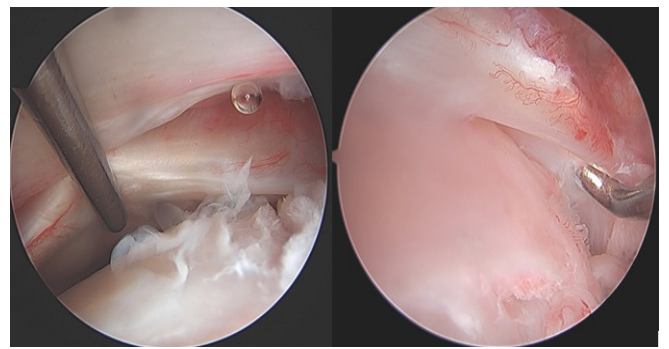


Figure 5. Labrum examination with hook.

Table I. Preoperative and end-of-follow-up Postel Merle d'Aubigné (PMA) scores

PMA score	Pain	Mobility	Ability to Walk	Total
Pre Op score	2.43±1.46	5.71±0.45	4.48±1.66	12.62±2.66
PMA at final follow-up	4.91±1.48	5.94±0.23	5.51±1.19	16.37±2.47
Significant difference	<0.001	<0.003	<0.001	<0.001

No secondary arthroscopy was required in any patient while a group of three patients only needed some additional surgical interventions like stem cell therapy, hip arthroplasty and pelvic osteotomy (8%).

The PMA score to assess functional results of the treatment shows improvement in ability to walk as well as level of pain the patients experience. The mean preoperative functional score (pain + ability to walk score) improved from 6.90 ± 2.66 to 10.42 ± 2.21 (P value < 0.001) at the final follow-up. The absolute result was calculated by adding the points for pain level and ability to walk: 11-12 standing for very good, 10 for good, 9 for medium, 8 for fair, and < 7 for poor. The preoperative functional score (pain + ability to walk) was medium in 7 (20%) patients, fair in 15 (42.86%) patients, and poor in 13 (37.14%) patients. At the end of observation period, the functional score improved to very good in 8 (22.8%) patients, good in 12 (34.28%), medium in 6 (17.14%), fair in 4 (11.42%), and poor in 5 (14.24%), according to the PMA scoring system. The relative result was calculated through the difference of the functional states before and after the operation. The scores for pain and ability to walk were multiplied by two: > 12 indicated very great improvement (8 patients, 22.8%), 7-11 indicated great improvement (9 patients, 25.7%), 3-7 indicated fair improvement (6 patients, 17.1%) and < 3 indicated failure (11 patients, 31.4%). Subjective improvement in patient satisfaction was 86%. There was a significant improvement in mean PMA score comparing the scores of 12.23 ± 16 before the operation to 15.14 ± 2.65 at the end of observation period. The difference in mobility has also been significant [Table 1]. The mean preoperative alpha angle decreased from 68.12 ± 9.47 to 49.04 ± 9.68 with a significant P value of 0.004 . We did not have any technique-related minor or major complications.

Discussion

The concept of peripheral compartment hip arthroscopy has grown to be more popular lately as the procedure does not require traction and has minimal complications. However, it is still debatable whether the only peripheral compartment hip arthroscopic procedure without entering the central compartment, is enough to treat conditions such as FAI. Our study shows promising results in terms of pain relief and the ability to walk in FAI patients treated with OPHA.

FAI as a pathology that causes progressive chondral and labral injury is diagnosed in higher numbers. Labral tears, which are mostly treated with simple labrum debridement, can often be associated with underlying

FAI.¹³ It is essential to have labrum integrity to maintain normal hip joint biomechanics. Labrum doesn't only serve to improve surface and depth of acetabulum to improve joint stability and to distribute biomechanical load for better weight bearing but also to have a sealing effect helping synovial fluid flow more efficiently from peripheral to central hip compartment. Thus, higher cartilage wear and load-bearing stresses on the joint is commonly observed in case of labrum due to loss of this sealing effect. With ongoing higher load-bearing, disruption of tissues initially limited to the labrum or chondrolabral junction may reach acetabular cartilage and load-bearing surface, causing softening of the cartilage, separation of cartilage from the subchondral bone, and eventually delamination, full thickness defects and femoral head injury.¹⁶

Entering the central compartment first is the most popular technique in hip arthroscopy and requires joint distraction. Dienst et al. describes peripheral compartment hip arthroscopy as a starting point in hip arthroscopy due to safer entry into the central compartment and reduced time for traction.⁷ From the concept of "Peripheral First" to "Peripheral Only", we present a versatile technique that provides access to excise cam lesions and enables treatment of labral pathologies and some types of pincer lesions.

In our technique, we use the anterolateral portal for vision and the distal anterolateral portal for working. Patient satisfaction and clinical outcome were evaluated using PMA scoring. Evaluation of the patient satisfaction based on level of pain and the distance patient is able to walk shows an increase ($P < 0.01$). Mean PMA score and the functional score shows a significant improvement, and the subjective improvement in patient satisfaction was 86%.

Although this study has some shortcomings and limitations, this was a retrospective study with fewer patients. Therefore, a well-organized prospective randomized clinical trial is needed in the future.

Most FAI syndromes include cam deformity. Additionally, cam deformity is in the peripheral compartment. OPHA may be enough in selected patients to prevent some important complications, such as injury to the cartilage, avascular necrosis, and prolonged operation times, associated with central compartment arthroscopy.

Conflict of interest: There is no conflict of interest to declare.

Funding: The authors, their immediate families, and any research foundation which they are affiliated with have not received any financial payments or other benefits

from any commercial entity related to the subject of this article.

Ethical approval: Prior to the study, permission was taken from the Academic Lectern Council.

Informed consent: All patients were informed about surgery and study prior to surgery.

Authors' contribution: IT was responsible for the conception and he performed the surgeries. VU collected the data and drafted the manuscript. MA collected the data and carried out analysis, WA wrote the paper, NE reviewed the literature.

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