



Original Article

Prevalence of femoroacetabular impingement morphology in asymptomatic youth soccer players: magnetic resonance imaging study with clinical correlation[☆]

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ABSTRACT

Objective: To determine the prevalence of femoroacetabular impingement morphology (FAIM), cam- or pincer-type, by magnetic resonance imaging (MRI) in asymptomatic adolescent soccer players, and to evaluate the possible correlation between alterations on MRI and clinical examination findings.

Methods: A cross-sectional study was conducted to determine the prevalence of FAIM in asymptomatic youth soccer players aged 13–18 years. A total of 112 hips in 56 players (mean age 15.3 years) were evaluated by MRI. Images were examined by two musculoskeletal radiologists for signs of FAIM. Cam-type (impingement) deformity was diagnosed by alpha angle $\geq 55^\circ$ or head-neck offset < 7 mm. Pincer-type (impingement) deformity was diagnosed by center-edge angle (CEA) $\geq 35^\circ$ or acetabular index $\leq 0^\circ$. Other MRI changes, characteristic of FAIM, were observed. Clinical examination was performed to determine the range of motion (ROM) of the hips. In addition, specific tests for anterolateral and posteroinferior impingement were performed.

Results: The prevalence of MRI findings consistent with FAIM among this young population was 84.8% (95/112). The alpha angle was $\geq 55^\circ$ in 77.7% (87/112) of hips, while the CEA was altered in 10.7% (12/112) of hips. Qualitative MRI findings consistent with FAIM were highly prevalent, and included loss of sphericity of the femoral head (77%), osseous bump (44%), femoral neck edema (21%), and acetabular osteitis (9%). The anterior impingement test was positive in 15% of the hips evaluated.

[☆] Study conducted at the Universidade Federal do Rio Grande do Sul, Faculdade de Medicina, Hospital de Clínicas de Porto Alegre (HCPA), Department of Orthopedic Surgery, Porto Alegre, RS, Brazil.

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Conclusion: Youth soccer players have a high prevalence of FAIM as diagnosed by MRI. There is no correlation between physical examination findings and MRI evidence of FAIM in this population.

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Prevalência da morfologia de impacto femoroacetabular em jogadores de futebol juvenil assintomáticos: estudo de ressonância magnética com correlação clínica

R E S U M O

Palavras-chave:

Impacto femoroacetabular
Articulação do quadril
Futebol
Ressonância magnética

Objetivo: Determinar a prevalência da morfologia de impacto femoroacetabular (MIFA), tipo cam ou pincer, por ressonância magnética (RM) em jogadores de futebol adolescentes e assintomáticos, bem como avaliar a possível correlação entre as alterações observadas na RM e os achados do exame clínico.

Métodos: Este estudo transversal teve como objetivo determinar a prevalência de MIFA em jogadores de futebol juvenil assintomáticos, com idade entre 13 e 18 anos. Um total de 112 quadris de 56 jogadores (idade média 15,3 anos). As imagens foram examinadas por dois radiologistas musculoesqueléticos, com o objetivo de identificar sinais de MIFA. A deformidade (impacto) do tipo cam foi diagnosticada quando o ângulo alfa $\geq 55^\circ$ ou desvio entre a cabeça e o colo femoral < 7 mm. A deformidade (impacto) do tipo pincer foi diagnosticada quando o ângulo centro-borda (ACB) $\geq 35^\circ$ ou índice acetabular $\leq 0^\circ$. Outras alterações características de MIFA foram observadas na RM. A amplitude de movimento (ADM) dos quadris foi determinada a partir de um exame clínico. Além disso, foram realizados testes específicos para impactos anterolaterais e posteroinferiores.

Resultados: A prevalência de achados de RM consistentes com MIFA nessa população foi de 84,8% (95/112). O ângulo alfa foi $\geq 55^\circ$ em 77,7% (87/112) dos quadris, enquanto o ACB apresentou alterações em 10,7% (12/112) de quadris. Observou-se uma alta prevalência de achados qualitativos de RM consistentes com MIFA, incluindo perda de esfericidade da cabeça femoral (77%), elevação óssea (44%), edema femoral (21%), e osteíte acetabular (9%). O teste de impacto anterior foi positivo em 15% dos quadris avaliados.

Conclusão: Os exames de RM indicaram uma alta prevalência de MIFA entre jogadores de futebol juvenil. Nesta população, não houve correlação entre os achados do exame físico e a evidência de MIFA observada na RM.

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Introduction

Femoroacetabular impingement (FAI) is a condition resulting from abnormal contact between the femoral head and the acetabular rim, usually caused by a change in morphology of the proximal femur and/or acetabulum.¹⁻⁴ Ganz et al.² described two basic mechanisms of FAI: cam and pincer. The cam mechanism occurs in patients with a non-spherical femoral head or with a decreased offset between the head and neck of femur. The impingement area is typically located on the anterolateral portion of the femoral head-neck junction. Pincer impingement, in turn, is characterized by acetabular overcoverage caused by an excess of the anterior wall.^{1,2,4,5}

FAI may decrease the range of motion (ROM) of the hip, especially in internal rotation (IR) of the flexed hip.^{2,6} FAI is described as a cause of hip pain exacerbated by physical activity, and occurs mainly in young adult patients.^{4,5} Clinical

symptoms usually do not appear until adulthood; however, detection of FAIM is becoming increasingly common in the pediatric population.⁷ Patients often develop cartilage lesions and injury to the acetabular labrum, which can progress to hip osteoarthritis (OA) if the anatomic changes are not treated or the physical activity modified.^{2,8-10}

Adolescent patients who practice sports often perform high-impact activities that require extreme movements of the hip, which may predispose to more frequent and more intense conflicts between the proximal femur and the acetabulum.¹¹

Physical activity during bone growth seems to be associated with an increased risk of cam-type deformity. Siebenrock et al. suggested that cam impingement in young athletes may be related to an abnormality in the physeal plate. Studies in high-performance adolescent basketball and hockey players found a high incidence of cam type FAI.^{3,12}

The purpose of this study was to determine the prevalence of FAIM (both cam and pincer type) in asymptomatic youth

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