Hip Strength Deficits in Patients With Symptomatic Femoroacetabular Impingement and Labral Tears

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Purpose: To determine the prevalence of hip strength deficits in a consecutive cohort of patients with unilateral femoroacetabular impingement (FAI) compared with the asymptomatic contralateral hip. **Methods:** Fifty consecutive patients undergoing hip arthroscopy for symptomatic FAI underwent preoperative hip strength dynamometer measurements and were included in the study. Manual isometric hip strength measurements were performed with a handheld dynamometer and included measurements of various hip strengths (flexion, extension, adduction, abduction, internal rotation, and external rotation). Weakness greater than or equal to 10% for any given measurement was defined as a strength deficit in this study. Clinical data including age, gender, size of labral tear, and preoperative outcome scores were recorded. Outcome scores included the modified Harris Hip Score and Short Form 12 Physical Component. **Results:** The mean age of patients in the study was 32.0 years (range, 18.1 to 49.8 years). There were 32 male and 18 female patients. Hip abduction strength deficits were seen in 46% of patients and flexion strength deficits in 42% of patients. An 8% decrease in strength of the involved hip was seen in flexion, and an 8.7% decrease was seen in abduction. Patients with hip flexion strength deficits had a loss of function (mean modified Harris Hip Score, 57.8 *v* 66.1; $P = .021$) and larger labral tears (mean, 39 mm *v* 28 mm; $P = .003$). Hip flexion strength deficits correlated with loss of hip flexion ($r = 0.373$, $P = .008$). **Conclusions:** Hip strength deficits were common in patients presenting with unilateral symptomatic FAI and occurred most commonly in hip abduction and flexion. Strength deficits in hip flexion were associated with decreased function, loss of motion, and larger labral tears in patients with FAI and labral tears. **Level of Evidence:** Level IV, prognostic case series.

Symptomatic femoroacetabular impingement (FAI) is recognized as a common cause of hip pain and decreased function in young adults.[1] However, the morphologic changes consistent with FAI are extremely common even in asymptomatic active young athletes.[2-4] The development of symptoms in individuals at risk of hip pathology because of underlying structural abnormalities is currently poorly understood. Patients with symptomatic FAI present with varying degrees of pain, weakness, and inability to participate in athletic activities.[5-7] It is unclear if loss of strength contributes to the patients' decreased function and increased symptoms.

Deficits in hip strength may play a role in the symptomatic presentation of patients with clinical features of FAI. Although manual muscle strength testing is commonly used for the clinical assessment of muscle strength, it is relatively inaccurate and unreliable in the absence of severe weakness.[8,9] Isometric handheld dynamometer strength testing has been reported in the literature as a reliable method for the measurement of hip strength.[10] Isometric dynamometer testing can be easily incorporated in the clinical setting, is relatively inexpensive, and has excellent intratester reliability.[11-16] Strength comparisons can be performed relative to an asymptomatic contralateral extremity or matched controls, with differences greater than 10% generally considered to represent a deficit.[10]

Determining the prevalence of hip strength deficits and determining their association with increased

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disability may allow for the development of potential nonsurgical or preoperative programs to improve disability. The purpose of this study was to determine the prevalence of hip strength deficits in a consecutive cohort of patients with unilateral FAI compared with the asymptomatic contralateral hip. We hypothesized that strength deficits would be identified in hips with symptomatic FAI when compared with the opposite extremity and these deficits would correlate to decreased function.

Methods

This study was approved by our institutional review board. Fifty consecutive patients undergoing hip arthroscopy for symptomatic unilateral FAI by a single surgeon (M.J.P.) were included in the study. Patients were evaluated between January and August 2011 (Fig 1). FAI was diagnosed based on combined clinical and radiographic assessment.[17,18] For this study, a positive impingement test (FABER) or flexion–abduction–external rotation test was defined as FAI. In addition, cam impingement was operationally defined as an alpha angle greater than 55°, and pincer impingement was defined as the presence of the crossover sign. If both were present, the hip was classified as having combined impingement. The presence of contralateral hip symptoms was determined at the time of preoperative evaluation by patient history and clinical examination findings; in addition, the development of contralateral hip symptoms was monitored for a minimum of 1 year postoperatively. The inclusion criteria were a diagnosis of unilateral FAI with strength measurements preoperatively. The exclusion criteria included age older than 50 years, previous hip surgery, radiographic osteoarthritis (minimum joint space width <2 mm), and contralateral hip symptoms (at presentation or within 1 year postoperatively). Clinical data including age, gender, dominant leg, sports participation, and clinical outcome scores were recorded. Clinical outcome scores included the modified Harris Hip Score (mHHS) and Short Form 12 (SF-12) Physical Component. At arthroscopy, all patients underwent labral repair.

Standardized isometric hip strength measurements were performed by a single tester (S.E.G.) using a handheld dynamometer (MicroFET2; Hoggan Health Industries, West Jordan, UT). Handheld dynamometer strength measurements of 8 strengths (hip flexion, extension, abduction in extension, abduction in flexion, adduction, internal rotation, and external rotation and knee flexion) were performed. Knee flexion strength was included and used as a control measurement. Testing of each strength measurement was performed using 3 trials, with the maximal voluntary contraction used for analysis. Force measurements were recorded in newtons, and torque values (in newton meters) were recorded based on measurement of the associated lever arm length. Individual testing was performed with a 3- to 4-second duration of maximal effort. Measurements of the symptomatic hip and contralateral asymptomatic hip were performed.

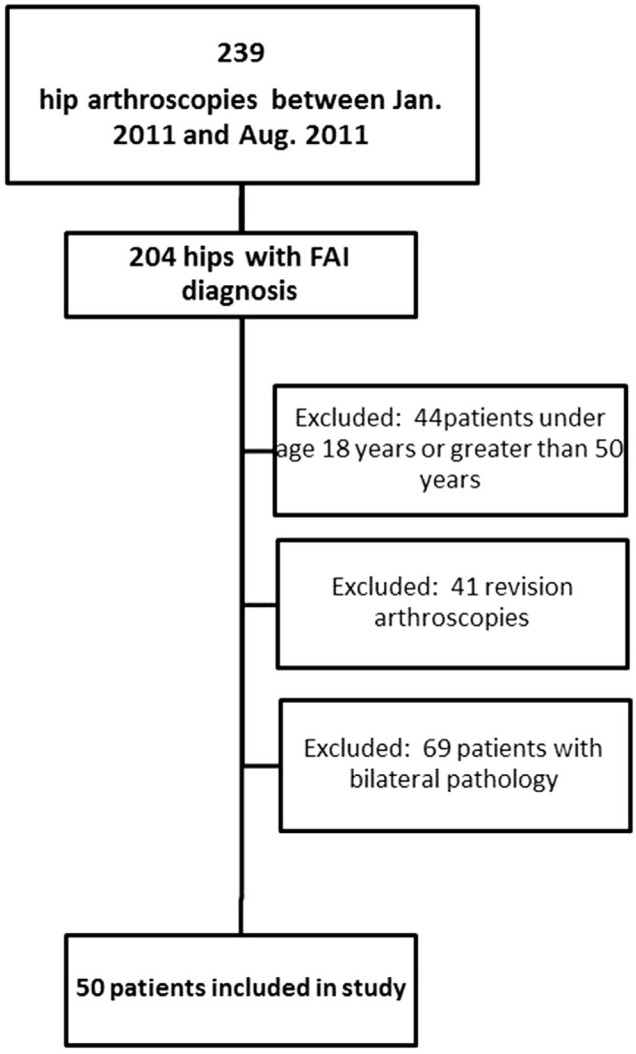

Fig 1. Patient selection flowchart. (FAI, femoroacetabular impingement.)

Testing was performed by a trained athletic trainer (S.E.G.) and in a standardized sequence alternating between hips in all patients. Testing was performed in the supine, prone, side-lying, and sitting positions. In the supine position, hip flexion strength was measured with the hip flexed approximately 10° and the knee extended. Measurements of hip extension, hip internal/external rotation, and knee flexion strength were performed with the patient in the prone position with the hip in a neutral position and knee flexed 90°. With the patient in the lateral decubitus position, hip abduction in extension was measured with the hip in a neutral flexion position with the leg in a neutral position. In this position, the patient was instructed to exert a force