

Hip arthroscopy in osteoarthritis consequent to FAI

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Summary. *Background:* Femoral Acetabular Impingement (FAI) means a set of alterations involving the acetabulum, proximal femur, or both of these components that can result in osteoarthritis. Arthroscopy is a choice for the treatment of initial stages of osteoarthritis (OA) in order to reduce evolution of the degenerative processes; advanced degrees of osteoarthritis are absolute contraindications. *Materials and Methods:* 40 patients affected by osteoarthritis in FAI underwent hip arthroscopy between May 2010 and March 2015. In all 40 cases OA secondary to FAI was diagnosed. All patients were clinically and instrumentally analyzed pre-operatively and then post-operatively after 3, 6, and 12 months. We evaluated the degree of OA using the Tonnis classification; our study included only patients affected by Tonnis grade 0-2 osteoarthritis. *Results:* The mean modified Harris Hip Score showed an evolution from 54.7 points to an average value of 89,1 points after 12 months. The Lower Extremities Functional Scale evolved by 43 points to an average value of 65,28 points. *Conclusions:* Based on the data of this study, supported by the concordance with recent literature reviews, in degrees Tonnis 0 and 1 an arthroscopic treatment is recommended. Instead the therapeutic algorithm in Tonnis grade 2 is still being discussed. We detect a significant response to arthroscopic intervention which leads us to suggest that validation of this method needs further confirmatory studies. (www.actabiomedica.it)

Key words: FAI, osteoarthritis, arthroscopy

Introduction

Osteoarthritis (OA) is a degenerative process of the hip that can be divided into two types: primary and secondary. Femoral Acetabular Impingement (FAI) is demonstrated to be an influencing factor that contributes to develop primary osteoarthritis (1-5).

FAI means a set of alterations involving the acetabulum, proximal femur, or both of these components that can result in OA.

All these forms are characterized by hip pain associated with reduction in the normal range of motion.

In literature it is reported that many years pass between the first evaluation and the correct diagnosis; an incorrect assessment of the clinical signs and the onset in young people and sportsman often leads to it being confused with groin pain (6).

From a morphostructural point of view, there are 3 forms of FAI:

- CAM
- Pincer
- MIXED TYPE (CAM + Pincer)

All these forms contribute to a progressive mechanical deterioration of the articular cartilage and cause a tear in the labrum with its subsequent degeneration and ossification. The instrumental diagnosis is based on a 3 projections radiographic study, indispensable for the measurement of loss in femoral head sphericity, off-set in the case of CAM and excess acetabular cover in Pincer (7-9).

Standard x-ray is the basic investigation that allows us to study the presence of an impingement and OA. It can be associated with the Computed Tomography (CT) for a better assessment of bone deformities.

A Magnetic Resonance Imaging (MRI) is necessary for further investigations for cartilage and acetabular labral tears (10-12).

Currently the indications to arthro MRI are not clear because of the high cost and the difficulty of the examination. In the past 10 years the evolution of techniques and toolkits used in hip arthroscopy has allowed us to expand the knowledge about the anatomopathology of this joint.

Hip arthroscopy is considered to be the gold standard for the treatment of FAI and its alterations (13-16), thus allowing an easy access to the joint to restore the correct morphology of the hip (17-20).

While in literature there is a clear consensus in the arthroscopic treatment of osteoarthritis (OA) in Tonnis grade 0-1, in order to restrain evolution of the degenerative process, an uncertain indication to arthroscopic treatment still remains in grade 2 of OA. Tonnis grade 3 is still considered a contraindication (21-27).

Objectives

The aim of this study is to evaluate clinical and radiographic results in patients affected by OA (grade 0-2 of Tonnis) and treated by hip arthroscopy.

Materials and methods

In the Orthopaedics and Trauma Surgery Department of the University of Verona, between May 2010 and March 2015, 40 patients (18 females and 22 males) affected by hip OA in FAI were studied. Patients had an average age of 47 years (range 34-61). In all 40 cases OA was diagnosed secondary to FAI. In 19 cases there was a CAM FAI, in 8 a Pincer and in 13 a MIXED type.

All patients were analyzed pre-operatively and then post-operatively after 3, 6, and 12 months, with an average follow-up of 20 months (range 6-24), through the modified Harris Hip Score (mHHS), Lower Extremities Functional Scale (LEFS), and instrumental diagnosis (X-Rays, CT and MRI). Specifically we served the conventional radiography, CT and

MRI in pre-operative stadium and X-Rays for the rest of the follow-up. The mHHS and LEFS were used to investigate the symptoms and the impact of the disease of the hip on daily activities (28-29).

The degree of OA was evaluated through the Tonnis classification and the angle of coverage, the acetabular index, alpha and beta angles, the offset ratio (AOR) was also measured.

The standard radiography was performed in the AP, LL and frog-leg position projections.

We used the 3D CT to evaluate anteversion, retroversion of the acetabulum and the femoral neck angles. The MRI was used for the study of the soft tissues and articular cartilage.

Hip OA was evaluated according to Tonnis classification which divides joint degeneration in stages 0,1,2,3 relating to a severity progressively greater.

Hip arthroscopy was performed with patients in the supine position on a traction-table. We used standard portals (Antero-Lateral, Anterior, Posterolateral). Depending on the deformities the following procedures were performed: CAM removal, Pincer rimming, restoration of labial tears with suture-anchors and microperforations, in cartilage lesions.

Weight bearing was forbidden for 30 days after surgery. During this period patients were treated with indometacin heterotopic ossification prophylaxis.

Results

Results are summarized in table 1-3.

In the 40 patients treated by hip arthroscopy there were 15 patients Tonnis grade 0, 12 patients Tonnis grade 1, 13 patients Tonnis grade 2. Clinical evaluation showed the following results.

In patients Tonnis 0 pre-operative mHHS was 51.9 and LEFS was 40.6. After 3 months mHHS was 89.1 and LEFS was 65.2; after 6 months mHHS was 89.1 and LEFS was 64.8; after 12 months mHHS was 88.9 and LEFS was 64.25.

In patients Tonnis 1 pre-operative mHHS was 54.4 and LEFS was 43. After 3 months mHHS was 90.2 and LEFS was 67.8; after mHHS was 88 and LEFS di 66.6; after 12 months mHHS was 92.5 and LEFS was 69.1.

Table 1. Preoperative values of alpha and beta angle, off-set, Coverage angle (CAM, Pincer and MIXED type)

Pre-op	CAM	PINCER	MIXED
Alpha angle	65° (range -50-85°)	46,8° (range 17-31°)	65,7° (range 54°-80°)
Beta angle	21° (range -10°-27°)	24,8° (range 60,5°-100°)	19,6° (range 10°-27°)
Off-set	0,10 (range -0,05-0,17)	0,16 (range 0,09-0,23)	0,09 (range 0,06-0,12)
Coverage angle	36,6° (range -25,3°-70,4°)	56° (range 48°-70°)	51,4° (range 45°-64°)
Acetabular index	9° (range -4°-15°)	8,3° (range 0°-13°)	4,6° (range 0°-7,8°)

Table 2. Postoperative values of alpha and beta angle, off-set, Coverage angle(CAM, Pincer and MIXED type)

Post-op	CAM	PINCER	MIXED
Alpha angle	51° (range 42°-57°)	46° (40°-52°)	48° (range 41°-65°)
Beta angle	27° (range -17°-31°)	33° (range 25°-38°)	32° (range 26°-37°)
Off-set	0,12 (range 0,08-0,21)	0,16 (range 0,09-0,23)	0,12 (range 0,09-0,15)
Coverage angle	36° (range 21°-42°)	43° (range 32°-60°)	39° (range 37°-43°)
Acetabular index	10° (range 5°-15°)	9° (range 0°-15°)	4,6° (range 0°-7,8°)

Table 3. Pre an postoperative values of clinical scores for Tonnis 0,1,2

	Preoperative		3 months		6 months		12 months	
	mHHS	LEFS	mHHS	LEFS	mHHS	LEFS	mHHS	LEFS
Tonnis 0	51,9	40,6	89,1	65,2	89,1	64,8	88,9	64,25
Tonnis 1	54,4	43	90,2	67,8	88	66,6	92,5	69,1
Tonnis 2	57	44,6	88,6	65,3	84,4	63,75	85,1	62,5

In patients Tonnis 2 pre-operative mHHS was 57 and LEFS was 44.6. After 3 months mHHS was 88.6 and LEFS was 65.3, after 6 months mHHS was 84.4 and LEFS was 63,25, after 12 months mHHS was 85,1 and LEFS was 62,8.

1st Clinical case

A 57 years old woman revealed a Pincer type FAI in osteoarthritis.

She was treated with hip arthroscopy, and after 12 months she showed optimal results, both clinically than radiographically (Figures 1a, 1b, 1c, 1d, 1e, 1f, 1g, 1h).

2nd Clinical case

A 50 years old man that feels pain and limitation during normal activities. Radiological examinations reveal a CAM type FAI in osteoarthritis Tonnis 2.He

was treated with hip arthroscopy but for the worsening symptomatology after three years it was necessary to treat the patient with hip arthroplasty (Figures 2a, 2b, 2c).

Discussion

Our measurements were in line with the orthopaedic literature. The data showed a significant improvement of the hip's considered morphological parameters, indicating the restoration of proper biomechanics.

The mHHS showed an evolution from 54.7 points with a standard deviation of 16.36 to 89.5 points with a standard deviation of 9.8. The LEFS evolved by 43 points with a standard deviation of 11.12 to 66.45 points with a standard deviation of 9.35. In this time the clinical outcome has changed for both tests by a low baseline score to a good final score. Concerning the cor-

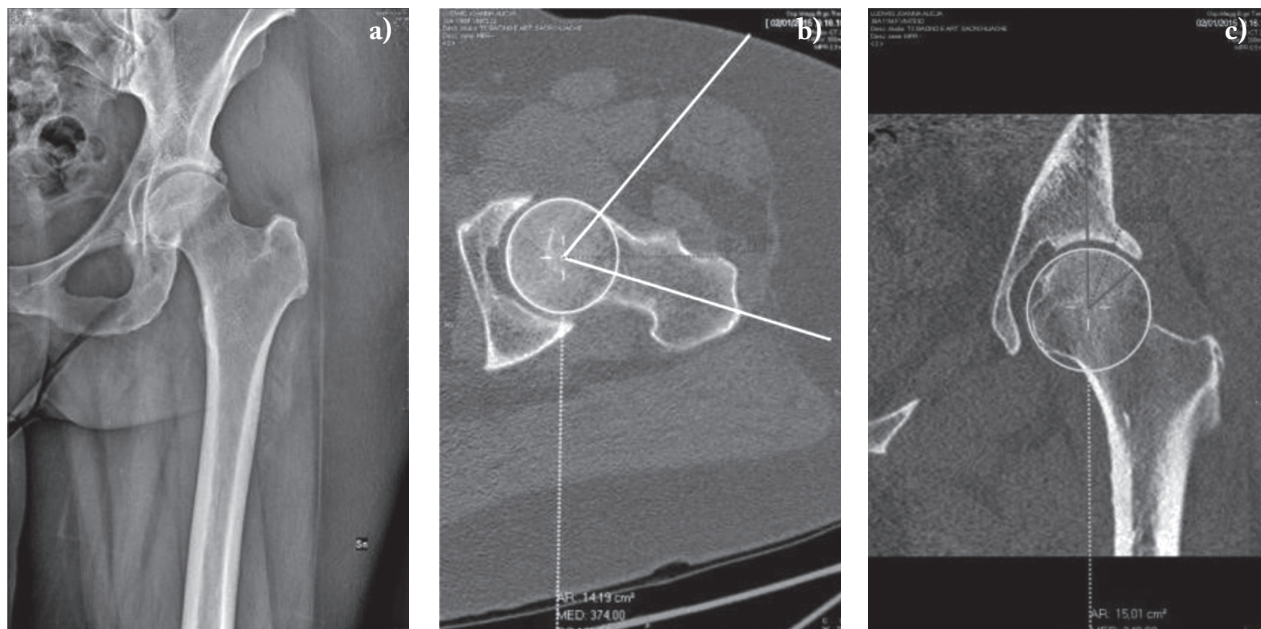


Figure 1 a, b, c. Pre operative rx and Tc

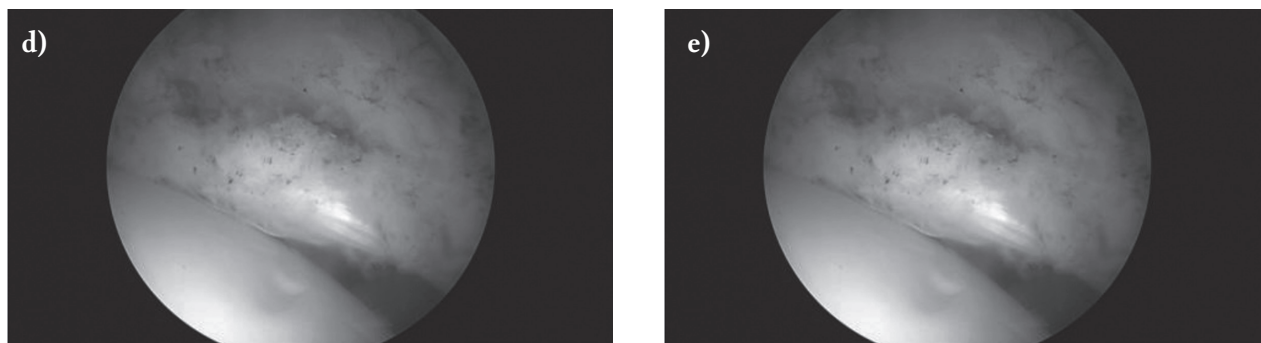


Figure 1 d, e. Intraoperative images, labral lesion (d) and labral lesion (e)

relation between the clinical scores and osteoarthritis, an improvement in the outcome obtained in all grades of osteoarthritis was assessed. The data suggest a better, albeit moderate, arthroscopic intervention response among patients classified as Tonnis 0 and 1, however considerable results are indicated even in patients with severe osteoarthritis. The values obtained, although they were not statistically significant because of the smallness and non-homogeneity of the sample population and the limited time of follow-up, provide interesting hypothesis about the evolution over time of these pa-

tients, suggesting a general maintenance of the results mainly among patients classified as Tonnis 0 and 1.

It would seem that the subjects Tonnis 2 who had undergone arthroscopy, despite the immediate present clinical scores substantially similar to the less severe osteoarthritis, gets less conservation of obtained outcome, already after the first year of follow-up.

This hypothesis is supported by the “t” test of Students which were compared to the averages of the scores at 12 months post-operative with the average post-op at 3 and 6 months.

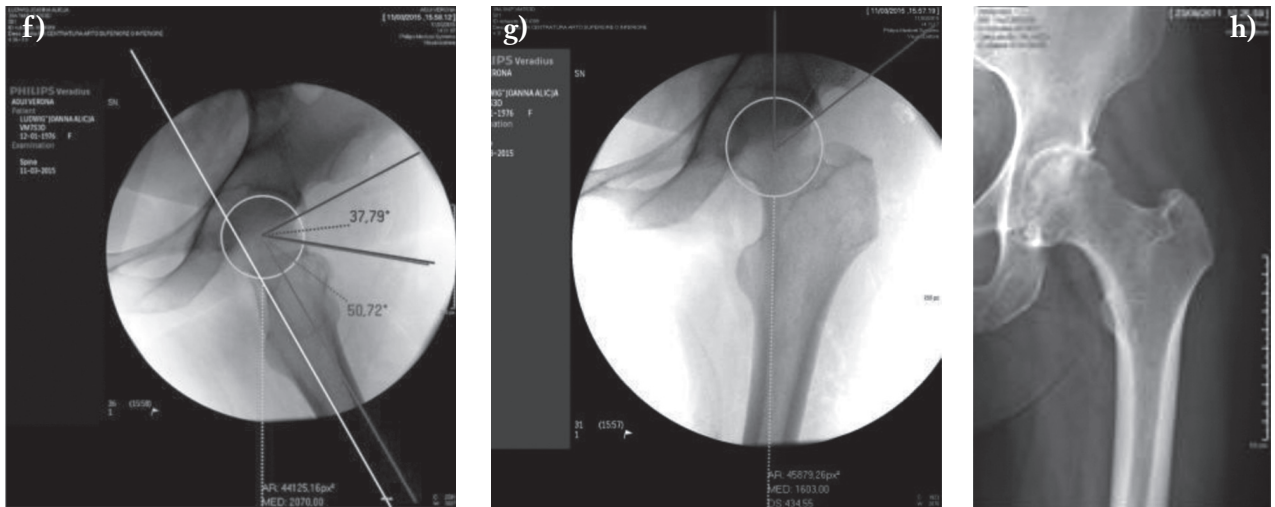


Figure 1 f, g, h. Post operative radiographies, surgery day (1f, 1g), after 12 months (1h)

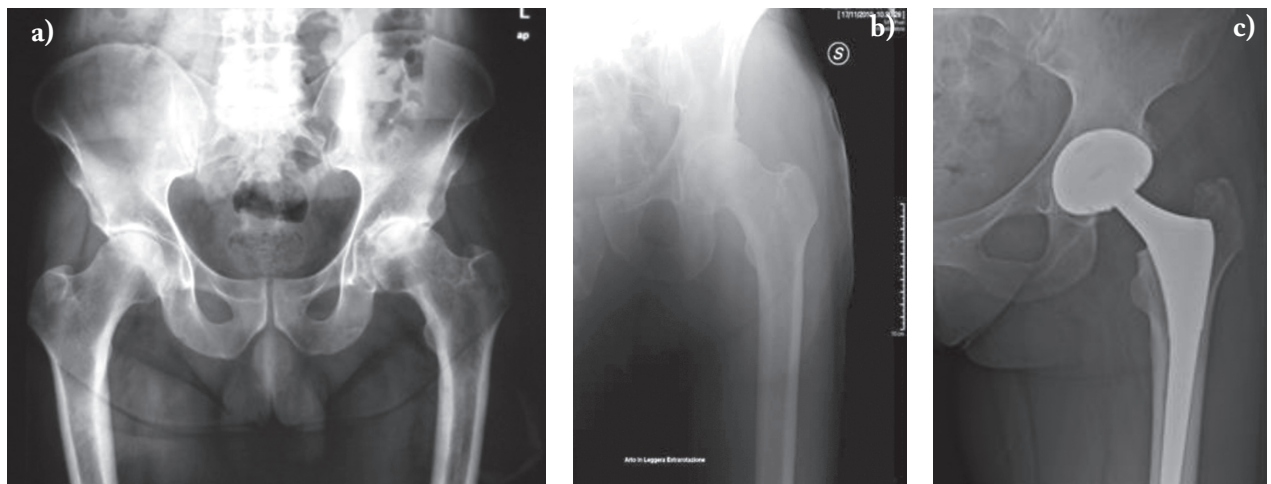


Figure 2 a, b, c. Post operative radiographies, after 12 months (2a), after 3 years (2b)

Analysing complications in our study sample we recorded a temporary paresthesia of the pudendal nerve, classified as a minor complication, and 3 hip arthroplasty conversions (12.5%), results comparable with those reported in the literature by J.D.Harris et al. reported a complication rate of minor complications of 7.5% and major complications of 0.58%, a rate of reoperation of 6.3% with a conversion rate to arthroplasty of 2.9% (17). B. Haviv et al. reported a failure rate, with conversion to hip replacement, in 16% of cases.

B.G. Domb et al. tried to define the limits of arthroscopy in osteoarthritis and documented a conversion rate of 23%, concluding that the evidence in the literature is still insufficient to be able to define the limit of arthroscopy in osteoarthritis, but pointing out that the combination of negative prognostic factors classified as Tonnis greater than 1 and the joint space of less than 2 mm (22–23).

J.G. Skendzel and J. Philippon highlighted the importance of the given parameter by the radiographic pre-operative joint space, with a survival of 86% at 5

years in patients with preserved joint space (> 2 mm) (12-24), compared with 20% in those who showed limited joint space (<2 mm).

M.J. Philippon et al reported a conversion rate of 20% in total prosthesis, but underlines the importance of the given parameter by the joint space, with a 3-year survival of 90% in patients with joint space > 2 mm against a survival of 57% for those who presented a joint space <2 mm, then with a risk 9.9 times greater for these patients to undergo conversion to hip replacement. B.G. Domb et al. concludes by considering hip arthroscopy as a treatment option for patients over 50 years if osteoarthritis is limited to the degree Tonnis 0 or 1 (25). R.Villar et al. performed a study on arthroscopy performed in cases of severe osteoarthritis, of which 44% required a hip replacement system 2 years after surgery, while until recently this level of osteoarthritis was considered a contraindication, a rate of 2-year survival of 56% can be considered acceptable in selected patients and accurately informed about risks and benefits (30).

Conclusions

Lancet has called the prosthetic hip replacement “the intervention of the century” for its excellent results, the surgical procedure is not free from complications; the inevitable wear of the prosthetic components, which after some time may require revision surgery, often more risky than the previous, drives the orthopedist to postpone the first implant intervention as soon as possible. In this perspective the possibility, in patients with osteoarthritis Tonnis 2, to postpone the first arthroscopy implant seems suggestive. Let it not be forgotten that the clinical evolution of a patient with moderate osteoarthritis and treated arthroscopically is poorly predictable.

Based on the data of this study, supported by the concordance with recent literature reviews, in degrees Tonnis 0 and 1 an arthroscopic treatment is recommended. Instead the therapeutic algorithm in Tonnis 2 is still being discussed. As our data shows we detect a significant response from arthroscopic intervention and this leads us to suggest it is valid method that needs further confirmatory studies.

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