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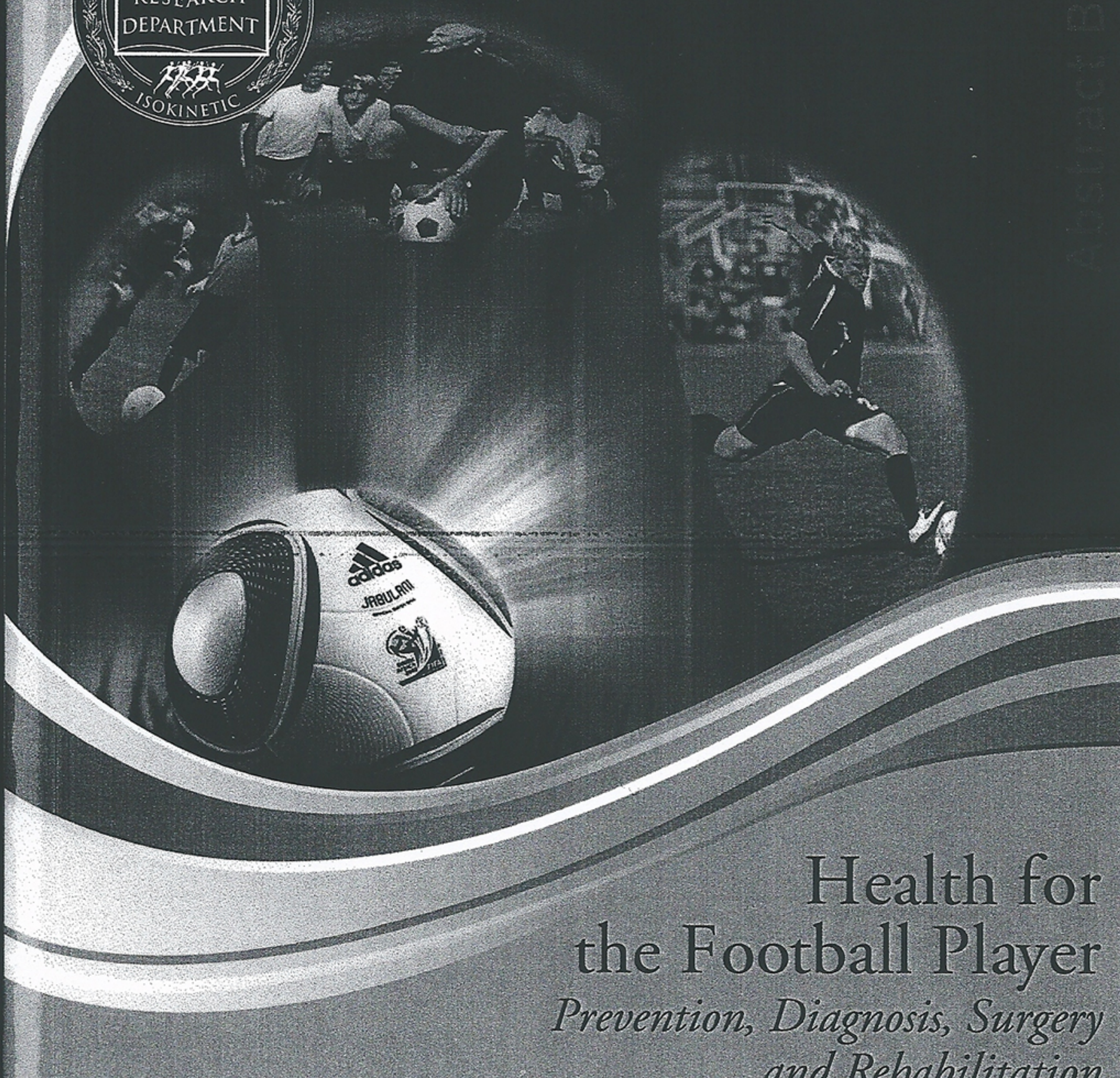

Health for the Football Player

Prevention, Diagnosis, Surgery and Rehabilitation

La Salute del Calciatore

Prevenzione, Diagnosi, Chirurgia e Riabilitazione

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HEALTH FOR THE FOOTBALL PLAYER: PREVENTION, DIAGNOSIS, SURGERY AND REHABILITATION

LA SALUTE DEL CALCIATORE: PREVENZIONE, DIAGNOSI, CHIRURGIA E RIABILITAZIONE

Con il patrocinio di
With endorsement of
Università degli Studi di Bologna
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Abstract book

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e d i t o r i

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BIOMECHANICAL ANALYSIS IN FEMOROACETABULAR IMPINGEMENT

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Introduction

There are a multitude of well recognized hip and groin injuries that commonly affect athletes, in particular football players.
Femoroacetabular impingement (FAI) is a more recently recognized cause of hip pain in athletes. It results from morphological abnormalities of the proximal femur and/or acetabulum which produce abnormal abutment of the acetabulum rim and femoral head-neck junction.
FAI consists of two main variations: i) pincer impingement (acetabular-based) is a result of local or general over-coverage of the femoral head by the acetabulum; ii) cam impingement (femoral-based) is caused by decreased concavity of the femoral head-neck junction most commonly in the antero-superior region. They can occur alone or in combination.
Both pincer and cam impingements are known to result in pathological consequences of cartilage delamination and labral lesions, leading to significant pain and dysfunction during sport performance and activities of daily living in athletes.
Although a connection between anatomic abnormalities of the hip and the development of hip osteoarthritis has been recognized, there are limited data on the natural history and the underlying pathologies of FAI.
Gait analysis is useful to study hip kinetics and kinematics in order to gain a better understanding of this dysfunction. Since walking causes hip pain in FAI patients, it is important to determine how FAI affects gait biomechanics. Biomechanical analysis not only studies hip alterations, but also the influence of hip musculature and adjacent joints mobility in FAI pathomechanism.

Studies on FAI

There is a unique study (1) in current literature regarding walking biomechanics of FAI that underlines some typical alterations. The FAI patients have lower peak hip abduction and total frontal ROM, slight reduction in sagittal hip ROM, decreased pelvic mobility in the frontal plane compared to the controls during walking. These alterations from normal gait pattern are not related to limited hip mobility caused by impingement: the gait adaptation in the FAI patients represents a different motion strategy, likely characterized by differences in the recruitment of hip joint muscles. It could be a hip joint stabilization strategy adopted by these patients to compensate for a deficiency in hip muscle function. There could also be an important soft tissue restriction related to the decreased maximal hip extension. FAI may even involve multiple joints such as the sacro-lumbar joint.
Another important biomechanical study (2) shows the effect of FAI during maximum squat. The maximal depth squat requires a large hip ROM that exacerbates hip pain in FAI athletes. Maximal squat is an appropriate test for lower limb functionality, which could be useful for diagnosis. Patients with FAI have no differences in hip motion during squatting but have decreased sagittal pelvic ROM compared to the control group. This reduction in pelvic mobility in FAI highlights the multifactorial nature of this pathology.

Diagnosis and surgery

There are currently several methods of assessing the degree of impingement by use of CT and magnetic resonance imaging scans, which can be used in conjunction with magnetic resonance arthrography and arthroscopy to assess the damage caused to the underlying structures of the hip. Both open and arthroscopic surgical methods are used, with recent reports in athletes showing excellent results for lifestyle improvement and frequency of returning to sport.
As surgical options evolve, rehabilitation protocols must meet the challenge of providing a safe recovery, yet meeting the aim of returning to high levels of functioning (3).

Functional recovery

Biomechanical studies may be also useful for assessing the functional recovery during post-operative rehabilitation. Movement analysis is able to monitor the restoration of physiological motor strategy during gait and sport activities. In order to reach this goal the athletes must follow a specific reconditioning protocol after surgery.
The surgical treatments that generally focus on restoring the femoral head-neck offset are not sufficient to obtain the complete functional recovery. Surgery must be implemented by a tailored protocol that includes muscular reconditioning, soft tissue stretching and pelvic mobility adaptation, as biomechanical studies (1,2) suggest.

Conclusion

Biomechanical analysis in FAI is able to assess the motor strategy during walking and sport activities in athletes, in particular football players: it can be useful to study the pathomechanism of FAI and to evaluate the functional outcome after treatment.

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