

21 Most Useful Orthopedic Tests



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Ottawa Ankle Rules | Ankle Fracture / X-Ray Indication



Execution:

1. Palpate for tenderness on the posterior edge of the lateral and medial malleoli from the distal tip up 6cm



2. Palpate for tenderness or pain at the 5th metatarsal and navicular bone



3. Ask the patient to walk 4 consecutive steps (limping is permitted)

Positive Outcome: Tenderness on any of the first two steps or the patient is unable to walk four consecutive steps

Study	Reliability	Sn	Sp	LR+	LR-
Bachmann et al. (2003)	NA	97.6	31.5	1.42	0.08

Comment: The OAR are one of the best researched screening tools. However, in the US this screening tool is usually not used due to insurance policies which make x-rays mandatory. The OAR are more sensitive within the first 48h after the trauma



Strong Clinical Value

Benign Paroxysmal Positional Vertigo (BPPV)

Dix-Hallpike Test | Posterior Canal BPPV



Execution:

1. Explain to the patient that his symptoms of vertigo might be reproduced and that he might feel nauseous. Have a bucket at hand in cases it is needed
2. Have the patient sit on the treatment bench in long sit with a pillow on the table to make sure that the patient's neck will come into 20° of extension at step 3
3. The examiner rotates the patient's head 45° towards the side to be tested
4. The patient is instructed to keep his eyes open and the examiner takes the patient backwards in a quick movement so that the patient's neck is still rotated 45° and the neck is brought into 20° extension
5. The patient's eyes are observed for the latency (typically 5-20s), duration and direction of a possible nystagmus. The nystagmus usually fatigues within 60 seconds

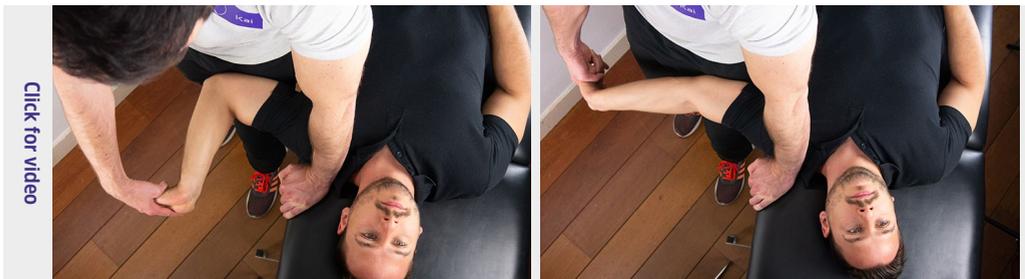
Positive Outcome: The patient experiences vertigo with an upbeat nystagmus towards the affected side in case of posterior BPPV

Study	Reliability	Sn	Sp	LR+	LR-
Bhattacharyya et al. (2017)	NA	NA	NA	NA	NA
Comment: The Dix-Hallpike test is regarded as the gold standard for diagnosing posterior canal BPPV					



Cervical Radicular Pain

Upper Limb Neurodynamic Test 1 / ULNT1 | Median Nerve, Interosseus Nerve, Nerve Roots C5-C7



Execution:

1. Have the patient in supine lying position
2. Depress the patient's shoulder, abduct to 110°, and flex the elbow to 90°
3. Extend the wrist and fingers(including the thumb), supinate the forearm, and externally rotate the shoulder
4. Slowly extend the elbow until the patient complains of familiar symptoms
5. Confirm that the findings are due to nerve stretch by flexing the elbow a little to create slack and ask the patient to laterally flex their neck to the contralateral side, which should increase the symptoms again

Positive Outcome: The patients familiar arm symptoms like shooting pain or paresthesia are reproduced. Some authors score the test negative in case of a marked decrease of mobility (>10°)

Study	Reliability	Sn	Sp	LR+	LR-
Wainner et al. (2003)	Inter-rater $\kappa=0.76$	97	22	1.3	0.12
Apelby-Albrecht et al. (2013):	NA	85	75	3.31	0.23

Comment: A negative ULNT1 considerably decreases the post-test probability and can therefore be used to exclude cervical radicular syndrome



Spurling's Test | Cervical Radicular Syndrome



Execution:

1. Bring your patient's head into extension and lateral bending and assess if symptoms occur distal to the elbow
2. If your patient does not report any symptoms, you can make the test more provocative by adding axial compression

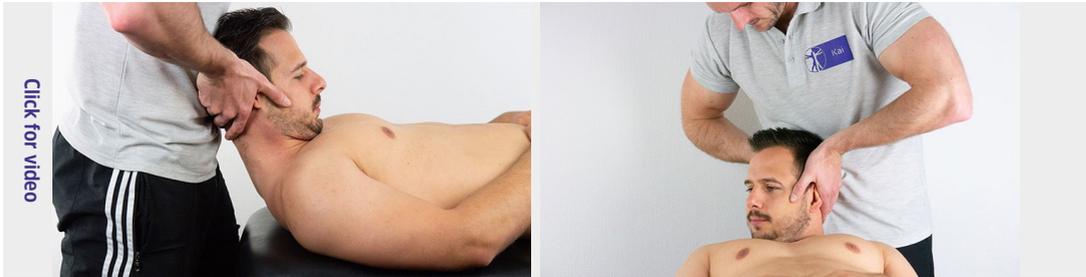
Positive Outcome: Patient experiences familiar shooting pain and/or paresthesia in the arm distal to the elbow in case of cervical radicular syndrome

Study	Reliability	Sn	Sp	LR+	LR-
Wainner et al. (2003): lateral flexion+compr.	Inter-rater $\kappa=0.60$	50	83	3.5	0.58
Shah et al. (2004): lateral flexion+compr.	NA	92	95	18.4	0.08
Comment: Anekstein et al. (2012) have described that the test is best done in extension, lateral flexion towards the affected side and possible overpressure if not provocative already					



Upper Cervical Hypomobility

Flexion Rotation Test



Execution:

1. Patient is in supine lying position with the cervical spine in maximal flexion
2. The examiner passively brings the patient's upper cervical spine into maximal rotation to both sides

Positive Outcome: $\geq 10^\circ$ reduction in passive ROM compared to the healthy average of 44° (so $\leq 34^\circ$ of PROM)

Study	Reliability	Sn	Sp	LR+	LR-
Hall et al. (2010)	Inter-rater $\kappa=0.95-0.97$	NA	NA	NA	NA
Ogince et al. (2007)	Inter-rater $\kappa=0.81$	91	90	9.1	0.1
Hall et al. (2010): Cut-off at 30° of rotation	NA	70	70	2.33	0.42

Comment: This test is excellent to detect a limitation in rotation on C1/C2 in patients with cervicogenic headache compared to healthy participants, while its accuracy is limited to distinguish patients with cervicogenic headache from other forms of headaches



Test Cluster for Subacromial Pain Syndrome (SAPS)



Execution:

1. Perform the Hawkins-Kennedy Test
2. Perform the Neer Test
3. Perform the Painful Arc Sign
4. Perform the Empty Can/Jobe Test
5. Perform resisted external rotation in the zero position

Positive Outcome: 3 or more of 5 positive tests of the above-mentioned

Study	Reliability	Sn	Sp	LR+	LR-
Michener et al. (2009)	NA	75	74	2.93	0.34
Comment: All tests can be found throughout this book. 3 or more positive tests still only slightly alter the post-test probability					

 Weak Clinical Value

Shoulder Instability

Apprehension Test | Anterior Instability



Execution:

1. The patient is in supine lying position
2. The patient's shoulder is brought into 90° of abduction
3. The examiner brings the shoulder into maximal external rotation with caution

Positive Outcome: Patient reports fear of luxation and will not allow the examiner to move further into external rotation

Study	Reliability	Sn	Sp	LR+	LR-
Hegedus et al. (2012)	NA	65.6	95.4	17.21	0.39
Comment: The Apprehension Test can be used to rule in/confirm anterior instability. Biomechanically it makes more sense to horizontally abduct the patient's arm to have the head of the humerus glide anteriorly					



Jerk Test | Posteroinferior Labrum Tear



Execution:

1. The patient is in sitting position and the examiner positions himself behind
2. The examiner stabilizes the scapula with one hand and holds the patient's affected arm at 90° abduction and internal rotation
3. Then the examiner applies a longitudinal force through the humerus at the elbow and moves the arm into horizontal adduction

Positive Outcome: Patient experiences sudden onset of posterior shoulder pain and a click in the shoulder. A painful response is also a predictor of failure for conservative treatment

Study	Reliability	Sn	Sp	LR+	LR-
Kim et al. (2004)	NA	90	85	6	0.12

Comment: The Jerk Test has moderate validity to confirm and good validity to rule out posteroinferior labral lesions. A painful Jerk Test is a predictor of failure of conservative treatment



Posterolateral Rotatory Instability (PLRI) of the Elbow

Lateral Pivot Shift Test / Apprehension Test



Execution:

1. Patient is in supine lying position with the arm to be tested overhead and the examiner stands at the head of the table
2. The patient's elbow is in full extension and gently brought into supination by the examiner at the wrist
3. The examiner then carefully passively flexes the patient's elbow while increasing the supination torque while a valgus torque close to the joint line and axial load along the forearm are added

Positive Outcome: The awake patient shows apprehension at around 20°-40° of elbow flexion or subluxation of head of the radius (dimple in the skin)

Study	Reliability	Sn	Sp	LR+	LR-
Regan et al. (2006) awake	NA	37.5	NA	NA	NA
Regan et al. (2006) anesthetized	NA	100	NA	NA	NA



Epicondylalgia of the Elbow

Cozen's Test | Lateral Epicondylalgia / Tennis Elbow



Execution:

1. Patient is in a comfortable sitting position with the arm on the table, elbow extended (different from the video)
2. The examiner fixates the forearm while palpating the lateral epicondyle with the thumb
3. The patient is then asked to make a fist, pronate the forearm and radially deviate and extend the wrist against the examiner's resistance

Positive Outcome: Sudden pain at the lateral epicondyle is reproduced

Study	Reliability	Sn	Sp	LR+	LR-
MacDermid et al. (2006)	NA	NA	NA	NA	NA

Clinical Prediction Rule of Wainner



The Cluster consists of the following 5 items:

1. **Flick Sign:** Patients report pain/tingling relief by shaking their hand repeatedly
2. **Wrist Ratio Index** > 0.67 (AP/latero-medial diameter of the wrist)
3. **SSS Score** > 1.9 (SSS = Brigham and Women's Hospital Hand Symptom Severity Scale)
4. **Diminished sensation** in the top of the thumb compared to the thenar eminence
5. **Age** >45

Positive Outcome: At least 3 out of 5 positive items from above

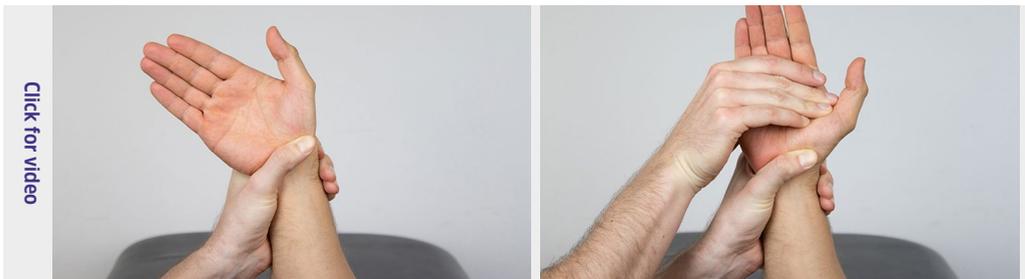
Study	Reliability	Sn	Sp	LR+	LR-
Wainner et al. (2005): 2 or more positive out of 5	NA	98	14	1.1	NA
Wainner et al. (2005): 3 or more positive out of 5	NA	98	54	2.1	NA
Wainner et al. (2005): 4 or more positive out of 5	NA	77	83	4.6	NA
Wainner et al. (2005): 5 positive out of 5	NA	18	99	18.3	NA

Comment: Phalen's Test, Tinel Sign and strength testing of the abductor pollicis brevis were not included in the cluster as their predictive ability was too low. There are no studies that have validated this cluster yet, which is why its clinical value is only moderate



Intercarpal Instability

Watson Test / Scaphoid Shift Test for Scapholunate Instability



Execution:

1. The patient is in sitting position with his elbow resting on the treatment table and facing the examiner
2. The examiner then fixates the patient's radius with one hand and gives pressure into dorsal direction on the palmar prominence of the scaphoid with his thumb
3. With the other hand, the examiner grasps the patient's metacarpals from the ulnar side to control the wrist
4. The examiner brings the wrist from maximal ulnar deviation and slight extension into maximal radial deviation and slight flexion and releases the pressure of his thumb on the scaphoid

Positive Outcome: The scaphoid shifts back ventrally upon the release of the thumb and produces a painful “thunk” sound

Study	Reliability	Sn	Sp	LR+	LR-
Vales et al. (2013)	NA	NA	NA	2.76	0.25
Comment: The Watson or Scaphoid Shift Test seems to be a moderate test to rule out scapholunate instability, while it only has weak clinical value to confirm an SL instability					



Roos Test



Execution:

1. Patient is in sitting or standing position
2. The patient abducts the shoulders to 90°, externally rotates and horizontally abducts the shoulders and flexes the elbow to 90°
3. The patient is then asked to open and close the hands for 3 minutes

Positive Outcome: Patient experiences heaviness, ischemic pain or weakness of the arms or numbness, tingling or discoloration in the hands. (Minor fatigue and distress are not considered as positive signs)

Study	Reliability	Sn	Sp	LR+	LR-
Gillard et al. (2001)	NA	84	30	1.2	0.53
Comment: The test is designed to stress all three intervals, but has a weak validity due to a very low specificity					



Lumbosacral Radicular Syndrome

Straight Leg Raise Test / Lasègue Test | Radicular Pain



Execution:

1. Patient is in supine lying position (without a pillow unlike shown in the video)
2. The examiner passively flexes the patient's hip joint while keeping the knee fully extended until symptoms occur
3. Optional: The examiner can confirm that the symptoms are due to mechanosensitivity of the nervous tissue by slightly reducing the provocative hip flexion and by adding dorsiflexion (Bragard's sign) or neck flexion (Neri sign)

Positive Outcome: Patient reports shooting pain down the leg before 60° of hip flexion

Study	Reliability	Sn	Sp	LR+	LR-
Van der Windt et al. (2010)	NA	92	28	1.28	0.29
Comment: A negative SLR Test can render radicular pain due to a disc hernia with nerve root compression at L4-S1 less likely					



Cluster of Laslett



Execution:

1. Perform the Thigh Thrust and Distraction Test
2. If both are positive → Diagnosis of SIJ Pain
3. Continue if 0 or 1 tests are positive
4. Perform the Compression Test → 2 tests positive? → Diagnosis of SIJ Pain
5. Continue if 0 or 1 tests are positive
6. Perform the Sacral Thrust test

Outcome:

- As soon as any 2 tests are positive → Diagnosis of SIJ Pain
- If 1 out of 4 tests is positive → SIJ Pain unlikely
- If 0 out of 4 tests is positive → Rule Out SIJ Pain

Study	Reliability	Sn	Sp	LR+	LR-
Laslett et al. (2005) for 2/4 positive tests	NA	88	78	4.00	0.16
Comment: The Cluster of Laslett originally contained the Gaenslen Test as well, but it does not provide additional diagnostic value, which is why it is not used in the diagnostic algorithm. The specificity can be increased if there is no symptom centralization as described by McKenzie.					



Femoroacetabular Impingement (FAI) / Labrum Tears

FADDIR (Flexion-Adduction-Internal Rotation) Test



Execution:

4. Patient is in supine lying position with both legs extended and the examiner is standing on the side to be tested
5. The examiner moves the patient's hip into 90° of hip flexion and then adducts and internally rotates the hip maximally

Positive Outcome: Reproduction of the patient's familiar groin pain, which might indicate hip impingement with or without labrum tears

Study	Reliability	Sn	Sp	LR+	LR-
Reiman et al. (2015)	NA	99	5	1.04	0.14
Comment: The FADDIR test is a highly sensitive test suitable to exclude hip impingement with or without labrum tears					



Anterior Cruciate Ligament Injury

Lachman / Richie / Trillat / Lachman-Trillat Test



Execution:

1. Patient is in supine lying position with the leg bent to 30° of flexion and slight external rotation (this position may be supported by the examiner's knee under the patient's knee)
2. The examiner then stabilizes the knee with his contralateral hand on the femur from laterally
3. The examiner's ipsilateral hand grabs on to the posterior part of the patient's tibia from medially and quickly pulls the tibia anteriorly

Positive Outcome: Soft or mushy end-feel or anterior translation on the tested knee is >3mm compared to the other knee

Study	Reliability	Sn	Sp	LR+	LR-
Benjaminse et al. (2006)	NA	85	94	10.2	0.16
Comment: Some authors recommend to first exclude a posterior cruciate ligament tear to avoid false positive results for ACL testing					



Inversion Trauma and Lateral Ankle Sprain

Anterior Drawer Test of the Ankle



Execution:

1. Patient is in supine-lying position with the knee slightly flexed to relax the gastrocnemius and the ankle to be tested hanging over the edge of the bed
2. The examiner grabs the distal tibia close to the joint line from anteriorly and fixates it on the table with the ipsilateral hand
3. The examiner then positions the talocrural joint in 10° of plantar flexion and performs an anterior translation of the talus by pulling on the calcaneus with the contralateral hand

Positive Outcome: Increased anterior translation compared to the other side

Study	Reliability	Sn	Sp	LR+	LR-
<u>Croy et al. (2013):</u> ≥2.3mm displacement	NA	74	38	1.2	0.66
<u>Croy et al. (2013):</u> ≥3.7mm displacement	NA	83	40	1.4	0.41
<u>Van Dijk et al. (1996):</u> Anterior TFL rupture in an acute situation	NA	96	84	6.0	0.05
Comment: While this test seems to be highly accurate in diagnosing an anterior talofibular tear within 5 days after trauma, it performs rather poorly in the diagnosis of chronic ankle instability					

 Strong Clinical Value: Acute

 Weak Clinical Value: Chronic

Achilles Tendon Rupture

Thompson Test



Execution:

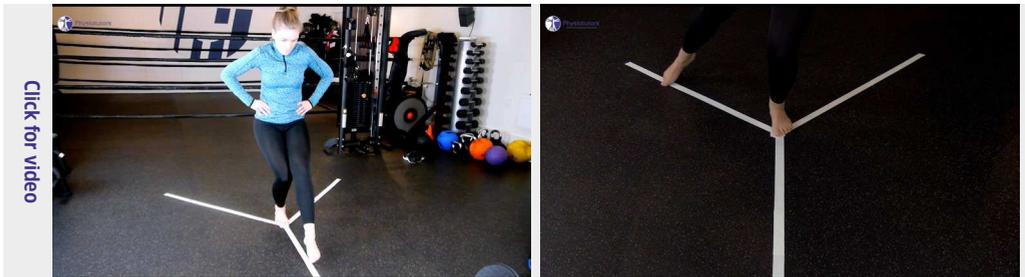
1. Patient is in prone-lying position with the feet hanging freely off the table
2. The examiner squeezes the calf a couple of times and observes the ankle joint to examine if it moves into plantar flexion

Positive Outcome: This test is indicative of an Achilles tendon rupture if the foot is not moving into plantar flexion

Study	Reliability	Sn	Sp	LR+	LR-
Maffuli et al. (1998)	NA	96	93	13.47	0.04



Y-Balance Test



Execution:

1. Place 3 strips of tape on the ground in a Y shape. The angles between the anterior stripe and both posterior stripes are 135° with 90° between both posterior stripes
2. Before starting the test, 4-6 practice trials in each direction are allowed after which your patient can rest for 5 minutes
3. For the anterior reach, the stance foot is placed with the toes on the zero mark position of the anterior reach direction line. For the posteromedial and posterolateral reaches the heel is placed at the zero mark position of the anterior reach direction line
4. To start, have your patient stand barefoot on one limb with his hands on his hips. Then ask him to reach as far as possible on each tape stripe with his foot of the other limb touching the ground only lightly with the toes
5. For the anterior direction 3 consecutive trials are performed with one limb, followed by the other limb. This procedure is repeated for the posteromedial and posterolateral directions
6. The examiner marks the most distal point on the tape with a pen for each trial and each round

N.B. A trial is not considered complete if the participant touches the tape heavily, comes to rest at the midpoint, has to make contact with the ground to maintain balance or shifts the foot of the stance limb during the trial

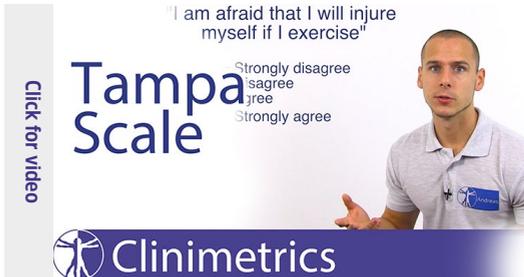
Outcome: The average reach of the 3 trials in each direction are calculated (p.e. direction 1 = (Reach 1 + Reach 2 + Reach 3) / 3). In total 6 values (3 for the right leg and 3 for the left leg) are calculated.

Then the average distance in each direction is calculated and divided through the patient's leg length multiplied by 100. (Average distance in each direction / leg length * 100) for a percentage score.

Study	Reliability	Sn	Sp	LR+	LR-
Plisky et al. (2009)	Intra-rater ICC=0.91 Inter-rater ICC=0.99	NA	NA	NA	NA



Tampa Scale | Kinesiophobia



Execution:

1. [Download the Tampa Scale questionnaire](#)
2. The Tampa Scale is a self-report questionnaire consisting of 17 questions
3. Two factors are identified with Somatic Focus (SF) for questions 3,5,6,7 and 11 and Activity Avoidance (AA) with items 1,2,9,10,13,14,15 and 17
4. For every answer a score from 1 (strongly disagree) to 4 (strongly agree) is given, while the score from questions 4,8,12,16 are inverted
5. A higher score indicates a higher level of fear of movement

Study	Reliability	Sn	Sp	LR+	LR-
Roelofs et al. (2011)	NA	NA	NA	NA	NA
Monticone et al. (2017)	NA	NA	NA	NA	NA
Lamé et al. (2008): Test-retest stability (52 days)	ICC = 0.63				
Vlaeyen et al. (1995)	NA	NA	NA	NA	NA
<p>Comment: In the Dutch population Roelofs et al. (2011) report higher average outcomes in patients with chronic low back pain, followed by upper extremity disorder, fibromyalgia and osteoarthritis. Monticone et al. (2017) report a minimal clinically important difference (MCID) of 6 in patients after lumbar spine fusion during cognitive behavioral rehabilitation. Lamé et al. (2008) report moderate test-retest stability over extended periods in patients with chronic pain. Vlaeyen et al. (2005) report sufficient internal consistency ($\alpha=0.77$) and validity.</p>					



This was only a sample of tests

we commonly use in practice. The entire Assessment Book contains more than 500 pages containing many more tests along with their clinical value.

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