

# 24 Most Useful Orthopedic Tests



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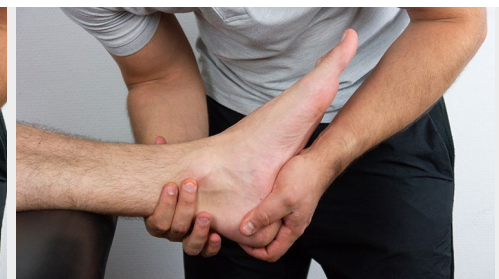


# Ottawa Ankle Rules | Ankle Fracture / X-Ray Indication



## 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-
<a href="#">Bachmann et al. (2003)</a>	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



# 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

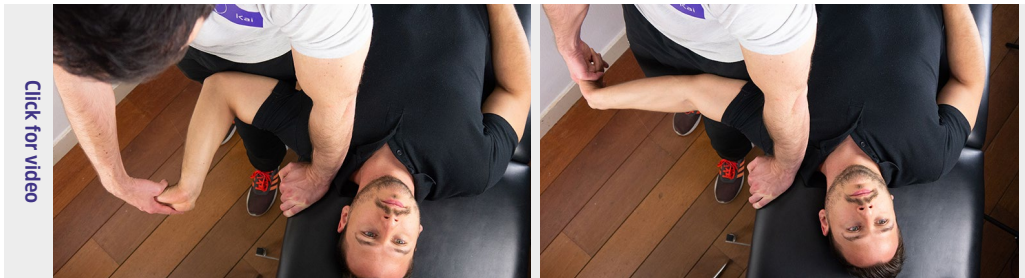
**Positive Outcome:** The patient experiences vertigo with an upbeat nystagmus towards the affected side in case of posterior BPPV

Study	Reliability	Sn	Sp	LR+	LR-
<a href="#">Bhattacharyya et al. (2017)</a>	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-
<a href="#">Wainner et al. (2003)</a>	Inter-rater $\kappa=0.76$	97	22	1.3	0.12
<a href="#">Apelby-Albrecht et al. (2013):</a>	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:

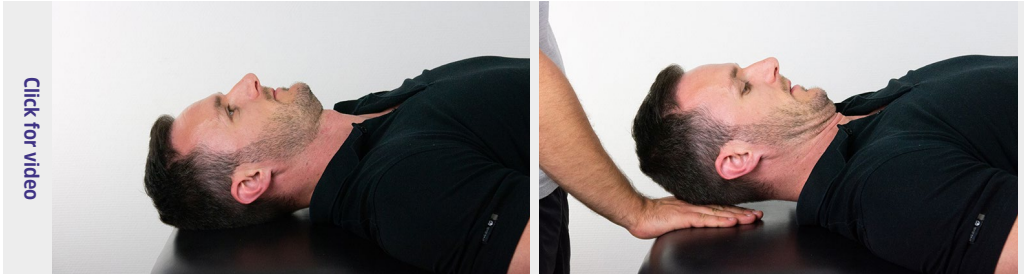
1. Bring your patient's head into extension and lateral bending and assess if symptoms occur distal to the elbow
2. If your patient does not report any symptoms, you can make the test more provocative by adding axial compression

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



# Deep Neck Flexor Endurance Test / Test of Harris



## Execution:

1. Patient is in supine hook lying position
2. Ask the patient to tuck the chin in (rotational axis around the ear)
3. The patient is asked to lift the head and neck until the head is approximately 2cm above the table
4. The examiner stops the test as soon as the patient's skin folds on the anterior side of the neck disappear or as soon as the patient's head touches the examiner's hand for more than 1 second

**Positive Outcome:** There is no cut-off value for a positive or negative test.

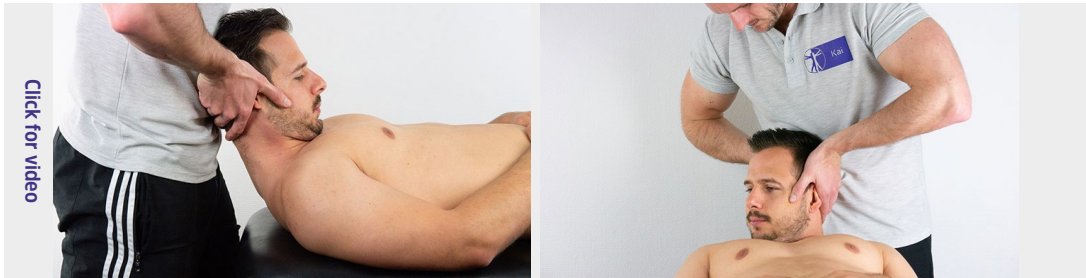
However, Domenech et al. (2011) reported average hold times in healthy subjects of 39s in men and 29s in women (age 20-80)

Study	Reliability	Sn	Sp	LR+	LR-
<a href="#">Domenech et al. (2011)</a>	Inter-rater $\kappa=0.66$	NA	NA	NA	NA



# 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  $44^\circ$  (so  $\leq 34^\circ$  of PROM)

Study	Reliability	Sn	Sp	LR+	LR-
<a href="#">Hall et al. (2010)</a>	Inter-rater $\kappa=0.95-0.97$	NA	NA	NA	NA
<a href="#">Ogince et al. (2007)</a>	Inter-rater $\kappa=0.81$	91	90	9.1	0.1
<a href="#">Hall et al. (2010):</a> Cut-off at $30^\circ$ 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-
<a href="#">Michener et al. (2009)</a>	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-
<a href="#">Hegedus et al. (2012)</a>	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

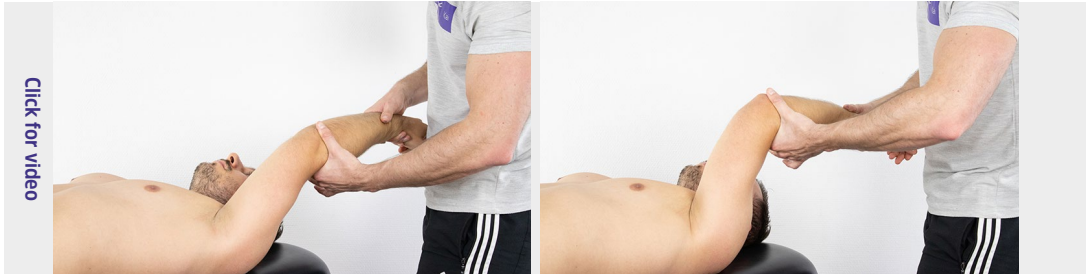
Study	Reliability	Sn	Sp	LR+	LR-
<a href="#">Kim et al. (2004)</a>	NA	90	85	6	0.12

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

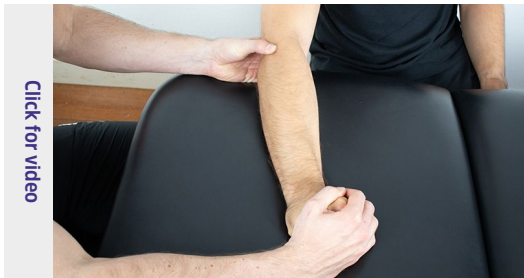
**Positive Outcome:** The awake patient shows apprehension at around 20°-40° of elbow flexion or subluxation of head of the radius (dimple in the skin)

Study	Reliability	Sn	Sp	LR+	LR-
<a href="#">Regan et al. (2006)</a> awake	NA	37.5	NA	NA	NA
<a href="#">Regan et al. (2006)</a> 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-
<a href="#">MacDermid et al. (2006)</a>	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

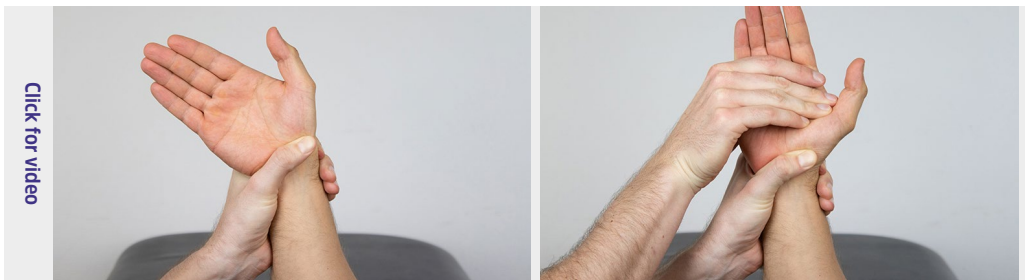
Study	Reliability	Sn	Sp	LR+	LR-
Wainner et al. (2005): 2 or more positive out of 5	NA	98	14	1.1	NA
Wainner et al. (2005): 3 or more positive out of 5	NA	98	54	2.1	NA
Wainner et al. (2005): 4 or more positive out of 5	NA	77	83	4.6	NA
Wainner et al. (2005): 5 positive out of 5	NA	18	99	18.3	NA

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-
<a href="#">Vales et al. (2013)</a>	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-
<a href="#">Gillard et al. (2001)</a>	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-
<a href="#">Van der Windt et al. (2010)</a>	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					



# Prone Knee Bending Test / Reverse Lasègue / Femoral Nerve Test | Radicular Pain



## Execution:

1. Patient is in prone lying position
2. The examiner passively flexes the knee maximally (some authors recommend to hold this position for 45-60s)
3. If unable to flex the knee past 90° or to add further stretch on the femoral nerve, the examiner can extend the hip

**Positive Outcome:** Patient reports shooting pain down the leg upon maximal knee (or added hip) flexion, which is indicative for nerve root compression at L2-L4

Study	Reliability	Sn	Sp	LR+	LR-
<a href="#">Suri et al. (2011)</a> for L2-L4	NA	50	100	∞	0.5
<a href="#">Suri et al. (2011)</a> for L3 only	NA	70	88	5.7	0.34
Comment: This test can be used to make the diagnosis of a higher disc herniation with nerve root compression more 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

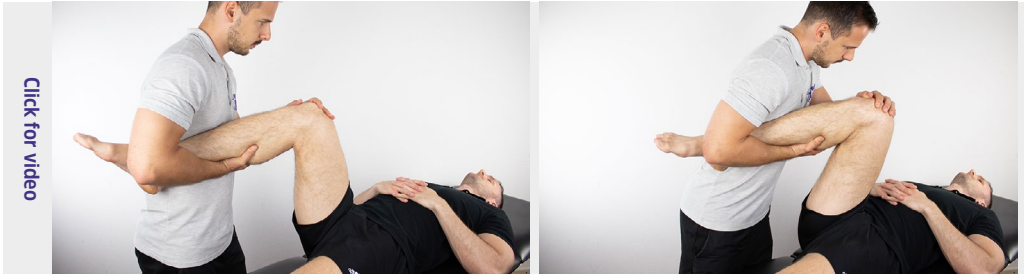
Study	Reliability	Sn	Sp	LR+	LR-
Laslett et al. (2005) for 2/4 positive tests	NA	88	78	4.00	0.16

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-
<a href="#">Reiman et al. (2015)</a>	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-
<a href="#">Benjaminse et al. (2006)</a>	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					



# McMurray Test



## Execution:

1. Patient is in supine lying position with the tested knee fully flexed
2. The examiner rotates the tibia medially and brings the knee into extension. This process is repeated several times with a different angle of knee flexion
3. The examiner then rotates the tibia laterally and repeats the steps from above

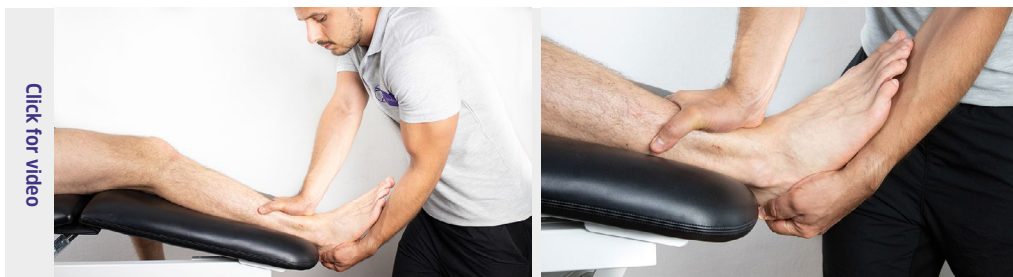
**Positive Outcome:** The patient experiences clicking, locking or pain in the tested knee

Study	Reliability	Sn	Sp	LR+	LR-
<a href="#">Smith et al. (2015)</a>	NA	61	84	3.2	0.52
<a href="#">Hegedus et al. (2007)</a>	NA	71	71	2.44	0.41



# 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

<b>Study</b>	<b>Reliability</b>	<b>Sn</b>	<b>Sp</b>	<b>LR+</b>	<b>LR-</b>
<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:

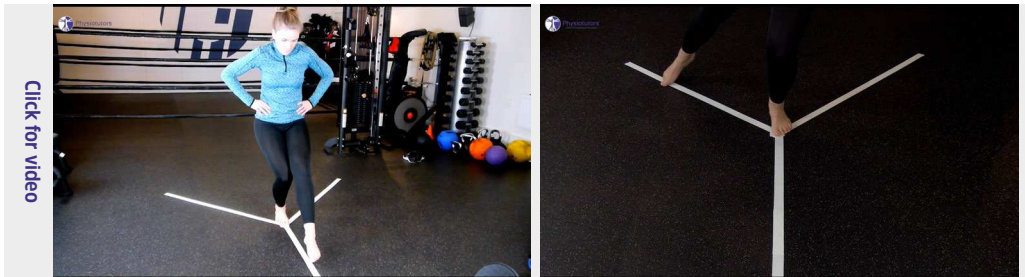
1. Patient is in prone-lying position with the feet hanging freely off the table
2. The examiner squeezes the calf a couple of times and observes the ankle joint to examine if it moves into plantar flexion

**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-
<a href="#">Maffuli et al. (1998)</a>	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  $135^\circ$  with  $90^\circ$  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

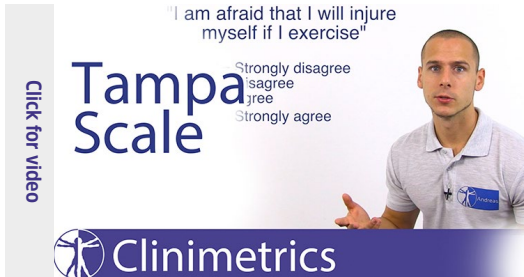
**Outcome:** The average reach of the 3 trials in each direction are calculated (p.e. direction 1 = (Reach 1 + Reach 2 + Reach 3) / 3). In total 6 values (3 for the right leg and 3 for the left leg) are calculated.

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.

<b>Study</b>	<b>Reliability</b>	<b>Sn</b>	<b>Sp</b>	<b>LR+</b>	<b>LR-</b>
<u>Plisky et al. (2009)</u>	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-
<a href="#">Roelofs et al. (2011)</a>	NA	NA	NA	NA	NA
<a href="#">Monticone et al. (2017)</a>	NA	NA	NA	NA	NA
<a href="#">Lamé et al. (2008):</a> Test-retest stability (52 days)	ICC = 0.63				
<a href="#">Vlaeyen et al. (1995)</a>	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 (<math>\alpha=0.77</math>) 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.

If you are interested, you can find the book on our website **by clicking here**



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