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CONSERVATIVE PHYSIOTHERAPY TREATMENT OF FEMOROACETABULAR IMPINGEMENT

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Abstract. *The femoro-acetabular impingement (FAI) syndrome is a motion-related disorder of the hip joint with premature contact between the acetabulum and the proximal femur. It is a relatively new clinical entity and no strict treatment protocols and guidelines have been established yet. Furthermore, patients are often misdiagnosed and not properly treated. We report a clinical case of a young adult female patient presenting with a bilateral FAI-CAM type deformity during the last 2 years. An individual progressive global elastic resistant training program was established which involved stimulation to all affected muscle groups using Pilates concept. Hip-specific and functional lower limb strengthening targeted the deep hip external rotators, abductors and flexors in the transverse, frontal, and sagittal planes. Improving the dynamic stability and Core stability was the main aim of the challenging physiotherapy treatment in this case. A good functional result was registered at 6 months follow up. All therapeutic activities were performed in a pain free range of motion which was of paramount importance for achieving excellent patient compliance and successful outcome respectively. The applied treatment strategy demonstrated to be reliable and could be a helpful tool in the armamentarium of contemporary physiotherapy when dealing with the FAI group of patients.*

Key words: femoro-acetabular impingement, hip joint, physiotherapy, Pilates concept

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INTRODUCTION

The femoro-acetabular impingement (FAI) syndrome is a motion-related clinical disorder of the hip joint with premature contact between the acetabulum and the proximal femur, resulting in particular symptoms, clinical signs and imaging findings [1-3]. Degenerative changes and osteoarthritis may develop because of the abnormal contact [4].

FAI syndrome is associated with three variations of the hip joint morphology: cam type, pincer type and a combination of both (Fig. 1).

Cam type morphology: the femoral head is not round and cannot rotate smoothly inside the acetabulum, which can then lead to chondrolabral separation and chondral delamination typically in the anterosuperior aspect of the acetabulum [2]. This morphology is more common in young, athletic men [5, 6].

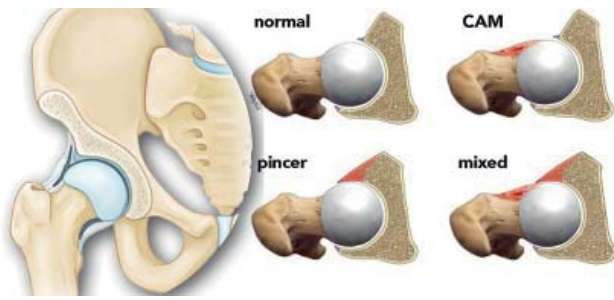


Fig. 1. Femoroacetabular impingement (FAI) types [1]

Pincer type morphology represents an “overcoverage” of the femoral head by the acetabulum in which the acetabular rim is extended beyond the typical range, either in one focal area or more generally across the acetabular rim [4]. This morphology is more commonly seen in women [5].

Mixed type morphology can lead to damage of the articular cartilage and the labrum due to impingement between the acetabular rim and the femoral head during movement, which causes the symptoms of FAI syndrome [6].

The etiology of the FAI syndrome likely is multifactorial. Perthes’ disease, repeated trauma, professional athletes, slipped capital epiphysis and some post-infectious conditions may trigger the development of FAI [4]. Metabolic analysis of tissue samples suggested that articular cartilage may be the main site of inflammation and degeneration in hips with FAI [6]. If osteoarthritis progresses, metabolic activity spreads to the labrum and synovium [7].

CASE REPORT

A 45-year-old woman presented with a bilateral symptomatic FAI morphology for the last 2 years. The patient was an ex-professional dancer with approximately 25 years of practice currently working as a trainer. At the beginning of her complaints she was misdiagnosed with Bechterev’s disease and bilateral coxarthrosis and was treated elsewhere with intraarticular Platelet-Rich Plasma (PRP) applications without Ultrasound guiding 2 times in 3 months for a period of 6 months; plus intraarticular corticosteroid injections 3 times in 1 year, NSAIDs (Ibuprofen) 2 times for 7 days in 1 year. Physiotherapy was also applied and included Shock Wave, heat therapy (TEKAR), passive soft tissue stretching and deep myofascial massage. The patient reported that physiotherapy was very painful. All the program was carried out for a period of 2 years and finally the patient was offered a bilateral alloplastic hip joint replacement which she refused.

At her first visit to our practice she stated that the previous treatment had no positive result and the symptoms had become even worse. After consultation with an experienced orthopaedic surgeon bilateral FAI-cam type was confirmed, and the previous diagnosis was rejected. The orthopaedic surgeon recommend physiotherapy in a different modality performed by our team.

An individual treatment program with regular follow up at the 1st visit, 3 and 6 months following physiotherapy was established in our practice. A good functional result was registered at the 6 month follow-up.

Below are the highlights of our treatment approach:

Treatment strategy

A strict physiotherapy programme was established as follows:

Assessment

1. Gait observation
2. Range of motion (ROM) using standard Goniometer

Toe touch test. Measurement of the distance from the fingertips to the ground. The distance between the end of the fingers and the ground is measured with a ruler.

Standard Hip Impingement test [8]. Patient lies supine. Hip is internally rotated and adducted during passive flexion to 90°. Reproduction of patient’s symptoms (i.e. groin and/or lateral trochanteric pain).

Trendelenburg test. Hip joint will be adducted and the pelvis will shift to the ipsilateral side iff muscle weakness or hip joint pathology is present [9].

The Visual Analogue Scale (VAS) measures pain intensity. The VAS consists of a 10 cm line, with two end points representing 0 (‘no pain’) and 10 (‘pain as bad as it could possibly be’) plus questions of where, when is it present, how long lasting

According to the assessment results we decided how to further organize our treatment strategy.

Clinical findings are listed in Tables 1 and 2.

Complex treatment modality included:

- **Deep oscillation** (“Physiomed”) programme for muscle stiffness and arthrosis.
- **COMPEX SP 6.0-program** for transcutaneous electrical nerve stimulation (TENS) for pain relief involving use of a mild electrical current. Position of electrodes in the inguinal painful area 2,5 cm apart.
- **Kinesiotaping** correction technic “I” shape application in the inguinal aspect to release the myofascial tension.

- **Proprioceptive Neuromuscular Facilitation** – “Hold-Relax” for piriformis muscle, and iliopsoas muscle. Technique – isometric contraction is performed against maximum resistance on muscle with increased tone according to the stage of treatment. It is followed by volitionally relaxation on those muscle, which can be performed with isotonic contraction on agonists.
- **Pilates apparatus** (“Balance body”) exercises using “Reformer”, “Wunda chair”, “Cadillac”. All exercises were addressing to the following primary stabilizers of the hip joints: iliopsoas, gluteus medius, gluteus maximus, quadratus femoris, obturator internus, inferior and superior gemelli, adductor brevis and pectineus. A range of 5 to 10 repetitions of each exercise was performed 3 times per week starting from the first visit up to the 6th month in 60 minutes session. After the 6th month patient continued her visits to our practice 2 times per week.
- **Home exercise programme:** The patient was instructed how to apply kinesiotaping at home on her

own. An individual program of Pilates exercises with elastic, “Thera-band” in a similar way like the one in apparatus was elaborated for the patient, self-muscle stretching and foam roller technics to relief muscle tightness were also applied.

Outcome

A significant improvement in ROM, Toe test, Hip impingement test, Trendelenburg test and VAS was found at 6th month following the conservative treatment (Tables 1 and 2). The strength and neuromotor control of the deep hip stabilizers was improved by applying a graded global hip strength and neuromotor control program with Pilates equipment. On the other hand, an improvement was observed in core and trunk muscle function, as well as in normal gait cycle with three aspects: weight acceptance, single limb support, swing limb advancement and balance control. Reduction of the overactivity in the secondary hip stabilizers was achieved by using a soft tissue technique “Hold relax” from neuro muscular facilitation and relief the pain using “Deep Oscillation” and “COMPEX”.

Table 1. Assessment of the range of motion of the left (L) and right (R) hip joints. The achieved improvement is clearly seen

Patient female 45 y old	Hip joint Flexion	Hip joint Extension	Hip joint Abduction	Hip joint Adduction	Hip joint External rotation	Hip joint Internal rotation
	L/R	L/R	L/R	L/R	L/R	L/R
1 st visit	75°/85°	5°/5°	15°/20°	5°/20°	0°/10°	5°/10°
3 rd month	80°/85°	10°/10°	20°/20°	5°/20°	15°/20°	5°/10°
6 th month	85°/90°	15°/20°	20°/25°	10°/20°	25°/35°	10°/20°
Normal ROM	115°-125°	10°-30°	45°	10°-30°	45°	45°

Table 2. Examination findings at 1st visit, 3 months and 6 months follow up. At 6th month: VAS showed poor improvement, the hip impingement test demonstrated that a strong pain was still present, the toe test indicated a better improvement with 2,5 cm and the Trendelenburg test showed slight increase of the m. gluteus medius strength

VAS	1st visit, 8 from 10	3 rd month, 7 from 10	6th month, 5 from 10
When?	When? During physical activity, during the night, bilateral – left side more	When/Where?	When/Where?
Where?	Where? Inguinal area, m. piriformis insertion; bilateral, more left side	Same, no changes or improvement were found	Poor improvements were found
Hip impingement test	1 st visit exacerbated pain	3 rd month exacerbated pain	6 th month Still strong pain
Toe test	1 st visit 4 cm from ground	3 rd month 2.5 cm from ground	6 th month 1,5 cm from ground
Trendelenburg test	m. gluteus medius weakness	m. gluteus medius weakness	slight strength improvement in m. gluteus medius

DISCUSSION

The FAI syndrome is a relatively new entity in daily practice and no strict treatment protocols and guidelines have been yet established. Casartelli et al. [10] suggested that improving the neuromuscular function of the hip should be a goal of conservative protocols for FAI syndrome due to weakness of deep hip musculature and an expected subsequent reduction in dynamic stability of the hip joint.

The goal of our treatment strategy was to elaborate the correct individual programme in order to further prevent functional complications and to restore the muscle function, core stability, compensatory mechanisms of movements and gait. According to the Jarosz B. [11] most FAI patients may exhibit a positive Trendelenburg sign and positive impingement test which would fall out positive in up to 95% of all FAI patients. Considering that, we additionally incorporated balance board exercises into the home programme. It has been demonstrated that patients with FAI have weaker hip musculature [12]. That's why we applied special exercises with Pilates apparatus for strengthening the muscular imbalance and dynamic control deficits in the hip joints.

Rechford T. et al. [13] found that a forceful contraction of the abdominal muscles with the trunk laterally flexed by dancers is the common mechanism of FAI morphology. That is the answer why our patient had reported pain with opposite side-bending as well as pain on palpation. Pain was also demonstrated at the anterior hips and groin with radiation to L2 to L5. As reported by Weaker G. and Munnings F. [14], anatomic variations in the proximal femur, such as a reduction in anteversion or head-neck offset, often lead to labral tears. Having that in mind, we applied generalized hip strengthening exercises with specific activation of the deep stabilizers prior to completing the exercise based on the clinical assessment.

It is worth mentioning that all functional activities were performed with a pain free range of motion which was of paramount importance for the patient's compliance and the successful outcome. A pain-free approach is the gold standard in our practice in general.

CONCLUSION

Conservative management of symptomatic FAI should aim at decreasing the adverse hip loads through the implementation of hip muscle strength programmes, pain relief and modification of external joint loads which significantly improve the symptoms. The reported clinical case illustrates how a good functional outcome could be achieved

in patients with bilateral FAI morphology when adequate physiotherapy is applied. Even quite promising at 6 months follow-up, further studies in a larger group of patients are still needed to verify the durability of the obtained clinical results. Nevertheless, we are convinced that our treatment strategy could be a helpful toll in the armamentarium of contemporary physiotherapy when dealing with the FAI group of patients.

Disclosure Summary: *The authors have nothing to disclose.*

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