

ACUTE

ADDUCTOR INJURIES

Clinical Examination





Aspetar Orthopaedic & Sports Medicine Hospital

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Intro

- This protocol is a description of the clinical examination tests included in our research study on acute adductor injuries only.
- All clinical examination tests included bilateral comparison, and were deemed positive only if the athletes recognized their specific acute injury pain.
- When dealing with athletes with groin pain in general, there are other relevant tests to perform.

Figures reproduced with permission from BMJ Publishing Group Limited [Can standardised clinical examination of athletes with acute groin injuries predict the presence and location of MRI findings? Serner et al, Br J Sports Med, Vol. 50(24), 1541-1547 - Appendix 1, Dec 2016].

PAIN PROVOCATION TESTS

ADDUCTOR PALPATION

Adductor palpation

The patient lies supine with the tested leg placed in a relaxed position with the knee on the examiner's thigh. The hip of the tested leg is flexed, slightly abducted and externally rotated. If palpation pain is present, the distance from the pubic insertion is recorded, as well as the length and width of pain.

Adductor Longus

The examiner palpates the adductor longus insertion on the pubic bone just inferior to the pubic tubercle and follows the adductor longus tendon and muscle distally.

Gracilis

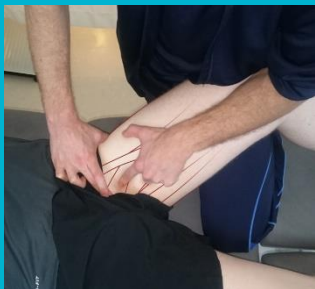
The examiner palpates the gracilis muscle a few cm. distal to the pubic insertion to distinguish the gracilis from the adductor longus. The gracilis is then palpated both proximally to the insertion and distally along the muscle.

Pectineus

The examiner palpates the pubic tubercle and follows the superior pubic ramus a few cm. laterally. Palpation is then performed a few cm. distal from this point within the femoral triangle, lateral to the adductor longus, and medial to the femoral vein, artery and nerve. While the examiner palpates the pectineus with a firm pressure with one hand, the patient is asked to push against the examiner's arm which is placed medially on the knee of the tested leg. The examiner should then be able to feel the pectineus contracting.



Adductor longus palpation



Pectineus palpation



Gracilis palpation



PAIN PROVOCATION TESTS

RESISTANCE TESTS

Squeeze 45°

The patient lies supine. One leg is flexed until the medial malleolus is positioned at the level of the contralateral medial knee joint line. The other leg is then flexed similarly, so both medial malleoli are next to each other and the feet flat on the bed. The hips will then be approximately 45 degrees flexed and the knees approximately 90 degrees flexed. The examiner then positions a clenched fist between the patient's knees, and the patient is asked to squeeze the knees together with maximal force.

Squeeze 0°

The patient lies supine with hips and knees in a neutral position. The examiner stands at the end of the examination bed with the lower arm between the patient's ankles to hold them apart. The patient's feet point straight up, and the patient squeezes the ankles together with maximal force without lifting the legs or pelvis.

Outer-range adduction

The patient lies supine. The examiner moves the leg to the side into maximal abduction, holding it with one hand to ensure the toes point straight up. With the other hand, the contralateral leg is supported to stabilize the testing position. In this position the patient is asked to push the leg in towards the examiners body.



Squeeze 45°



Squeeze 0°



Outer-range adduction



PAIN PROVOCATION TESTS

STRETCH TESTS

Passive adductor stretch

The patient lies supine and the examiner abducts the tested leg, holding it with one hand to ensure the toes point straight up. With the other hand, the contralateral leg is supported to stabilize the testing position. The tested leg is then moved into maximal abduction.

FABER test

The patient lies supine. The hip and knee of the tested leg is flexed, abducted and externally rotated, as the foot of the tested leg is placed on the contralateral thigh just proximal to the knee. While stabilizing the pelvis on the contralateral side, a gentle pressure is applied downwards on the knee of the tested leg.



Passive adductor stretch



FABER test



RANGE OF MOTION TESTS

Hip adductor muscles

Bent Knee Fall Out test (BKFO)

The patient lies supine with app. 90° knee flexion, 45° hip flexion, and the feet together. This is achieved by flexing one leg first, so the medial malleolus is placed next to the medial knee joint line of the contralateral leg, which is then positioned similarly. The patient is instructed to allow their knees to fall outward whilst keeping their feet together. The examiner uses gentle over-pressure to check that the player has relaxed at the limit of movement. The distance between the most distal point on the head of the fibula and the surface of the bed is measured using a rigid tape measure and distance is recorded in cm to the nearest 0.5 cm.

Side-lying hip abduction

The patient is side-lying on the non-tested side with hip and knee of the bottom/non-tested leg in about 90° hip and knee flexion. The height of the bed is adjusted so the hip of the tested leg is at the same height as the tester's hip. The tester stabilizes the participant's pelvis with their own hip, and holds medially on the knee of the tested leg, which is placed in a relaxed knee flexion angle with the examiner's forearm supporting the patient's lower leg. The patient's leg is then abducted towards the ceiling to end of range, maintaining the hip in neutral flexion/extension. The range of motion is measured with a digital inclinometer on the lateral thigh mark of the tested leg. The test is performed twice and the average score recorded.



Bent Knee Fall Out test (BKFO)



Side-lying hip abduction

STRENGTH TESTS

General

The weight (kg) and lever arm (cm) of the patient is measured. The lever arm is measured from the anterior superior iliac spine to 8 cm. proximally from the most prominent point of lateral malleolus, which is marked together with an equivalent point medially on the tibia.

A practice test should be performed for each strength test followed by 3 maximal contractions with a rest of 30s between each repetition. The participant exerts a 3s maximum voluntary isometric contraction against a hand-held dynamometer (HHD) and a break is then performed by the examiner pushing the leg slowly (2s). The standardized instruction for the tests is: “go ahead-push-push-push-push-push” lasting total of 5s. Patients are instructed to push as hard as possible within their comfort zone. If participants cannot perform the test due to pain – 0 N is noted. The highest score is recorded.

Eccentric hip abduction – Side-lying

The patient is side-lying on the side of the non-tested leg with the hip and knee in app. 90° of flexion, resting on the examination bed. The tested leg is held in a neutral position by the tester. The patient is instructed to hold on to the side of the examination bed with one hand for stabilization. The tester applies resistance with the HHD on the lateral fibula mark ensuring the leg is not pushed into the bed.

Eccentric hip adduction – Side-lying

The patient is side-lying on the side of the tested leg with a straight hip and knee. The hip and knee of the non-tested leg are placed in app. 90° flexion with the knee resting on a stack of folded towels to maintain pelvic position. The patient holds on to the side of the bed with one hand for stabilization. The tester lifts the leg off the bed into full adduction and applies resistance to the adducted leg with the HHD on the medial tibia mark ensuring the leg is not pushed into the bed.



Eccentric hip abduction



Eccentric hip adduction

Eccentric hip adduction – Supine

The participants are supine and stabilize themselves by holding onto the sides of the examination bed with their hands and with an added stabilization belt around the pelvis. The non-tested leg is flexed at the knee and hip, placing the sole of the foot flat against the examination bed with the medial malleolus in line with the contralateral knee joint line and with the toes resting at the end of the bed. The tested leg is kept straight at the knee and hip and moved into maximal hip abduction. When maximal hip abduction is reached the tested leg is taken off full stretch towards the midline in order to allow an eccentric break during testing (app. 20 cm). The dynamometer is then placed on the medial tibia mark and the examiner places own elbow on their own ASIS to stabilize their arm while testing and a break is performed by the examiner who pushes own pelvis pushing the leg into further hip abduction.



Eccentric hip adduction

Reproducibility

Methods

An intra- and inter-tester reproducibility study of the hip abduction range of motion and the two eccentric strength tests was performed prior to the study. 21 healthy males (18-40 yrs.) with a physical activity level >2.5 hrs./week were included. Exclusion criteria were: any current hip/groin pain or any other injuries, which could be painful or presumed to influence the execution of the tests, as well as a history of longstanding hip/groin pain (>3 months), which previously have interfered with their physical activity.

One male and one female physiotherapist performed the test with a minimum of 10 min. rest between the test protocols, blinded to each other's results. A practice session with 5 different participants was performed prior to the study to align test technique. The flexibility tests were performed first in order to minimize any warm-up effect from the strength tests. The order of the strength tests and the testers were randomized, and the strength tests were conducted on the dominant leg only, defined as the preferred kicking leg. To determine intra-tester variability, the male tester performed the tests again one week after the first session.

Intraclass correlation coefficients were analysed using a two-way mixed effects model with average measures.

Reproducibility

Results

There was no systematic difference between 1st and 2nd test session on the same day (0.9% to -4.1%, p-values = 0.231-834).

There was no systematic difference between testers for side-lying eccentric hip adduction and abduction strength – side-lying (2.2% & 2.5%, p-values = 0.600, & 0.491).

The male tester had systematically higher results in hip abduction range of motion (6.7%, p=0.034) and in eccentric hip adduction strength supine (9.6%, p=0.010).

Test	ICC	95%CI	SEM	SEM%	MDC	MDC%
Hip abduction range of motion	.88*	.65-.96	3.2	6.7	8.9	18.5
	.84**	.57-.94	4.4	9.2	12.3	25.4
Ecc. adduction strength – Side-lying	.82*	.56-.93	25.2	10.3	69.7	28.5
	.66**	.14-.86	31.8	13.3	88.2	36.9
Ecc. abduction strength – Side-lying	.78*	.45-.91	23.7	12.3	65.6	34.0
	.84**	.60-.93	21.8	11.4	60.4	31.7
Ecc. adduction strength – Supine	.90*	.75-.96	21.1	9.2	58.4	25.6
	.82**	.47-.93	22.5	10.4	62.4	28.9

N=21, ICC = Intraclass coefficient, * = intra-tester, ** = inter-tester, SEM = standard error of the measurement, MDC = minimal detectable change.

Reproducibility of the bent knee fall out test has previously been reported*:

- intra-tester: ICC= 0.90, SEM= 10%

- inter-tester: ICC= 0.92, SEM= 14%





* Malliaras P, Hogan A, Nawrocki A, Crossley K, Schache A. Hip flexibility and strength measures: reliability and association with athletic groin pain. *Br J Sports Med.* 2009;43(10):739-744. doi:10.1136/bjsm.2008.055749.



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