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Research Article

Reliability of FABER test in correlation with alpha angle in diagnosis of cam type femoroacetabular impingement

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Abstract

Femoroacetabular impingement is a condition characterised by an abnormal contact in between the head of femur and the acetabulum which leads to labral damage and various degrees of chondral injury. The Flexion Abduction External Rotation (FABER) test is a broad provocation test done to detect hip, lumbar or sacroiliac joint pathology. The aim of this study is to assess the reliability of FABER test in diagnosis of cam type femoroacetabular impingement by comparing it with radiological findings.

In this prospective study it was concluded that the FABER test is sensitive and has a significant positive predictive value for the diagnosis of cam type femoroacetabular impingement where as a negative FABER test cannot completely rule out this diagnosis as it has a relatively low specificity.

Keywords: Alpha angle, FABER test, femoroacetabular impingement

INTRODUCTION

Femoroacetabular Impingement (FAI), a term first coined in 1999 by Myers et al [1], is described by an abnormal intracapsular contact between the proximal femur and the acetabulum leading to impaction of the former over the latter during ranges of motion because of morphological changes in either one or both the structures which, over time, leads to failure of labrum, the labro-chondral junction and the adjacent cartilages leading to early osteoarthritis of the hip [2]. FABER test is a commonly utilized provocation test for hip examination particularly for anterior hip and groin pain. This study tests the reliability of FABER test and its correlation with alpha angle calculated on axial views of MRI scan in patients presenting with hip pain to diagnose femoroacetabular impingement.

There are two distinct types of FAI: cam type and pincer type. Cam type impingement is caused by a decreased head and neck offset i.e., a non-spherical femoral head-neck junction in contact with the acetabulum. Pincer type impingement, seen most commonly in middle aged active women, is an increased acetabular coverage. In 70% of the cases, a combination of both the types with a slight predominance of one of them is seen [2]. FAI is a major cause of early osteoarthritis of the hip, especially in young, adult active patients [3,4]. An objective method of diagnosing the cam type of femoroacetabular impingement is the measurement of the head-neck relationship on MR. scans using the alpha angle. The alpha angle of ≥ 55° is suggestive of cam deformity [5,6]. The purpose of this study is to determine the diagnostic accuracy of FABER test and its correlation with alpha angle calculated on axial views of MRI scan in cam type femoroacetabular impingement on the basis of its sensitivity, specificity, positive and negative predictive value.

MATERIAL AND METHOD

This study was a prospective analysis of patients presenting with insidious onset hip pain, clinically tested for FABER test and calculation of alpha angle on axial views of MRI scan of the hip joint. This analysis was commenced after clearance from the Institutional Ethical Committee (IEC). A total of 120 patientsabove eighteen years of age presenting with insidious onset hip pain, especially in the anterior hip joint region and groin pain in the Orthopaedic out-patient department between January 2022 and June 2022 were included in the study after a written informed consent. Clinical assessment recorded on one visit in the out-patient department basis was done by three orthopaedic consultants or trainees, individually to ensure avoidance of any kind of experimenter bias (Fig. 1 & 2).

All these patients then were advised an MRI of the affected hip joint and the alpha angle on the axial views of the hip joint was calculated by two different radiologists who were blinded in such a way that they did not know the clinical findings of the patients being assessed.

Patients with adjuvant comorbidities like sacroiliitis, spondylolisthesis of the lumbar vertebrae, lumbar canal stenosis and prolapsed intervertebral disc or patients with history of trauma, neck of femur fracture, intertrochanteric femur fracture or those who do not give consent were excluded from the study. Statistical analysis: Data collected by each examiner was recorded into the MS-Excel worksheet. The reliability of the clinical test and its correlation with the radiological investigation was tested on the basis of its sensitivity, specificity, positive predictive value and negative predictive value, after condensing all the data in a table 1.

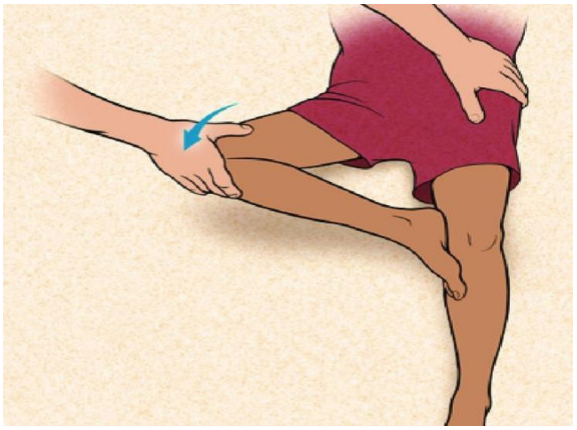

Fig. 1. FABER Test: Flexion Abduction External Rotation

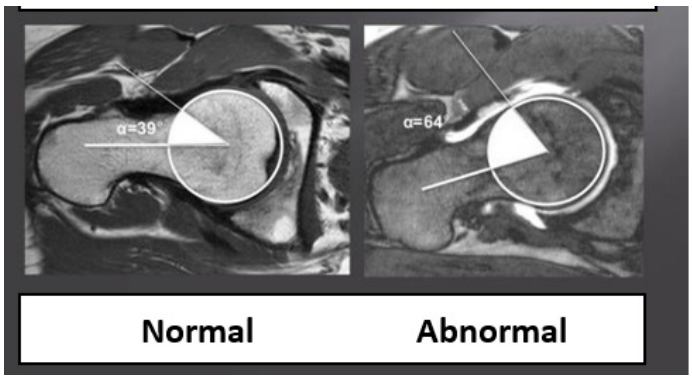

Fig. 2. ALPHA Angle on the axial views of the hip joint

Table 1. Predictive value of positive and negative

		Truth		
		Disease	**Non Disease**	**Total Number**
Test Result	Positive	A	B	T (Test Positive)
	Negative	C	D	T (Test Negative)
		T Disease	T Non Disease	Total

Table 2. FABER test angle

	Alpha angle ≥ 55°	**Alpha angle< 55°**	**TOTAL**
FABER +ve	81	15	96
FABER -ve	6	18	24
TOTAL	87	33	120

Formulae:

Sensitivity: A/(A+C)×100 Specificity: D/(D+B)×100

Positive Predictive Value: A/(A+B)×100

Negative Predictive Value: D/(D+C)×100

RESULTS

The average age of all the patients included in the study was found to be 34.375 years. However out of these, 87 patients gave a history of participation in heavy contact sports like kabaddi, kho-kho, wrestling and football, to name a few. The average age of patients presenting with a history of contact sports was relatively less, that is 29.126 years and the average age of the remaining 33 patients with no history of contact sports, or heavy physical activity was found to be 48.212 years. On clinical assessment, only those who had a positive FABER test recorded by at least two examiners were considered as having a positive FABER test, which was seen in 96 patients, the remaining 24 patients were considered to be FABER negative. An arithmetic mean of the readings of the alpha angle in axial view of the hip joint was calculated as per the readings recorded by the two radiologists and out of a total of 120 patients, 87 had an alpha angle equal to or above 55°. Out of these 87 patients, 6 patients had a negative FABER test.

On plotting this data in table 2, it was found that the sensitivity of FABER test with respect to a positive alpha angle to be 93.10% whereas the specificity was calculated to be 54.55%. FABER test has a positive predictive value of 84.88% while a negative predictive value of 75%.

DISCUSSION

Femoroacetabular impingement is a condition characterized by an abnormal contact in between the head of femur and the acetabulum which leads to labral damage and various degrees of chondral injury.

It is characterized by a repetitive and abnormal contact in between the head of the femur and the acetabular skeletal prominences leading to early degenerative changes in the hip joint [7,8].

In our study we saw that out of 120 patients, around 87 patients had a history of contact sports, and it was observed that the history of heavy physical activity was associated with an early onset of the signs and symptoms of FAI.

The FABER test is the most widely used hip provocation test. The test appears to be nonspecific because the FABER position can cause pain emanating from the sacroiliac joint and lower lumbar facet joints and that's why patients with these concomitant pathologies were excluded from the study [9].

Mitchell et al reviewed the records of 25 patients who underwent hip arthroscopy. Of these 25 patients, 17 patients had a documented FABER test before surgery. Of those 17, 15 patient shad a positive FABER. All 17 of the patients had positive findings on arthroscopy.

Thus, the authors concluded that test was 88% sensitive for identifying patients with a labral tear [10]. At imaging, the abnormal morphology of the anterior femoral head–neck junction is best evaluated on the axial oblique plane. The alpha angle measurement is a commonly used method for this assessment. The alpha angle was first described by Notzli et al in 2002 as an objective tool to evaluate the femoral head–neck junction [2]. Angles greater than 55° were thought to be associated with femoroacetabular impingement, and these higher values are believed to be associated with cam type impingement [2].

According to the analysis of the data it was deduced that a clinical FABER test is highly sensitive at 93.10% in diagnosing a patient with cam type FAI, but has less reliability in ruling out the disease if the FABER test is negative as the specificity is slightly low at 54.55%.

FABER test has produced a high positive predictive value at 84.88% but a negative predictive value of 75% makes it necessary for measures

like MRI of the affected hip joint to calculate the alpha angle in axial view to be undertaken to rule out FAI as the diagnosis.

CONCLUSION

This study shows that a positive FABER test holds a good value in diagnosing a patient with cam type femoroacetabular impingement and can be considered as a sole mode of diagnosing the disease in patients with an insidious onset hip pain where all the other concomitant pathologies have been ruled out, especially in the rural setups where MRI is not readily available so that the disease is picked up in its early stages and the management of the patient can be commenced at the earliest.

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